Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Guide to editing maps

Geological Survey of Western Australia

Contents

Version	*Date*	*Comments*
1.0	Sept 2015	Revisions by E&P team, Roger Hocking, Angela Riganti
1.1	Jan 2019	Brand revision by Robin Bower, Bec Hitchings, minor updates

Guide to editing maps

Introduction

This map editing guide is to provide editors with the process, principles and tasks involved in editing Geological Survey of Western Australia (GSWA) maps that are plotted for sale to the public, and released as PDFs online. In addition to map-specific editing principles, most elements of GSWA house style, outlined in the GSWA style guides series, also apply. Processes and tasks for editing other forms of maps, such as digital data layers, are outlined in Guide to editing digital products. This guide will be reviewed and updated from time to time to reflect developments in the production of GSWA hardcopy maps. *Red text is hyperlinked to sections within the document and related files or resources.*

How to use this guide

The map edit is carried out in two main stages: 1) pre-assembly; 2) full map edit (see below). A checklist is provided for each stage and it is recommended that the editor tick off the items on the checklists as the edit proceeds. This ensures a complete edit.

Following the checklist for each editing stage are notes, mainly as annotated figures taken from recent series maps. Refer to these notes for examples and explanations of specific editing points to look for, and how parts of the map should be laid out.

Appendix 2 lists various sources of information about current best practice. Refer to this appendix for current map production and editing standards. Some sources, such as the document Geoscientist rulings, are continually updated in-house rulings (in this example, from the Chief Geoscientist), whereas others are unpublished internal manuals, published GSWA Records, or online resources. Appendix 2 may itself be refreshed from time to time as new sources become available.

Types of maps

Broadly speaking, there are three categories of maps: Geological Series, non-series, and data layers of interpreted solid geology or regolith (Table 1). Series and non-series maps are usually plotted for distribution and sale to the public, whereas data layers are prepared for data packages and no plotted map is planned.

The 1:100 000 Geological Series map is the flagship product, and provides the source and model for many other digital and manuscript products. Note that, although this guide draws examples mainly from published 1:100 000 Geological Series maps, the same editorial principles apply to all other GSWA maps, including 1:250 000 Geological Series, updates to regularly published thematic maps, the Resource Potential for Land Use Planning Series, and maps appearing as plates in Reports and Records.

Some map types, such as 1:250 000 Regolith Geochemistry Series and 1:1 000 000 Geological Series maps will probably not be produced in future.

The main components of GSWA 1:100 000-scale maps follow international conventions, and components for 1:250 000-scale maps are very similar to those for 1:100 000 scale. However, non-series maps, which focus on a particular theme or activity, tend to be simpler. For instance, iron ore maps for the Yilgarn or Pilbara regions show only very broadly interpreted geology, lack an Interpreted Bedrock Geology (IBG) inset (since the map face geology is already interpreted bedrock), and are accompanied by minimal marginalia.

The editing process for non-series maps is correspondingly less complex and shorter.

The components and contents of maps are illustrated and discussed in more detail in Best practice. As you are working through this document, refer to the glossary for terms relevant to map editing.

Table 1. Examples of types of maps produced

Series	*Non-series*	*Data layer*
1:100 000 Geological Series 1:250 000 Geological Series	Regularly updated thematic maps (e.g. Major Resource Projects, Iron ore deposits of the Yilgarn Craton, Iron ore deposits of the Pilbara region)	Interpreted bedrock geology digital data layer[1]
Resource Potential for Land Use Planning	Project maps (e.g. plates for Records or Reports) Basic raw materials Geophysical images	Statewide digital geology layers released through the Data and Software Centre (e.g. 1:500 000 interpreted bedrock geology or 1:500 000 tectonic units of Western Australia)

NOTE: 1 May be produced under banner of 1:100 000 or 1:250 000 Geological Series for digital products

Map production and editing process

The map production process describes how geological maps are prepared for publication (Fig. 1). Map production, especially of series maps, is complex, with stages and contributions from a number of key players: the author(s), Project Manager, Chief Geoscientist, Geographical Information Systems (GIS) officer, cartographer (Mapping), geoscience editor, other members of the editorial team, Manager Editing and Publishing (E&P), Manager Mapping, and the Leadership Team all have a role. The editor interacts with all these contributors at some stage, and follows the progress of maps through the production process. Editors should stay in close contact with these key players, and discuss uncertainties with editorial colleagues, Manager E&P, and with the Chief Geoscientist.

The 1:100 000-scale Geological Series maps are constructed from a variety of data sources, such as field observations, geophysical surveys, satellite imagery, and orthophotography. The data are combined in a seamless ESRI ArcGIS database (SDIDIV) to create a 1:100 000-scale interpreted solid geology layer. Regolith information is compiled separately and laid over the solid geology to create a surface geology map. Individual map tiles (for planned hard copy maps) measuring 30 seconds latitude by 30 seconds longitude are derived by clipping data from the seamless database.

The 1:500 000-scale IBG is generated by 'rolling up' the 1:100 000-scale geology and omitting the regolith cover.

Editing a map involves checking all details of the plotted map and checking the map contents against several databases, including the databases from which geological information is derived. It is possible for a cartographer to apply rock code changes in the Explanatory Notes System (ENS) to a map in compilation without those changes being applied retroactively to the source data in SDIDIV. This could result in a mismatch between data in a digital package and codes on the published map. The editor should follow up with the GIS section to ensure that changes recommended during map editing are also applied to the seamless digital layer.

A careful check must be made to ensure that information is displayed correctly for the layer in which it is displayed. For instance, linear features interpreted from aeromagnetic or satellite imagery are symbolized differently in the surface geology (i.e. on the map) than in the ArcGIS interpreted solid geology layer and in the IBG.

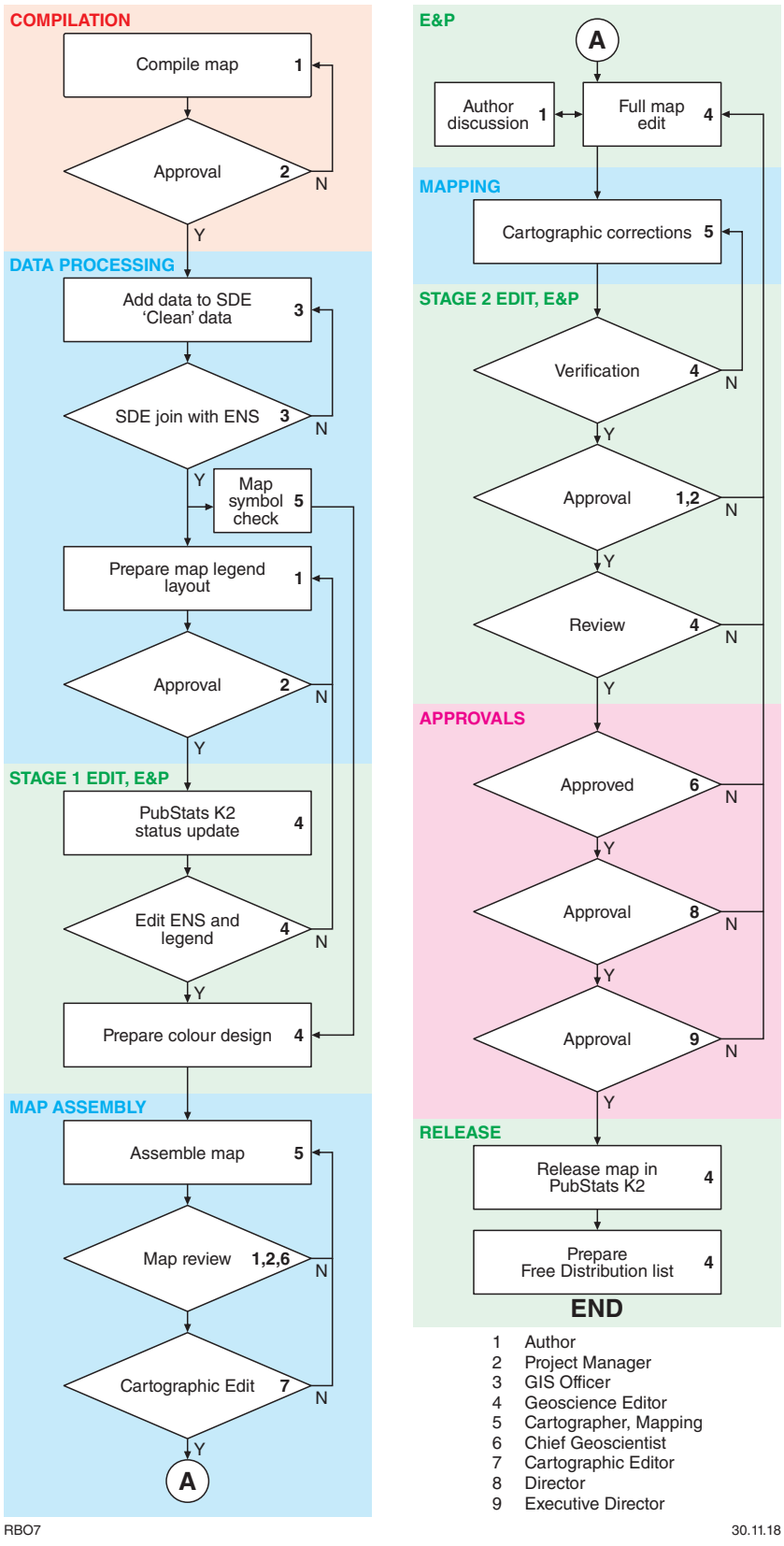


Figure 1. Map production flow chart

Diagrammatic sections are an interpretation of the geology below the surface and can include rock units not mapped in the surface geology. Therefore, they need to be checked against the surface geology, the interpreted geological layers, and the legend.

Several plots at different scales, showing the geology in different guises, are required to carry out a complete edit. Appendix 1 lists the plots an editor will usually request from the cartographer.

Parts of the map

The main parts of a 1:100 000-scale Geological Series map (Fig. 2), in order described in this guide, are:

- title block
- location figures
- reference panel
- data sources panel
- symbols list
- mineral sites panel
- legend
- map face
- IBG
- diagrammatic section(s)
- reliability diagram (not on all maps).

Frames around each part or element of the map in Figure 2 are hyperlinked to sections of this guide that describe editing points particular to that map element.

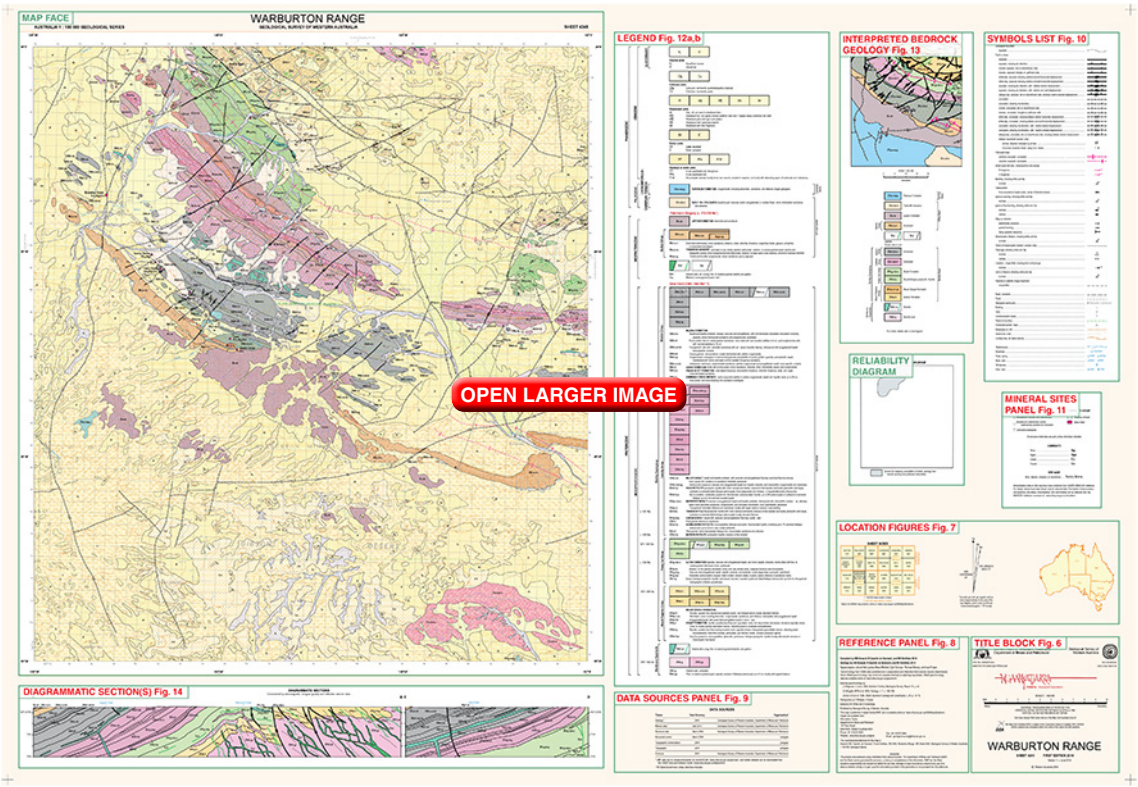


Figure 2. WARBURTON RANGE 1:100 000 Geological Series indicating the main parts of the map; shaded frames are hyperlinked to later sections that describe the editing tasks related to that map element

Editing stages

Edit stage 1, the pre-assembly stage, proceeds in parallel with GIS processing of map data and concerns the draft legend, ENS entries, and the colour design — all of which should be in place by the time Mapping extracts the data from SDIDIV to begin assembling the map in its standard template.

Edit stage 2, the full map edit, includes a review of the legend and colour design, but also considers all other aspects of the map in its publishable format.

Questions about different aspects of the map should be addressed to the relevant parties. For instance, questions about polygon size, rock unit identity, or quality of linework can initially be taken up with GIS. Questions about legend content or layout should first be addressed to the map author(s), and when they are not available, to the Project Manager, Chief Geoscientist or ENS Content Manager. There should be no surprises for the author when the map has been assembled and is returned for approval and sign-off.

Colour design

Colour design is the combination of colours and patterns used to represent rock units on the map. The goal of colour design is to create a distinct and appropriate appearance for every rock unit: an appearance that makes the unit readily distinguishable and visually imparts the most information possible. This is achieved by making sure the map unit colour appropriately reflects either the lithology or stratigraphy (Appendix 3), and hopefully both, and possibly even says something about the rock texture.

Geoscience editors or the cartographic editor may be asked to create or amend colour designs for a map or for a whole project, including for digital packages. Further details for generating colour designs are given in Edit stage 1.

Roles and responsibilities

The editor's role begins soon after delivery of data to the Geoscience and Titles Information Branch (GITB) — typically this means the GIS section — and continues to publication of the map. The editor should ensure that GSWA geological standards and conventions are adhered to, and work in consultation with all participants in the map production process.

Editors may recommend improvements to the way the geology is portrayed on a map, but must not make changes without the approval of the map author or Project Manager. For instance, the editor may advise where mapped stratigraphic relationships appear to be inconsistent with the legend, but may not reinterpret the geology, change the content or meaning of map legend narratives (other than amending the syntax to conform to house style), or alter the presentation or values of structural data.

As soon as the editor is informed that the map has been passed to GIS or Mapping for assembly and production, PubStats K2 should be updated, and should be kept up to date during passage of the map through GITB. The map will circulate, and bounce back and forth, between the various contributors. It is the map editor's job, as far as possible, to keep the product on track for publication by the agreed date.

The organization of the **map editing checklists** reflects the fact that parts of the map require editorial input at different times. For instance, before the map is assembled, the editor will review the relevant entries in ENS and edit the legend content and layout. The map sheet colour design will usually be based on an existing project-scale colour design, so this process can also be started early.

After the map has been assembled (stage 2), using ArcGIS data 'cleaned up' by the GIS section and the legend and colour design from the editor, the Mapping section sends the map to the Project Manager and Chief Geoscientist for review. The full edit (stage 2) only begins after the Chief Geoscientist is satisfied with the geological content of the map.

Edit stage 1 (pre-assembly)

Edit stage 1 focuses on a review of ENS entries relevant to the map being edited, the draft legend layout, and the colour design. Relevant references and sources of information are given in Appendix 2 — Reference material.

Detailed specifications for construction of a legend are maintained by Mapping (Section6_StandardsAndSpecifications, p. 8–10). The cartographer applies the specifications to the final legend during map assembly, and the editor verifies during Edit stage 2 that the specifications have been correctly applied.

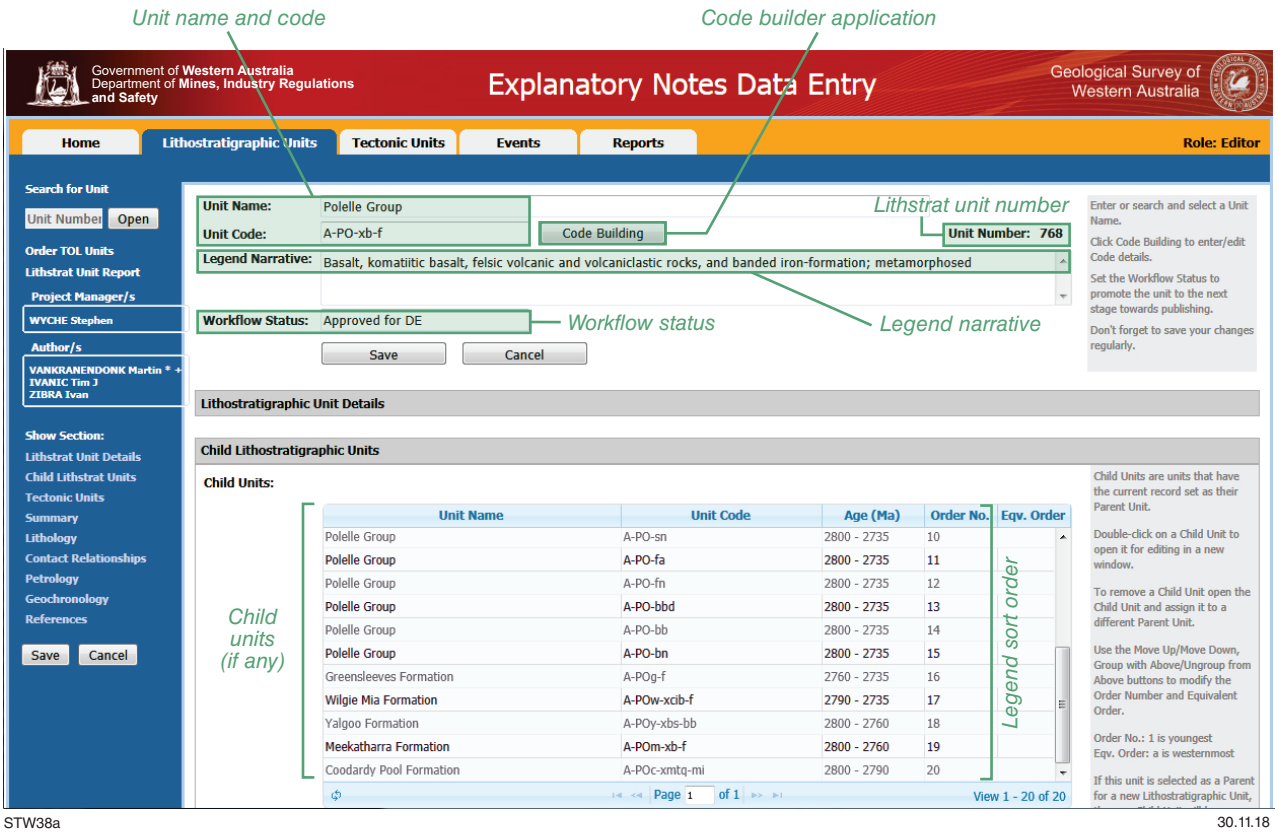
Checklist

The editor should use the Edit stage 1 — checklist provided to track the progress of editing tasks.

Notes

Explanatory Notes System

ENS (Fig. 3) is the primary 'point of truth' for information about rock units included on maps, in data packages, and described in publications. ENS is similarly the basis for the content of lookup tables (lut) prepared for geological units in GIS data packages, of which series maps form an integral part.



STW38a 30.11.18

Figure 3. ENS data entry form for a lithostratigraphic (lithstrat) unit. Key features for editors are unit name and code, legend narrative, and sort order of child units (if any)

ENS entries are edited independently from the map production process (see Style sheet for writing and editing GSWA Explanatory Notes), but the content of ENS is relevant to map editing because:

1. all lithological and geochronological information portrayed in maps must be in ENS before the map is assembled
2. if the geologist has changed the interpretation of the geology during map compilation, but not changed ENS, the editor should alert the geologist and the ENS administrator.

During the legend edit, it is necessary to check the following against ENS:

- parent–child relationships are shown correctly, both by arrangement of legend boxes and by the hierarchy of legend narratives
- correct geochronology information is shown
- rock units are assigned to their correct tectonic units
- the tectonic units field is completed in ENS for all rock units included on the map, and tectonic units are correctly bracketed against rock units
- deformation events are correctly named and positioned, with correct date(s).

Legend

The map legend shows the geological relationship of rock units to each other, and the colour design representing each geological unit. It also gives the geological code for each rock unit and its narrative. The legend reflects the latest geological interpretation of the area at the time map data are delivered to the GIS section.

The map author (geologist) prepares a draft legend using an MS Excel template copied from the 'Colour designs and legends' folder of the E&P project resources space. The draft legend spreadsheet should be saved as an author OurDocs file, and revisions by the author or editor made in subsequent worksheets.

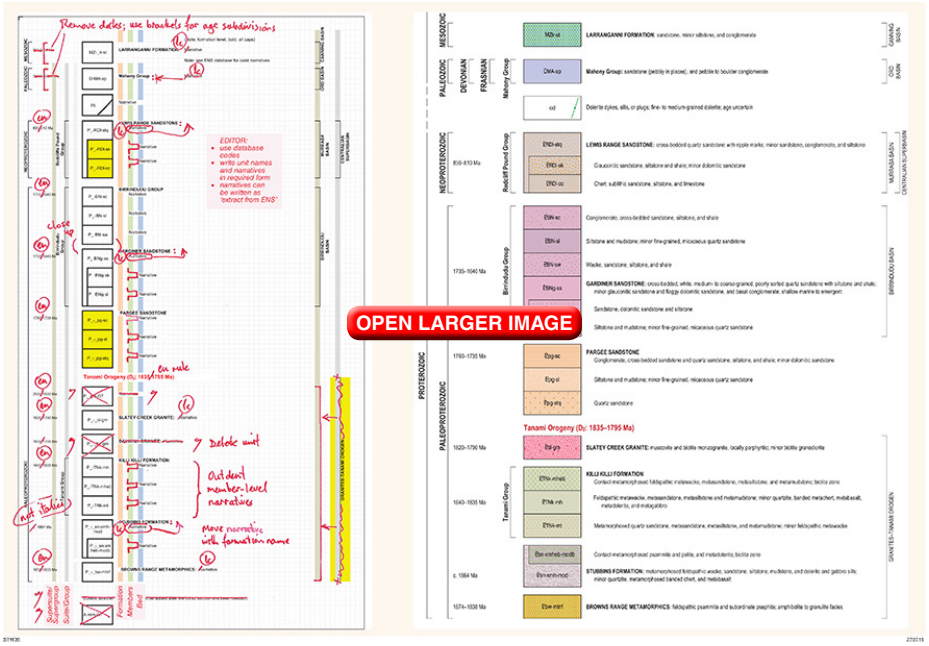
The template spreadsheet provides building block shapes — somewhat like Lego tiles — to organize rock units on the basis of lithological, chronostratigraphic and parent–child relationships. The number and identity of rock codes in the legend must be based on a summary, provided by the geologist or by GIS, of all rock units associated with the map — on the map face, in the cross-section and in the IBG.

If not already provided, at this stage the editor should request a copy of the rock unit summary directly from the GIS officer assigned to the map project. This is a reference against which to evaluate the content of the legend.

Edit stage 1 concentrates on the structure of the legend and the graphical depiction of the geological relationships of rock units to each other. There are two distinct parts to a 1:100 000 Geological Series legend: bedrock and regolith. The principles for arranging these follow different guidelines.

Bedrock

The ENS data entry form is the primary reference for legend attributes of bedrock units). Essential points to check (Fig. 4) are the arrangement of legend boxes, the limits of age, stratigraphic and tectonic brackets, the hierarchy of stratigraphic and tectonic units, and the hierarchy of the legend narratives, based on parent–child relationships in ENS. Also check ENS to ensure that cited dates are isotopic, not inferred or biostratigraphic.



NOTES: 1) this example is marked up by hand, but electronic mark-ups are equally acceptable
2) columns are coloured to indicate alignment of narratives with the same lithostratigraphic rank, and rows are coloured to align age or tectonic brackets with their rock units

Figure 4. Annotated example of the draft legend for bedrock units on Slatey Creek, 2014, 1:100 000 Geological Series, indicating points that needed to be checked, appropriate mark-up symbols, and features where errors commonly occur. For comparison, the final bedrock geology legend is shown on the right

Full rock unit narratives are not usually included in the draft legend, but formal unit names must be supplied by the geologist. Narratives are extracted from ENS by the cartographer during map assembly and reviewed by the editor during Edit stage 2.

Common errors and problems

- Incorrect graphical representation of parent–child relationships
- Coeval intrusive and lithostratigraphic units not correctly aligned
- Mix of map and database codes — use only database codes in the draft legend
- Codes do not correspond to the intended rock units or narratives in ENS
- Narratives not correctly aligned to reflect parent–child relationships
- Formal rock unit names missing
- Isotopic dates missing or not aligned with correct rock unit (cf. ENS)
- Tectonic unit brackets do not embrace correct rock units
- Time scale brackets do not embrace correct rock units
- Tectonic events in wrong place, or missing
- Other points itemized in Edit stage 1 — checklist.

Some errors or oversights may arise from late changes in SDI — possibly because of work continuing on adjacent regions of the seamless interpreted bedrock database, or changes to ENS.

Other points to note:

- Some rock units in the main 1:100 000 legend may be in the diagrammatic section only, which is not available at this stage, or concealed by regolith. A check during Edit stage 2 will show which units this applies to, in which case a statement 'section only' is added (in parentheses) to the unit narrative.
- Line units representing intrusive igneous units have a dot added to the line symbol. Dots are not added to line units representing thin sedimentary or extrusive igneous (volcanic) units, nor to line units with metamorphic rock codes, even if derived from intrusive igneous protoliths.
- Legend narratives in ENS may be edited during the legend layout check, but only after consultation with the map author or WA Geology Online database administrator.

Regolith

Regolith units are not included in ENS. GSWA Record 2013/7 explains how to interpret and construct regolith codes. The document Geoscientist rulings provides guidelines for the sorting and layout of regolith units. The general order for regolith units from top to bottom of this part of the legend (Fig. 5) is CWALESR — **C**olluvial, (Sheet)**w**ash, **A**lluvial, **L**acustrine, **E**olian, **S**andplain, **R**esidual or **R**elict. Not all types of regolith feature in all maps.

Regolith units are grouped by landform type and by degree of consolidation (Fig. 5). If consolidation is known, this is indicated by adding a number to the landform code: 1 – unconsolidated; 2 – partly consolidated; 3 – consolidated (e.g. C1, A1, C2, W3). No number is added if the consolidation is unknown. All units numbered '1' are grouped together, above all units numbered '2', and so forth. Within these groupings, the CWALESR order still applies.

'Undivided' or 'unassigned' regolith units, with no number, are usually placed above all units for which consolidation is indicated by numbering, and the landform heading is followed by 'age undivided or unassigned' (Fig. 5).

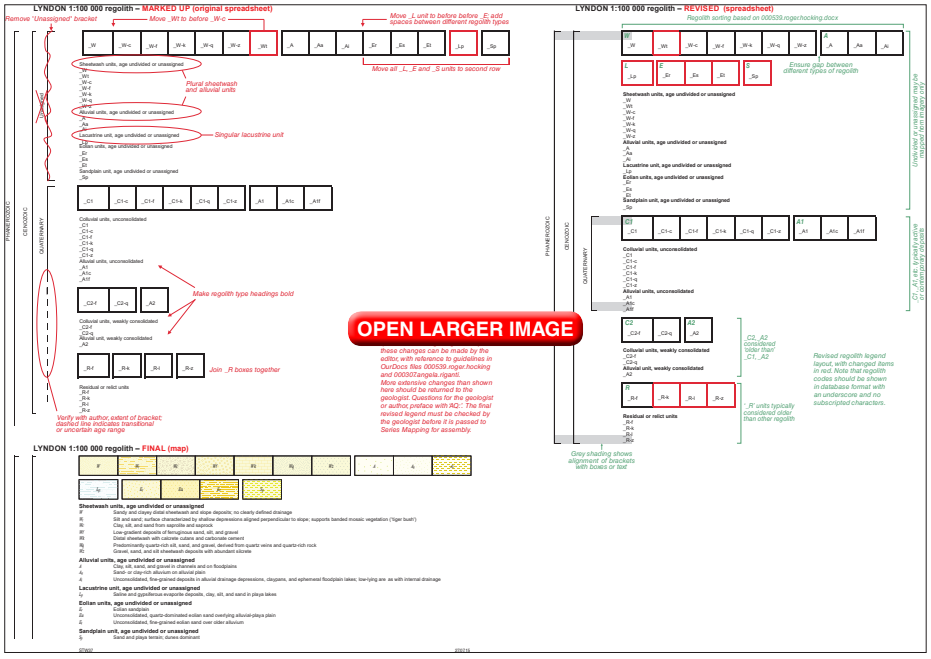
If unnumbered regolith units only are shown in a legend (i.e. there are no C1, A1, C2 or other numbered regolith units), the phrase 'age undivided or unassigned' may be omitted. If in doubt, consult the Chief Geoscientist for guidance.

R units are generally placed below all other regolith types. In some regions, mappable Cenozoic units have been named and their ages determined, and these are slotted in between other regolith groups as appropriate.

Coastal regolith or other late Cenozoic – Quaternary sediments designated beach (B), tidal (T), and marine (M) should be placed in their correct chronostratigraphic position, if known, and listed below sandplain but above relict/residual units; i.e. the modified order of regolith units becomes CWALESBTMR.

Common errors and problems

- Incorrect order of regolith units (cf. lookup table)
- Mix of map and database codes — use only database codes in the draft legend
- Incorrect use of hyphens to demarcate subscript qualifiers from other code characters
- Wrong style and format for regolith–landform headings
- Incorrect placement of 1st, 2nd and 3rd ranked codes relative to R codes and named Cenozoic units
- Wrong use of age brackets.



NOTE: This example is marked up electronically in the spreadsheet, but draft legends may also be marked up by hand

Figure 5. Annotated example of the draft legend for regolith units on LYNDON, 2014: 1:100 000 Geological Series: a) original spreadsheet marked up with changes required to meet criteria of the document Geoscientist rulings; b) revised spreadsheet with notes explaining various conventions; c) part of final published legend for comparison

Colour design

Colour designs are created in, or uploaded to, the MapSym_System2003 MS Access database. The 'General Inquiries' form of the database can be accessed by all editors, cartographers, and other staff. Administrator rights, granted by the Manager Spatial Systems, allow an editor to open the 'Mapping Editor' form of the database, and to create, modify, and delete unit colour designs.

Colour design comprises two parts: a base colour and a pattern. When entering colour designs in the MapSym database, or communicating colour designs to the Mapping section, colours are referred to by their Pantone Matching System (PMS) code (p123, p335, etc.; Appendix 3). Base colour is primarily chosen according to the following:

- precedents set by colour designs used in earlier editions of the in prep. geological map(s) (typically based on lithology and age as described below)
- precedents set by adjoining or nearby maps covering the same geological province
- lithology — e.g. granitic rock (pink/red), mafic intrusive rock (green), metasedimentary unit (grey or brown)
- age — especially for Phanerozoic rock units and sedimentary units with formal stratigraphic names, according to the Australian standard colour scheme (Appendix 3).

A standard set of line, dot and other patterns is maintained by Mapping (Appendix 3). With one exception, the pattern colour is at 100% tint density of the selected PMS colour, and:

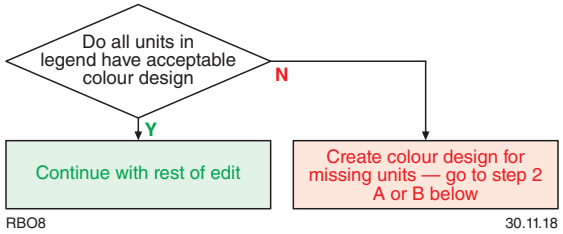
- is typically the same as the base colour if it is mainly being used to represent a characteristic feature of the unit, such as texture
- is commonly determined by the lithology of a secondary rock type in a lithologically mixed unit
- may be the same as the base colour of the parent unit in the case where a different base colour is used for a distinctive, mappable lithology (e.g. mafic subunits of a predominantly granitic suite or supersuite)
- where practicable, the overprint pattern is selected to represent lithological or textural features of the rock
- by exception, a dark grey custom colour called blkop (black overprint), equivalent to 80% black, is used for patterns, rather than 100% black.

Editing colour designs

Follow precedents set by maps or digital layers previously released for the region. If no 1:100 000 map precedent exists, the colour design for high-level rock units of the same group, suite or formation in the 1:500 000 interpreted bedrock units of Western Australia may serve as a suitable guide.

The approach to editing colour design depends on the status of colour design for the current project in MapSym.

Step 1: What is the status of the colour design?



Step 2: Units missing colour design

A) Colour design exists for previous year — update previous colour design

i. Create new project folder for current financial year in the 'Colour designs and legends' space (V:\GS80_PublicationServices\ProjectResources\Colour designs and legends)

ii. Open the MapSym database and extract the previous colour design for this project as an Excel file (General Inquiries ➔ Extract to Excel MAP — it will be extracted as a Microsoft Office 2003, *.xls file)

iii. Save in the 'Colour designs and legends' folder with the extract date in the file name

iv. Add new units as new rows using the legend arrangement (based on ENS or a LUT) to decide where in the list the new units fit. *NOTE*: to facilitate later checks, it is best to sort unit colour designs in the same order as the legend (and ENS)

   - Enter new codes in ENGUNIT (database code) and UNIT (map code) fields
   - Create colour designs for the new units (see notes above)
   - Test each proposed colour design in the MapSym database to ensure that it does not duplicate an existing colour design for a different code and unit

v. When all codes have been added to the spreadsheet, open the 'bulk_colour_template.xls' spreadsheet from the 'Colour designs and legends' folder — *do not make any changes to the format of this file*
    - Clear the contents of all cells but NOT the headings row
    - Carefully copy the map codes, database (English) codes, and the new colour design parameters to the UNIT, ENGUNIT, and the colour and pattern columns, respectively, of this spreadsheet — use the 'Copy values' option to avoid introducing unwanted formatting
    - Choose a MAP NAME (e.g. Murchison_2014_15) and MAP NUMBER (e.g. GS58_2014_15) suitable for the project. The map number must be unique; if a map number is used that is already assigned to a colour design in MapSym, the new colour design will not be recognized when it is uploaded. A combination of cost centre code for the project plus financial year is usually a good option

vi. When everything seems to be in order, save this newly populated template spreadsheet in the project subfolder of Colour designs and legends
    - DO NOT OVERWRITE THE ORIGINAL TEMPLATE SPREADSHEET
    - Keep the same file name — bulk_colour_template.xls — as this is the only file name that MapSym will recognize during upload

vii. Open the Mapping Editor form of MapSym and select 'Import C/D'

viii. Browse to the new colour design spreadsheet just created and follow the prompts.

A successful upload will add the new colour design to MapSym. Test this by returning to the General Inquiries form and searching for the new colour design. If all is well, notify the Mapping section and the other editors that a new colour design has been added to the MapSym database.

B) No previous colour design (entirely new map or project)

In the less common instance that an entirely new colour design is required — e.g. for a non-series map or special project — the editor may have to generate a draft colour design spreadsheet from scratch. This draft spreadsheet can conveniently be based on a **copy** of the 'bulk_colour_template.xls' used for upload into MapSym.

i. Create new project folder in the 'Colour designs and legends' location (V:\GS80_PublicationServices\ProjectResources\Colour designs and legends)

ii. Open the 'bulk_colour_template.xls' spreadsheet from the 'Colour designs and legends' folder — you will add rows to the spreadsheet but *do not make any changes to the format of this file*

iii. Save this spreadsheet as an *.xls file with a suitable name in the project subfolder of 'Colour designs and legends' — DO NOT OVERWRITE THE ORIGINAL TEMPLATE SPREADSHEET. This becomes the draft colour design for the new project

iv. Add new units as new rows using the legend arrangement. *NOTE*: to facilitate later checks, it is best to sort unit colour designs in the same order as the legend (and ENS or a LUT)
    - Enter new codes in ENGUNIT (database code) and UNIT (map code) fields
    - Create colour designs for the new units (see notes above)
    - Test each proposed colour design in the MapSym database to ensure that it does not duplicate an existing colour design for a different code and unit

- Choose a MAP NAME (e.g. Murchison_2014_15) and MAP NUMBER (e.g. GS58_2014_15) suitable for the project. The map number must be unique (see point v) in A) above)
- Copy MAP NAME and MAP NUMBER entries for the full length of their respective columns to match the number of rows with rock unit codes

v. Open the Mapping Editor form of MapSym and select 'Import C/D'

vi. Browse to the new colour design spreadsheet just saved and follow the prompts.

A successful upload will add the new colour design to MapSym. Test this by returning to the General Inquiries form and searching for the new colour design. If all is well, notify the Mapping section and the other editors that a new colour design has been added to the MapSym database.

Edit stage 2 (full map edit)

All assembled maps arriving in E&P for a full edit should have been reviewed and approved by the geologist (map author), Project Manager and Chief Geoscientist. The scientific content should have been agreed on. Ensure that at least one plot of the map bears signatures from the Project Manager and Chief Geoscientist attesting to this. Comments in Pubstats K2 serve the same purpose.

Editing should not start until the task has been allocated to the editor in Pubstats K2.

Resources

Editors request from the cartographer all the plots required to carry out the edit. Minimum resources for editing the plotted colour maps are given in Appendix 1, a copy of which can be ticked off for the cartographer to supply. A list of databases and other reference sources is given in Appendix 2.

Best practice

Use the checklist provided to tick off each item as it is completed. It is not necessary to follow the order of this list exactly, but all items should be considered when editing 1:100 000 or 1:250 000 maps. Some items are not relevant to project maps, which include plates for a GSWA Record, Report or Bulletin.

At this stage, the legend and colour design should be close to finalized and should not need to be edited in as much detail as during Edit stage 1. However, it is often the case that changes made to the seamless SDIDIV database can impact the content of the map, even if those changes are outside the boundary of the map being edited. Therefore, both the legend and the colour design must be reviewed with reference to ENS, the draft legend (Excel template), and the MapSym colour design database.

Report possible errors or differences between the content or layout of the legend to the map author, or to the Project Manager or Chief Geoscientist if the author is not available.

Take care when comparing a new map sheet against previously published maps, even from the same region, because the geological interpretation may have changed, or published maps may still have errors! Conversely, check with authors that their interpretation takes into account recently released maps, or includes relevant information from non-series maps, such as plates in Bulletins (this applies particularly for maps that are compiled primarily from existing sources with minimal fieldwork component).

Checklist

The editor should use the Edit stage 2 — checklist provided to track the progress of editing tasks.

Notes

Following are annotated examples drawn from Geological Series maps, indicating points that need to be checked for each map, and features where errors commonly creep in.

Marginalia

Title block

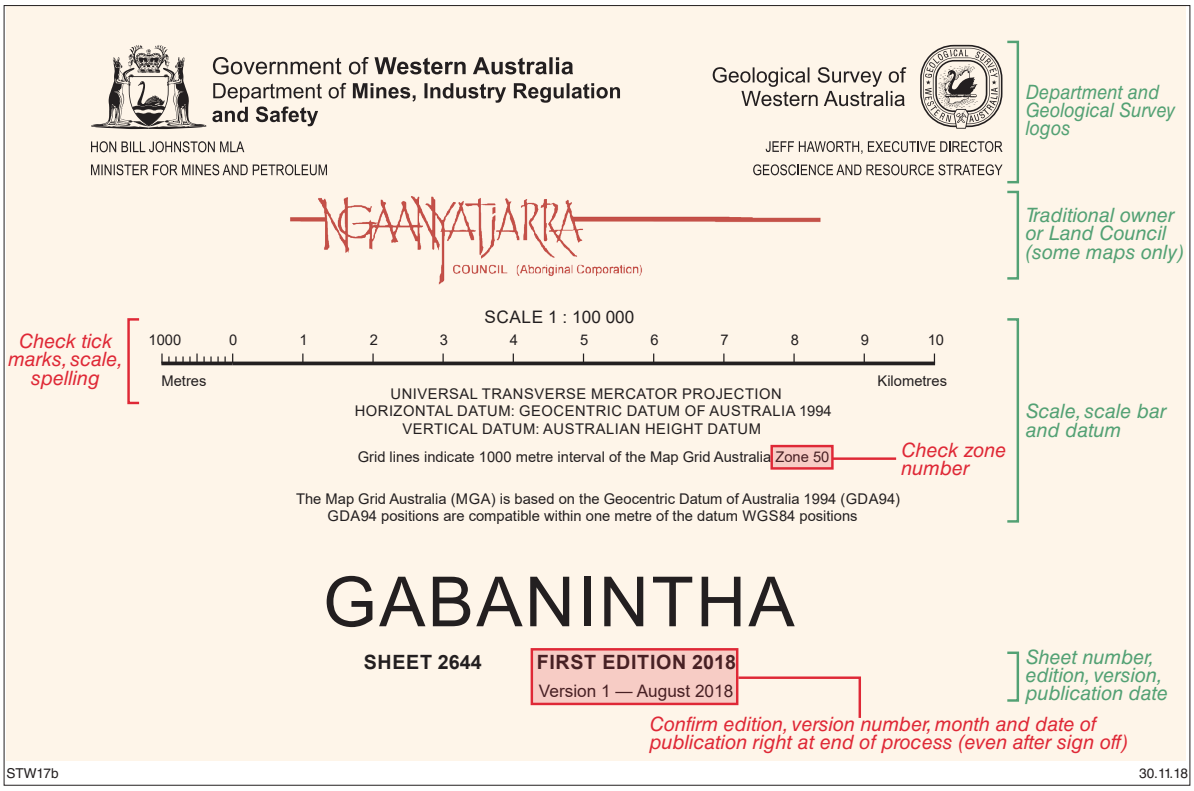


Figure 6. Title block for a recent map

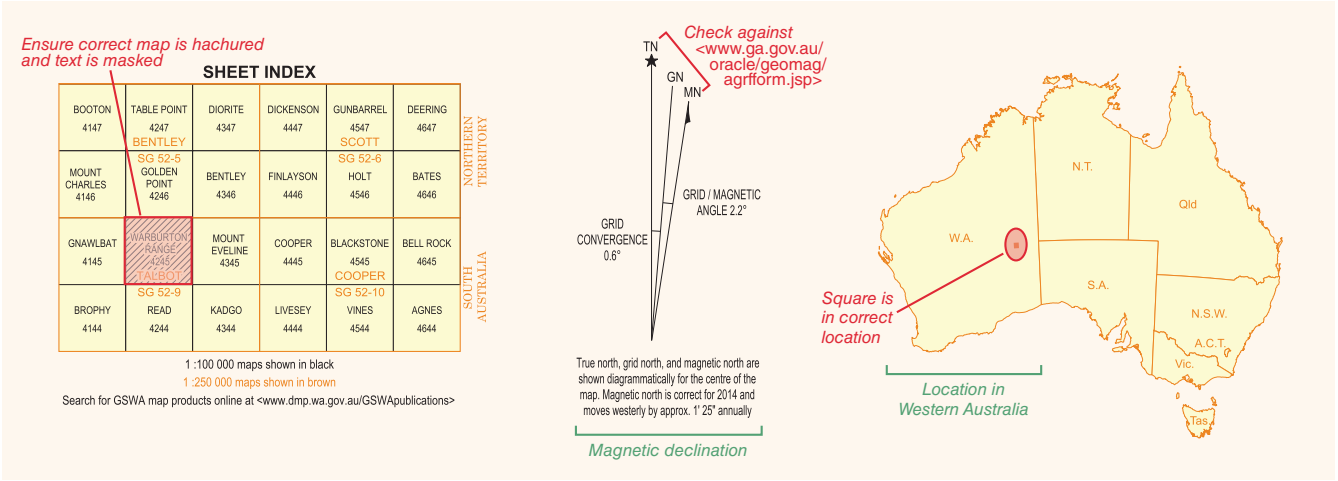
Points to look for include:

- correct edition and version number
- date is anticipated month and year of release
- grid zone number is correct
- graphical scale is correctly drawn
- requirement for logo, such as EIS or traditional owner.

Location figures

Points to look for include:

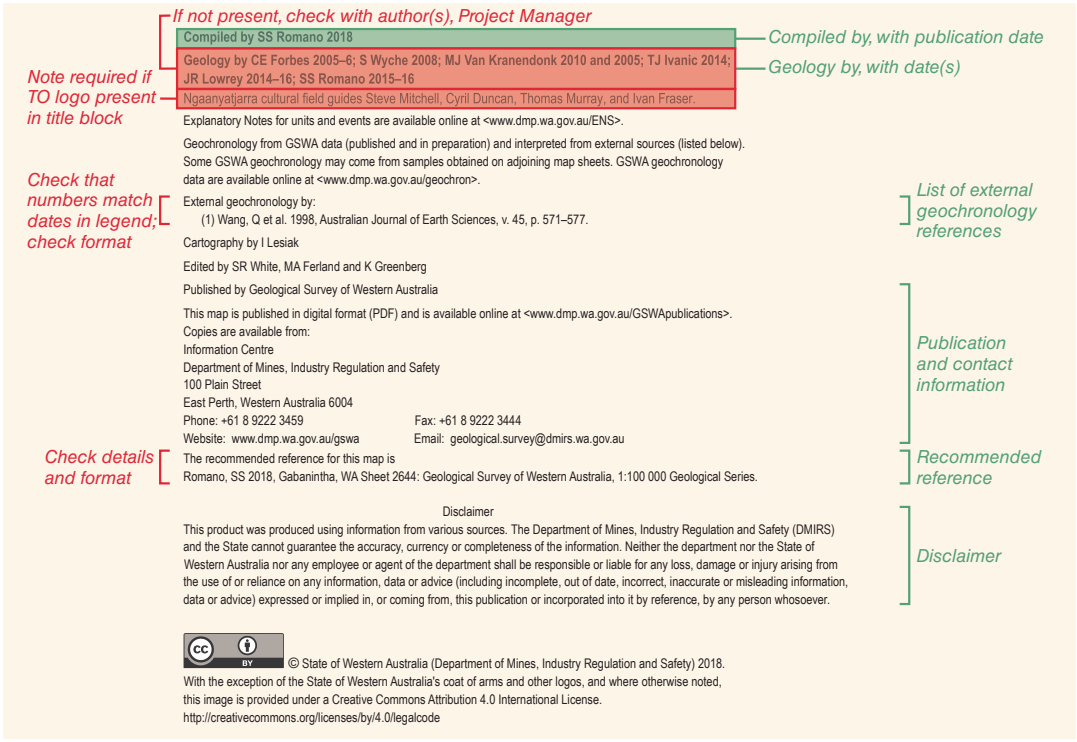
- map is correctly located in Western Australia
- magnetic declination and variance is correct.



STW21a 23.12.14

Figure 7. Location figures for Warburton Range

Reference panel



STW30a 30.11.18

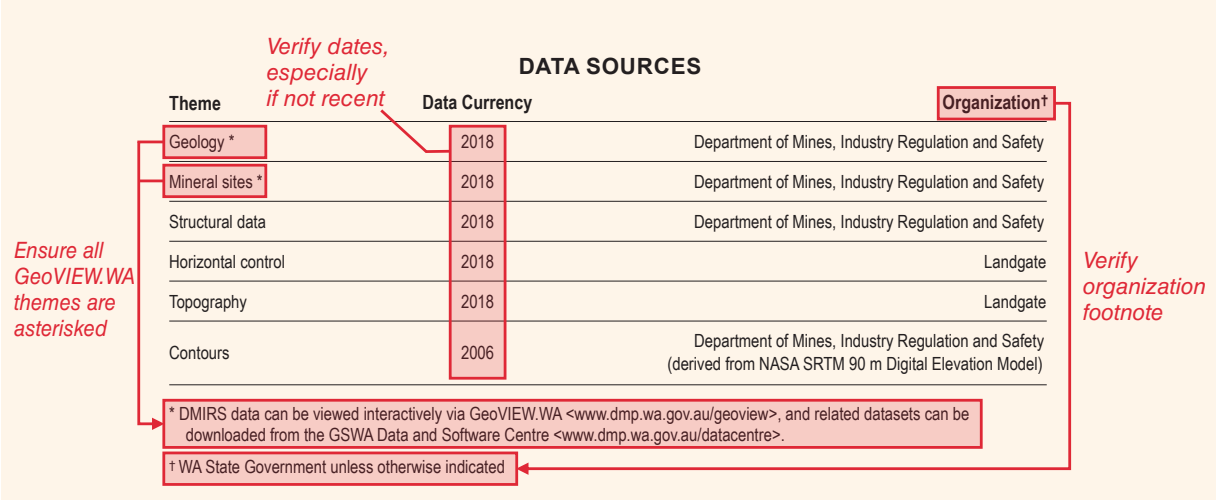
Figure 8. Reference panel for Warburton Range

Points to look for include:

- 'Compiled by' and 'Geology by' include all relevant contributors and dates; typically, the date attached to 'Geology by' will be at least one year earlier than the date of compilation. 'Geology by' may include geologists no longer employed by the Department of Mines, Industry Regulation and Safety (DMIRS)
- superscripted numbering of ages for rock units or tectonic events in the legend are matched in the reference panel by a numbered list of external geochronology references, in abbreviated form

- content and format of recommended reference for this map is correct
- if a logo is included in the title block, people from that organization or Aboriginal Council may be acknowledged below 'Geology by'
- the statement 'Geochronology from GSWA data … … (listed below)' is to be retained on all maps, but if no external geochronology sources are cited, omit '(listed below)'
- a standard 'Disclaimer' statement is present, typically placed below the reference panel.

Data sources panel



STW29a 30.11.18

Figure 9. Data sources panel

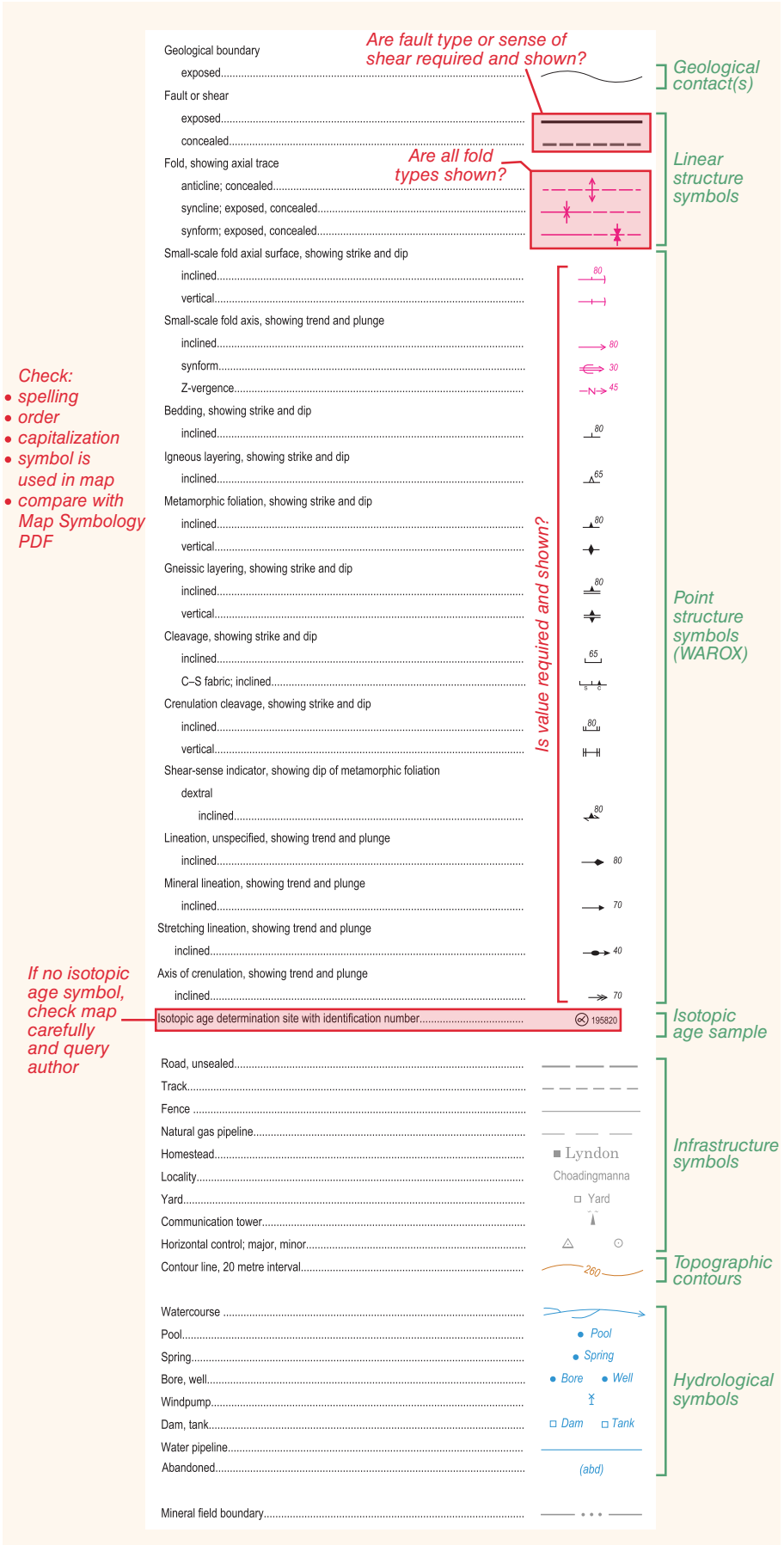
Points to look for include:

- all major themes used on the map are cited, with their source organization
- currency or extraction dates are consistent and correct
- URLs for GeoVIEW.WA and Data and Software Centre are correct
- dagger for the footnote 'WA State Government unless otherwise indicated' is to be retained on all maps, even there are data sources listed that are not WA State Government.

Symbols list

Note items in checklist, paying particular attention to points marked in Figure 10 and the following:

- check against map face that all symbols listed are used on the map, and vice versa
- if point structure symbols on the map have values assigned, this is shown in the symbols list
- ensure that, if an isotopic age symbol is shown in the list, it is used on the map; if no isotopic age symbol is shown in the list, verify that none is needed (query author). For GSWA isotopic age sample sites, a sample number must be shown with the symbol, and for external geochronology, the external organization's sample number should be given, and an external geochronology reference may be needed in the reference panel.



STW28 27.07.15

Figure 10. Symbols list for LYNDON

Mineral sites panel

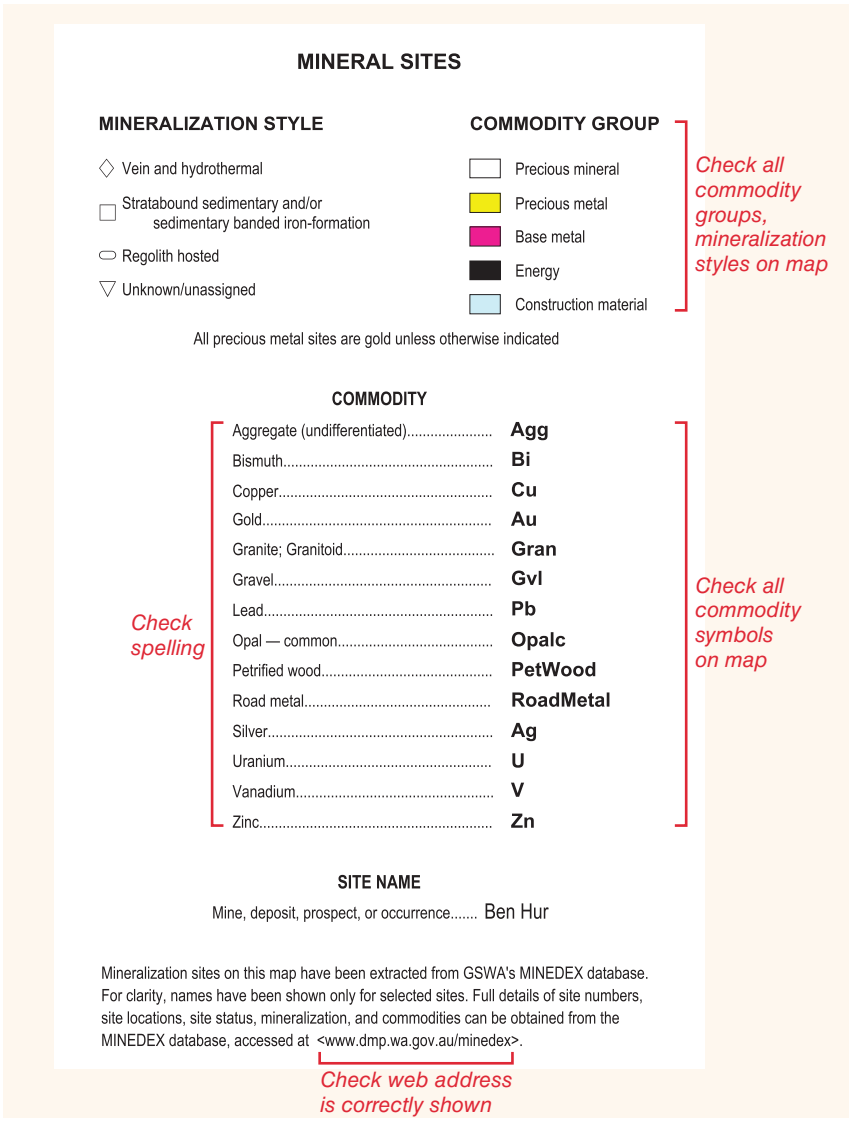


Figure 11. Mineral sites panel for LYNDON

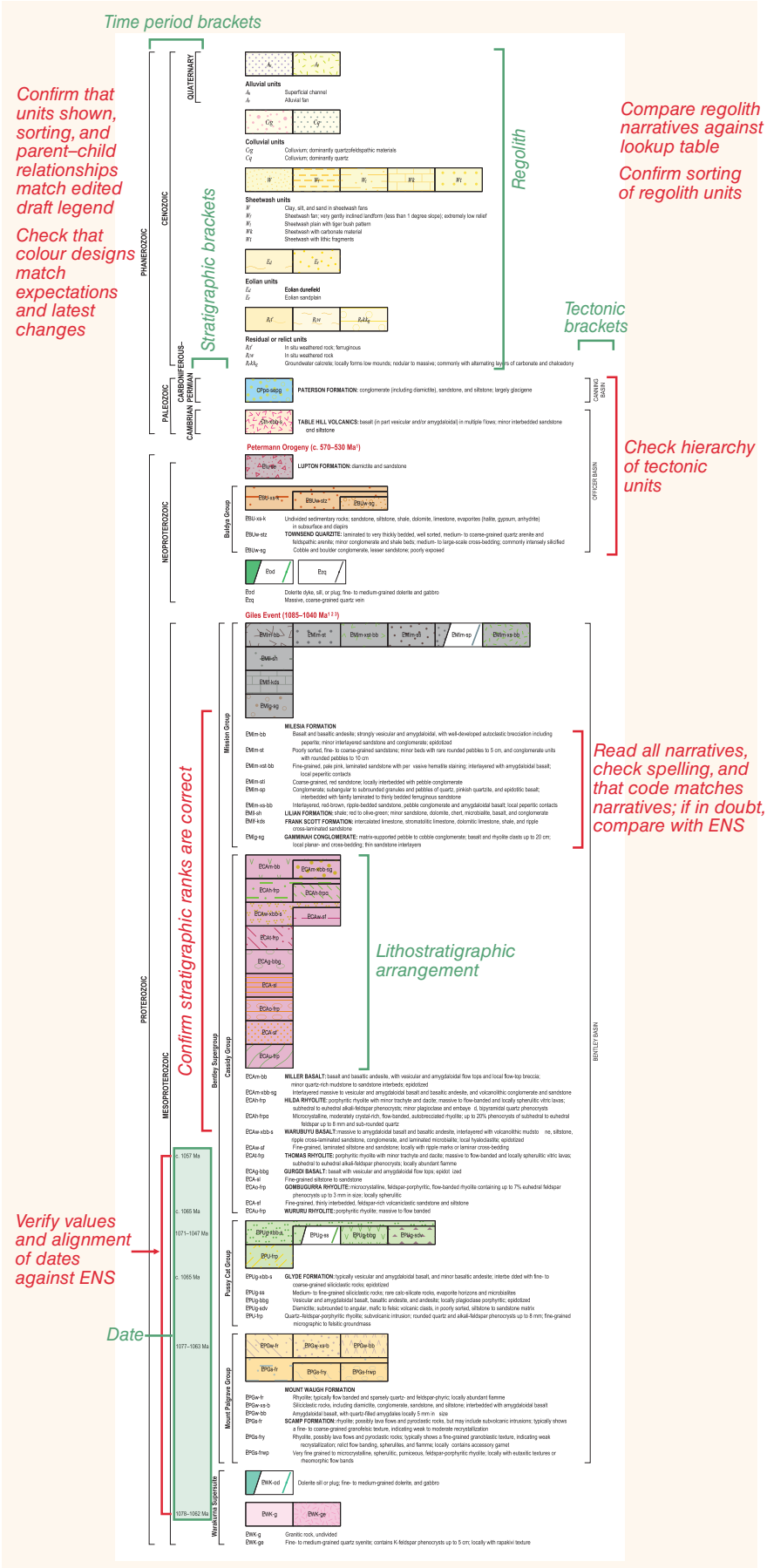
Note items in checklist, paying particular attention to the following:

- check against map face that all symbols, commodity groups and commodities listed are used on the map, and vice versa
- confirm that the example site name is actually used on this map.

Legend — layout

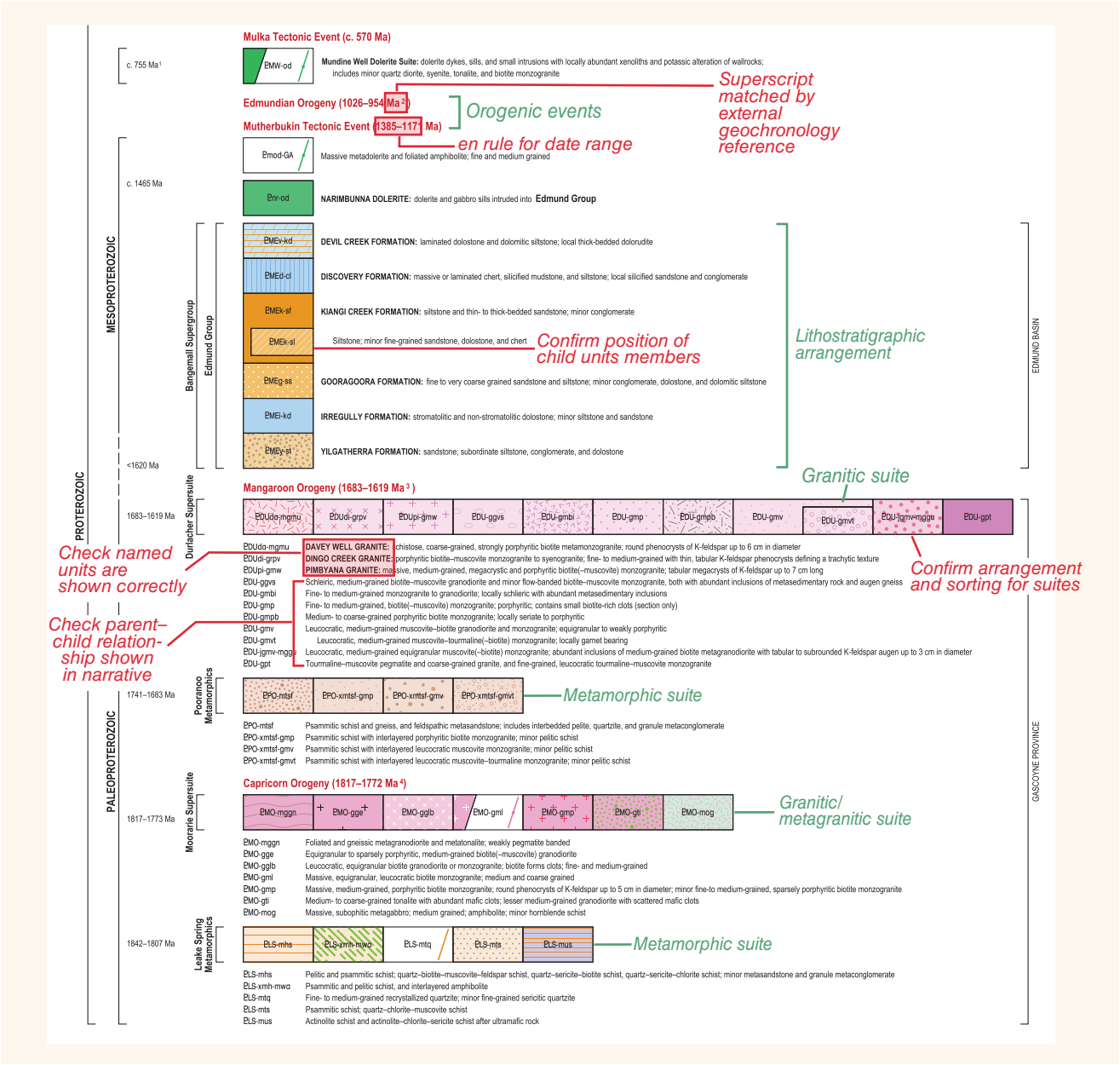
Note items in checklist, paying particular attention to the following:

- compare the assembled legend against the draft spreadsheet legend that was approved by the geologist. If there are any differences in layout, or any rock units are present in one and not the other:
  - o ask the cartographer for a summary of all rock units on the map and in the diagrammatic section(s), and compare this against the legend



STW34 27.07.15

Figure 12a. Assembled legend for LYNDON — full legend



STW33 23.12.14

Figure 12b. Warburton Range — bedrock only

- follow up with the geologist to confirm that any changes were approved
- re-evaluate the legend layout to confirm that it is consistent with ENS, and conforms to standards for legend layout (including arrangement of boxes, parent–child relationships, narrative arrangement)
- check whether changes made for this map impact on other maps in the project, for the current year

- compare rock codes with narratives to ensure that formal unit names are used (formation-level units in **BOLD UPPER CASE**; suite- and member-level units in **bold lower case**)
- check that isotopic ages are aligned with the correct rock units, or with whole groups or suites
- check ENS to ensure that cited ages are **isotopic**. Inferred or biostratigraphic ages are not allowed, except for instances approved by the Chief Geoscientist

- read all narratives for spelling, correct use of en rules and hyphens, and any characters that could have been lost copying from ENS
- confirm whether any rock units are in the diagrammatic section only and require 'section only' to be added (in parentheses) to the unit narrative
- confirm that all line units for quartz veins and nonmetamorphosed intrusive igneous rocks have a dot; similarly, check that sedimentary and metamorphic rock line units, including banded iron-formation do not have dots.

Legend — colour design

- Visually confirm that the colour design is as expected, and check against MapSym if anomalies are suspected. It may be helpful to review the Edit stage 1 — checklist to ensure all aspects of colour design have been correctly implemented.

Map face

Refer to Figure 2 — Warburton Range, WA Sheet 4245.

Scan the entire map face (using the MGA grid lines as a guide), noting points identified in the checklist, and especially the following:

- all rock and regolith units on the map face are in the legend
- linework, such as geological contacts, reasonably reflect relative age relationships between rock units, and between bedrock and regolith. Parse this generously, but refer glaring anomalies to the geologist, or Project Manager
- labels for all features are suitably arranged for best readability. Ensure especially that rock codes, WAROX structure data, mineral site names or commodity labels, and place or road names do not clash; request that the latter be moved, if necessary
- the sense and symbols for structure line features, such as fold axial traces, are consistent with measured data (WAROX points)
- coinciding WAROX structural data, such as foliation and lineation symbols, are quantitatively consistent (e.g. plunge of lines makes sense with their associated foliations)
- there is a reasonable distribution of WAROX and MINEDEX points, sufficient to interpret the geology, but not so dense as to obscure other information
- the colour design produces a clear, geologically appropriate, and attractive impression.

Consult with the geologist about any issues concerning the geological content, such as crosscutting relationships or WAROX points. Return matters to do with the assembly and appearance of the map directly to the cartographer for corrections.

Interpreted bedrock geology

Use the IBG enlargement (printed on polyester film) to review items in the checklist. The most important consideration is that the roll-up from 1:100 000 scale to 1:500 000 scale has resulted in an appropriate generalization of the geology. It is helpful to place the IBG over the 1:100 000-scale interpreted solid geology, and over the surface geology, to check the following:

- geological contacts and structures in the 1:500 000 IBG exactly match their equivalents in the 1:100 000 interpreted geology — they should have been copied from one scale to the other (not redrawn arbitrarily)

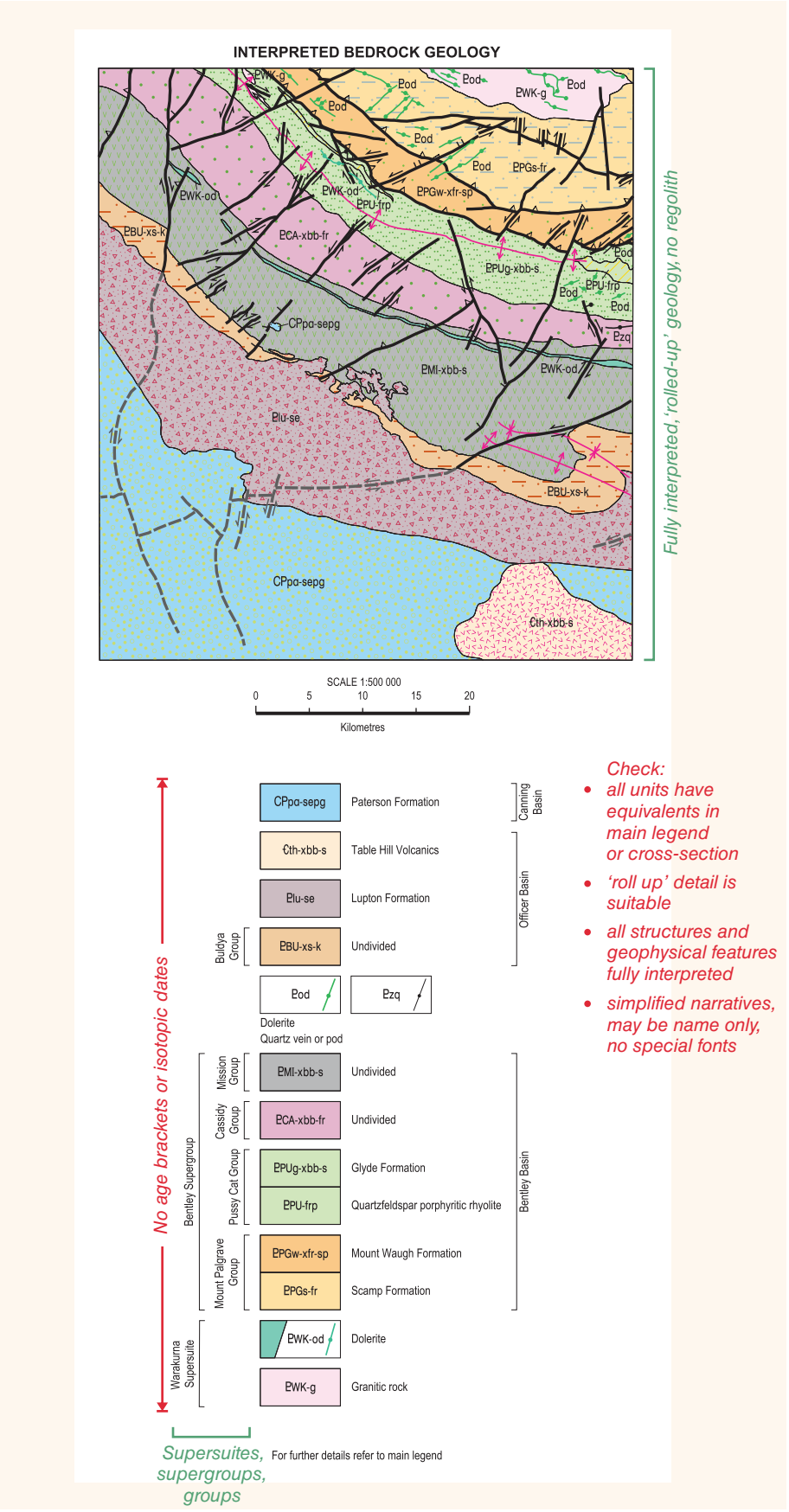


Figure 13. 1:500 000-scale IBG for Warburton Range

- no important rock units have been omitted, and no completely new rock units have been introduced, in the roll-up
- rock units in the 1:500 000-scale IBG are mostly parents once or twice removed from the 1:100 000-scale geology
- the legend for the IBG includes all rock units at 1:500 000 scale, and is arranged to be consistent with the 1:100 000 legend
    - o named rock units may be identified by name only, especially if they are already described in the 1:100 000 legend
    - o rock descriptions (narratives) should be significantly abbreviated compared with their 1:100 000 legend equivalents
    - o parent–child indenting may be used for narratives, but a plain font is used for all text in the IBG legend (no bold, no all capitals)
    - o no age brackets or isotopic dates are included.

Diagrammatic sections

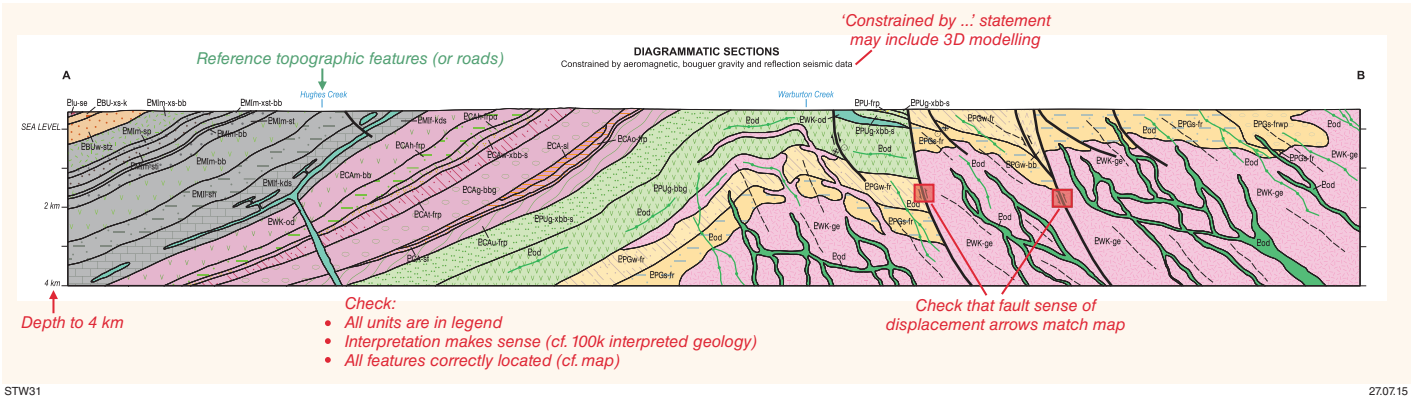


Figure 14. Diagrammatic section for Warburton Range

The diagrammatic section(s) printed on polyester film can be laid over the 1:100 000 interpreted and surface geology plots and lined up with the diagrammatic section line. Use this to review points noted in the checklist, noting in particular the following:

- the surface locations of geological contacts, structures and topographic features shown in each section must line up
- sense of movement on faults (normal/reverse, dextral/sinistral) and types of folds (antiform/synform) must match between the maps and sections
- geological relationships between bedrock units must be consistent between the interpreted geology and section
- structure line symbols for anticlines and synclines, or antiforms and synforms, are **not** used in the sections, but named faults and folds can be identified with red text above the surface line of the section
- check that rock units identified in the legend as 'section only' are in the section, and that no units in the section only are missing from the 1:100 000 legend.

Policy for versioning

The process of continually evolving ArcGIS compilation and in-house map plotting has created a motivation to apply corrections to series maps as errors or omissions are found. This raises the issue of how to manage updates of series maps. The following points outline current policy for issuing a new **version** of a Geological Series map.

1. The version number will be clearly displayed below the 'Edition' notice in the right hand marginalia, below the map title
2. The version number will comprise an integer number. A change of version is warranted when remapping or reinterpretation, possibly based on mapping of an adjacent sheet, results in a significant change to the science (not more than about 25% change). The map date should change to reflect the month the change was made.
3. This versioning policy applies to amended 1:100 000 and 1:250 000 series maps published from June 2002 onwards.
4. The change-control process for minor modifications (e.g. an error found in one rock unit code) will involve E&P reviewing any amendments, and the author or Project Manager approving the change. Cartographic staff will make the corrections only after approval. For more significant changes, the change-control process will also include approval from the Director Geoscience before release.
5. A copy of the amended map, with the Director's signature, must be filed by Manager Mapping.
6. A change of version number must be recorded in eBookshop.
7. New, previously unpublished maps do not include edition or version numbers in the recommended reference; if no edition or version number is shown, it is implied that this is the first and only available version of the first edition of this geological map sheet.
8. The recommended reference will include the version number for Version 2 onwards. In this case, the recommended reference will be updated to show both the edition and the version number; e.g. 1st edition, Version 2.0.
9. The Mapping section will supply copies of the reversioned map to the front counter.
10. Libraries and other free distribution subscribers do not necessarily receive a new copy every time a new version is released. Generally a new free distribution will happen only with a change of edition.

A new **edition** of a map may be released if a map area is remapped and extensively reinterpreted. This process will be initiated by the Project Manager as part of a project team's work program plan.

Approvals and publication processes

Approvals

The Geoscience Editor is responsible for delivering and 'driving' the colour plot through approval and sign-off by the author(s), Project Manager, Chief Geoscientist, Director, and Executive Director (Fig. 1).

It is important to consider if decisions made at this stage affect other maps in progress, especially those from the same project. Brief other editors on these issues as soon as possible so it can be determined if the decisions affect the map(s) they are working on. If other projects are affected, input from those Project Managers may be required. If possible, coordinate a meeting so that all parties have a chance to comment at the earliest possible point in the editorial process; this will very likely save time and additional loops through map production.

A step-by-step guide for the approvals and release process is detailed in Post-production process.

Glossary

bedrock	general term for the rock that underlies soil or other superficial material; broadly synonymous with solid geology
colour design	combination of colours and patterns used to represent rock units on the map
cross-section	two-dimensional (2D) vertical interpretation of subsurface geology
E&P	**E**diting and **P**ublishing section
ENS	**E**xplanatory **N**otes **S**ystem — specifically, the browser-based data entry portal for entering and updating information about Western Australian lithostratigraphic and tectonic units, and tectonic events
GSWA geolfont	typeface based on Helvetica, designed for rock unit codes on maps
IBG	**i**nterpreted **b**edrock **g**eology; usually used for 1:500 000-scale interpreted geology 'rolled-up' from 1:100 000 scale; compare with **solid geology**
isotopic date or age	absolute date or age of a rock or geologic event determined by analysis of radioisotopes in minerals hosting elements such as uranium, lead, potassium, thorium; use in preference to radiometric date or age
lookup table (LUT)	a table that acts as a 'master list' for something and used it to 'look up' contents based on a key value; usually a master list of rock units for a project with SORT number as the key
map vs database codes	rock unit codes used on a map or in a database respectively, conveying the same information but differing in their syntax and font
MapSym	MapSym_System2003 — MS Access colour design database
marginalia	information about and arranged around the margins of a map, including reference, data sources, location
OurDocs	centralized electronic document and records storage facility
PubStats K2	**Pub**lications **stat**istic**s** system used to record and track products
rolling up	the process by which rock units are generalized, usually by amalgamation into their parent unit, when smaller scale (e.g. 1:500 000) maps are derived from larger scale (e.g. 1:100 000) maps
SDE (also ArcSDE)	**S**patial **D**atabase **E**ngine — ESRI ArcGIS server–software subsystem for spatial data, supporting the use of geodatabases; in casual terms, may be used interchangeably with SDI
SDIDIV	**S**patial **D**ata **I**nfrastructure Geological Survey **Div**ision — data storage volume for GIS data used to produce digital packages and maps
SDIPROD	**S**patial **D**ata **I**nfrastructure **Prod**uction — data storage volume for finalized GIS data delivered to the web
solid geology	continuous, usually interpreted, geology with no regolith shown; contrasts with surface geology for which bedrock is shown as outcrop only. Useful when referring to 1:100 000-scale digital interpreted geology, to avoid confusion with rolled up 1:500 000 interpreted bedrock geology (see IBG)
surface geology	geology as seen at the Earth's surface, including outcropping bedrock and superficial materials, such as soil or regolith; may involve interpretation from remote sensing (satellite or orthophoto images), but contrasts with solid geology or interpreted bedrock geology, for which regolith or other cover materials are omitted
WAROX	field observations database

Appendices

1. Editing plots required from Mapping (checklist)

2. Geoscience editor's references

3. Colours and patterns

Colour swatch based on the Pantone Matching System (PMS)

Standard patterns

Australian standard colour scheme for geological maps

Ideal base colours for rock units, based on age for Phanerozoic rock units and lithology plus for Precambrian rock units, described using PMS. These colours broadly conform to Australian standard colour schemes, with minor modifications to suit the Western Australian context.

Note that the GSWA (and Australian standard) colour scheme is different from the North American and European systems for colouring maps.

4. Age symbols and special characters

List of symbols representing geologic ages (eons, eras, periods, epochs), generated using the customized typeface **GSWA geolfont** and Alt + NumLock keypad combinations; e.g. ì ('Proterozoic P') is Alt + 0236.

This appendix also includes keypad combinations for 'subscript' characters for regolith map codes and other special characters that may be used in text or tables.

Various decisions and rulings about GSWA geoscience

This is a living document. It will grow as new issues appear and are resolved.

The document contains various decisions, guidelines and rulings that needed resolution, and this is a convenient place to dump them all for reference. Items are grouped with a vague logic as much as possible.

Items so far considered are:

Capitalization for tectonic units, singular and plural

GSWA usage has always been to capitalize both the prefix and suffix parts of a named tectonic unit. So we have Canning and Officer Basins, not Canning and Officer basins (AAPG usage). Also Canning Basin not Canning basin. For the lower case use, there is ambiguity about whether the name is formal or just something named after a river or a suburb for convenience. As with formal stratigraphic names, lower case usage in a GSWA publication implies informality. The first reference point should be ENS, and if you find your favoured formal name isn't there, consider entering it to *Approved for data entry* level.

If you want to use a name informally, say so explicitly, as in *Desert basin (informal name)*.

If you're writing about an obsolete or incorrect name, be explicit and use quotes: *'Bangemall Basin' (now Edmund and Collier Basins)* or *'Yilgarn Block' (now Yilgarn Craton)*.

Capitalization of, and formal names for, faults and folds

Check with the local GSWA authority, generally the Terrane Custodian, about formal names for faults and folds. The Ada Fault (or Shear Zone) or the Darling Fault would generally be capitalized, as would the Hardabut and Yandi Faults. When listing more than one named fault, *Faults* should be so, as with tectonic unit names.

Faults (and shear zones) can be named, but generally they should be major to warrant a name. Major structures are defined as 'a regional to crustal-scale structure, commonly bounding different terranes or tectonic units'. This means they generally have a throw of hundreds of metres if not several kilometres at some level, on a structure probably hundreds of kilometres in length that extends deep into if not through the crust. Even the Mundrabilla Fault, which has a throw of about 2 or 3 m out on the Nullarbor, has a major suture beneath it at Proterozoic level. Exceptions to the naming convention might be Quaternary faults of neotectonic significance, like the Meckering Fault.

Similarly, folds may be named if they are regional (e.g. Cape Range Anticline) or of obvious local significance or importance (e.g. Hardabut Anticline).

Capitalization style for formal formations and tectonic units, on maps and in ENS

How formal Formation names are stored in ENS and presented, or styled, on maps is changed as of January 2014, to allow unambiguous identification of formal and informal terms and ensure consistency with the Australian Stratigraphic Unit Database.

- Names of formal units ranked as formations have been changed in ENS from UPPER CASE to 'Leading Caps', e.g. 'AHERN FORMATION' is now 'Ahern Formation', 'BUNGARRA IGNEOUS COMPLEX' is 'Bungarra Igneous Complex', etc. Note that Formal Status and Rank must be set in ENS in the Lithostratigraphy tab. All existing names have been changed, all new formation-level formal units should now be entered as mixed case / leading caps.
- Names of formal units ranked as formations will still be shown capitalized and bold on 'hardcopy' map legends (other than the IBG inset), for visual aid.
- Other formal units (Groups, Suites, Members, etc.) will remain in mixed case and bold.
- Names for combo units consisting of linked formations (e.g. Heavitree Quartzite and Bitter Springs Formation) that have informal status, generally subgroup ranking but coded like formations (in the absence of a defined group), should be shown on maps in Mixed Case, not CAPS.
- Informal named units (e.g. Wirrildar beds) must have Status and Rank set in ENS. These exist because of prior usage, where there is insufficient information to formalise the name. Don't make new ones. Rank will generally be Formation or Member. The second part of the name is always lower case. Names for these informal units should be presented as follows:
    - ENS Wirrildar beds NB status = informal
    - Text "Wirrildar beds"
    - Hardcopy maps "Wirrildar beds"

Tectonic unit name style storage and presentation is similarly changed.

- In ENS, tectonic unit names have also been changed from UPPER CASE to 'Leading Caps', e.g. 'CAPRICORN OROGEN' is now 'Capricorn Orogen'
- On hardcopy maps: orogens, cratons, basins, and superbasins remain capitalized, for visual aid, on the main map legend, but not the IBG legend (no change)

Names for faults and folds on maps

Fault and fold names are not shown on Series surface geology maps to avoid confusion as to what segments are actually named. By all means attribute names on the layer associated with the map, but only show names on IBG maps where continuity will be clearer. Symbolization as 'major' will help differentiate structures that are regional vs. local.

Remember the surface geology map is just one of several spatial geoscience layers, and can't convey every piece of information.

Capitalization and structural events

All terms of structural events with specific names should be capitalized: Prices Creek Movement, Emu Pool Event, Meda Transpression, Fortescue Rifting Event, etc. However, extension and breakup are not capitalized, for example, Jurassic-Cretaceous extension and Gondwana breakup. Each contains several events, so is an informal grouping term in the same sense as 'Eastern Goldfields Superterrane events'.

Terms and names also change over time as more data are collected. Eventually the Events tab in ENS will provide a usable (although probably not definitive – we're not *that* good) reference. When considering naming, or formalizing, an event, consider how regional it may be. As with faults, formally named events should have regional significance, and be specific rather than groups of related events.

Tectonic units and events in manuscripts and in ENS

When writing reports that refer to tectonic units or events in a formal sense, please ensure that that your usage matches entries in ENS if they are 'established' names. Update ENS if you have new data for existing entries. Enter new tectonic units or events into ENS with an appropriate level of detail covering at least basic defining information, after gaining any necessary approvals from the ENS content manager and CG. If you wish to change the concept (as opposed to understanding) of a tectonic unit or event, you need to justify the changes to the TC and CG. ENS is the reference database and single-point-of-truth, not a standalone manuscript.

Editors should also check that usage matches with ENS with checking manuscripts and maps.

Legibility and purpose of series maps

Series maps and plotted spatial map-layers with a named scale must be readable at their final scale using no more than a 10x hand lens. This includes all overprints, labels, and symbols, not just raw polygons. Maps and spatial data layers are valid at the scale they are published, not at all scales. GSWA 'standard' scales now are 100K, 500K, and 2.5M, with 250K in places where 100K is not warranted or as an intermediate summary scale.

Consider readability guidelines and scale validity when deciding which structural points to display or turn off. Several near-identical orientations or foliations in the space of a few millimetres on the map can be pruned back to a couple without losing essential data – the map will probably be better for it. The reader doesn't need to see every place the mapper visited on the paper map. Pruning of WAROX points should be completed before the map is submitted to GIS. See the WAROX custodian to obtain authority to toggle point display for sites created by originators currently not employed by GSWA.

There are minimum size rules for polygons (round and elongate) and minimum length rules for linear units. As a general guide from a pre-digital age, round polygons should be no less than a millimetre diameter at final scale, and elongate units no less than 0.5 mm across. So at 1:500 000, units need to be 500 m across, not 50 or 100 m. Specifics are set out here (currently 000087.shaun.coldicutt.xlsx).

Different scales have different purposes.

- 100K scale aims to show everything that fits and can be shown legibly at 100K.
- 250K summarizes the local geology so that the user gets a picture of the important geology in an area, and an idea of how the local geology fits together.
- 500K should focus on the regional fabric of a tectonic unit as a whole, rather than be buried in detail.

- 2.5M focuses on the relationships between tectonic units, and how the state fits together as a geological whole, highlighting commonalities and differences.

Generating a seamless map layer

Ultimately, GSWA wants seamless 100K, 500K and 2.5M geological layers across WA that also match with boundaries from SA and NT. GA is also beginning the compilation of a seamless 2.5M bedrock geology of Australia. In 2014, there will be a state-wide seamless 500K bedrock geology layer with as consistent a level of detail as is possible, and consistent attribution. This is based on the 2001 500K geology, with numerous updates from later mapping and some interpretation in areas where there has been no work. This seamless layer is the master reference, to which any future changes must be integrated rather than just cut in. Bedrock geology layers for projects should be matched into the seamless IBG layer incrementally, and then the seamless layer and its attributes upgraded as necessary (and upgrades will be necessary as field work revises geology). Otherwise border faults will appear, map units and structural styles will vary, and attribution will be inconsistent. Someone with lesser knowledge of the border area will be left to fix them, rather than the geoscientist with local knowledge.

In short, project IBGs should not be just cut into the working state layers. They need to be integrated, with geological boundaries, geological map units, and unit attributes bled through. This maintains a seamless state layer that can be incrementally upgraded, rather than re-assembled periodically. The seamless 500K layer should never be overwritten with un-stitched, possibly older and inconsistent project layers. It should be bled into, at all times. If significant modifications are wanted, consult TCs, CG, or AD(M).

Structures and ages in regolith on maps

Two types of structures can be observed in regolith:

- structures that originate in the regolith – thus, a dip and strike symbol would indicate the regolith is tilted; a paleocurrent direction provides information on conditions of regolith deposition.
  - ➔ these are plotted using purple symbols and annotations
- structures inherited from a protolith. Regolith derived by in situ weathering of the underlying bedrock may preserve a foliation
  - ➔ these are plotted using black symbols and annotations, and will only be published on a map if within a _R_i regolith unit.

Ages plotted in regolith are assumed to be ages of the regolith, not bedrock (hard to radiometrically date a fabric preserved in clay or weathered protolith!). They should be plotted in purple.

If purple symbols or notations are present on a Series map, the following statement will be inserted in the map Reference:

> Purple symbols and notations are measurements derived from regolith features.
> Black symbols and notations are measurements derived from bedrock features.

There will need to be a visual check of all such features by author and editor because of the internal workings of WAROX. There are issues with extraction at present.

Simply put, black = bedrock, purple = regolith; based on what the structures originate in.

Conceivably, regolith could even be cleaved if you found Precambrian regolith that is demonstrably a soil. Permian lags are common across the NE Yilgarn and Earaheedy, clay soils date back to the Devonian in the northern Yilgarn, and Jenolan Caves in NSW are Carboniferous, but this not a normal expected feature. Such a regolith unit would also be shown at the correct stratigraphic position in the legend.

Teeny weeny, but important, outcrops

Generally, enlarge the outcrop to a circular polygon of minimum plot size, trim a creek back, etc. If this is not acceptable geologically or aesthetically, such exposures can be (and probably should be anyway) represented digitally within a surface geology point layer, as described below:

ProjectName_surfgeo_pnt_100k	**Surface geology point layer:** contains field observations of rock units that are too small to show as polygons at this scale

In areas of very limited exposure, a limited number of correctly attributed points can be plotted on a map with written consent from the General Manager Mapping (Ian) or the CG. This is the same approach taken to represent information from RAB/RC drillholes. The point is plotted as a red dot, the same size as waterholes, bores, etc., with a black lithological label/code, and a black structural symbol and measurement.

The author must liaise closely with the Project Manager, cartographers and editors to ensure points are verified and correctly attributed.

Vertical scarps

Where vertical scarps expose multiple units at resolutions finer than is valid for the layer, overlapping lines to represent different units are allowed in digital layers, but they must be ranked by numbers (1 at the top) to avoid confusion with topological errors. This is the same approach used to represent multiple lithologies from subsurface information points from a single drillhole.

Trends, exposed and under cover

Map/layer readability at final scale is paramount in determining whether to plot trends either at surface or undercover.

Trends (under cover or otherwise) should not be plotted on series digital layers and hardcopy maps at 500k scale and smaller (i.e. 1:1M, etc.). Trends (under cover or otherwise) can be plotted on series digital layers and hardcopy maps at scales of 250k and greater (generally 100K).

Plotting of trends on non-series maps will be assessed on a case-by-case basis.

Trends under cover will be represented by the same symbols used on IBG/surface layers but using grey colours (as with concealed faults).

Structural points in Made Ground

Obviously, structural observations cannot originate in a spoil heap. They may have been made prior to the heap, but in general these would not be plotted. They would only be plotted by express permission of TC or CG.

Structural measurements made in a open-cut mine or pit can be plotted if important, even though the feature measured may be obliterated by later excavation, by express permission of the TC or CG. They are bedrock measurements, so will be in black. A photograph of the site where the measurement was taken should be in WAROX, to ensure full documentation.

Cross sections

The 3D geology group is available to assist with assessing the validity of your cross sections. Please show them your sections and consider their input before submitting cross-sections and other 3D geology aspects.

Regolith LUT style in GIS/GEP packages

As of January 2014, the following guidelines/rules apply to regolith unit names in lookup tables (LUTs) for GIS/GEP packages.

- The 'Unnamed regolith unit' narrative in the 'UNITNAME' column is replaced by more informative text such as 'Colluvial unit', 'Alluvial unit', etc. This is just a change in what fields are extracted from supplied tables
- For _R codes, the unit name to be used remains as 'Residual or relict unit'. Don't split it to 'Residual unit' or 'Relict unit'.
- The 'REGOLITH' column preserves additional information, e.g. 'Colluvial unit, age undivided or unassigned', 'Alluvial unit, weakly consolidated', etc.

Geochronology in ENS: age types

For guidance in what Age Data Type to choose in the Geochronology section of ENS, see 000317V02.angela.riganti.docx. This is the distillation of discussions by geochronologists, CG, and ENS CM.

Managers should pay particular attention to the dot points in this document, as these may require some of you to make adjustments to some of your units.

Plotting multiple structures on maps

This point applies to the assembly of a printed, or paper, map. When assembling a map (generally 100K), do not turn on / flag for plotting every structural observation made at every point. Where there are multiple observations (orientation, cleavage, foliation, whatever) made at or near a single point, plotting all of them only gives an illegible structural clusterbomb. Just turn all bar one or two (no more) off, for the sake of legibility. On the plotted paper map, do not nudge observations to make them all fit. The structures are preserved in the digital layer that is part of the map package.

Remember, if the map cannot be read unambiguously with a 10X hand lens at most, it fails.

ENS submission procedures: adequate notification to E&P

To date, some of the submission protocols for Explan Notes System material have been a bit hazy, or not clearly set out. E&P, as with any manuscript-type material, need some prior warning in order to plan workloads, so a work-flow process similar to the Manuscript Flow Form needs to be in place. With this in mind, and to try and avoid yet another form, please give adequate notice to the Manager of E&P of the following items. This could be when you start writing, or at least a couple of months from finishing a 'chunk' of ENS entries:

- Number of units expected, in total and in each batch (multiple batches make editing more manageable). To the nearest five or so units.
- How many batches of units
- Main author
- Expected submission date for editing, for each batch. Approximate.
- Tectonic unit(s), to make it easier for the editor
- New or revised status, meaning full or minimal editing
- Anticipated 'publishing' date (when they are wanted for a package or other release)
- Related units or batches already published, if any
- Status of RefMan entries (in case some are not complete)

- Status of Geochronology entries/links (crosscheck).

Geochronology data on maps

Numerical ages in map legends.

- These are NOT shown where the basis for the age is biostratigraphic. There, the linking feature is the System (Permian etc), Series (Upper etc), and/or Stage (Wuchiapingian etc). A numeric age is incorrect, as the number may change as a Golden Spike is chosen or an unequivocal isotopic age determined.
- A numerical age is only shown where there is an isotopic or paleomagnetic age that contributes to the construction and understanding of the legend. The age should be reliable in the author's and geochronologist's estimation. It should be from the unit it is positioned against, at the base of, or at the top of, in the legend (depending on whether it is an age applicable to the unit, a minimum age or a maximum age, or an age that applies to a chunk of the succession), or from a well-controlled correlative somewhere relevant and generally close by but not necessarily on the same map sheet (still with me??). Something that lets you say with reasonable confidence that the rock unit is question is younger than, older than, or the age placed next to it. If it thought to be a xenocrystic age, you may want to not show it.
- Consult a geochronologist (Mike or Chris at present) about the quality or significance of isotopic dates when you are doing ENS entries if there is any doubt (probably a good idea anyway). It should be resolved before the map legend is set up, not during or after.
- External geochronology can be shown, and gets an abbreviated citation in the text block at the bottom of the legend. Be critical, and show what you and a geochronologist are confident applies to a unit and is reliable, not every date ever obtained in the region.
- Uncertainties (the +/- bit) are not shown. Instead, show the age as 'circa', abbreviated "c.", not ~. An age range can be shown (e.g. 2345–2356 Ma), in which case there is no c.
- Inferred ages are by default not shown.
- For further queries, look at the text block/disclaimer/boilerplate text at the bottom of any GSWA series map from the last 5 years or so. Much of the above, and more, is explained there.
- Remember you have the free text field associated with the Geochronology tab in ENS to discuss all the external geochronology and its merits or lack thereof.

Plotting geochron sites on maps.

- We plot GSWA geochron sites, with the sample ID, on maps as these are assumed to be ground-truthed and accurate. At worst, you should be able to get back to original source information.
- External geochron sites are not plotted on maps, because the accuracy of the locality data is beyond our control unless by good fortune it can be ground-truthed. 50 m inaccuracy (less than the AGD/GDA shift) could put a location in the wrong unit, or even over a major unconformity. A figure in a journal, or a 6 digit grid reference in a paper, or '3.25 km SW of the Black Stump', is not accurate location information. We have no control over the information, no assurance of its quality.

Geochronology sources

- For GSWA geochronology, dates are sourced from ENS (as this should incorporate the latest dating results), and locality data is sourced from the Geochron layer. Ages are filtered by the geo who tells the cartographer, but they are sourced from ENS. Have been for years.
- References should also be in ENS. They should be entered in ENS as soon as a geochron record is published and available in RefMan. Ages on a map that do not match ENS are removed as part of checking or editing.

Textual information in map legends.

- Once more, the unit code, the unit name (if applicable) and the unit narrative are derived from ENS. There will be a loud WTF moment followed by immediate return to the PM/Author if differences are found. This has applied since the days of the prototype ENS.
- ENS is the working web-based current version of the database, located at http://perweb23:8600/ENS/. The prototype version, in MS Access, is no longer maintained or current except to update the web version where information has been generated in the prototype but not the web version.

Referencing Reservation of Names, and Australian Stratigraphic Units

- In the absence of a formal decision by the Australian Stratigraphy Commission, do not use the Australian Stratigraphic Units Database (hosted by GA, and accessed by ENS to maintain our stratigraphy tables) as a reference in ENS or RefMan. The database changes and is not regarded as a formal publication – incorrect information occasionally needs updating when discovered, entries have status edits from time to time, and a single geographic name may have multiple entries for historical variants. It contains a history of publications about a name and its usage, so refer to those publications rather than the database.
- If it is necessary to specify when a name was reserved and who reserved it, rather than just when it was first published (which is what counts in formal lithostratigraphy, since a reservation can be gazumped), do so approximately as follows (assuming it's for a map unit, later written up):

  "The name xxx was reserved by A. Geologist in 2010, for a yyy unit in the zzz area, and first used by A. N. Othergeologist (2015) on abcd Mapsheet. It was fully described and defined by Y. E T. Anothergeologist (2016)."

- If a lithostratigraphic name is involved, please take the time to fully describe the unit in ENS so that all information necessary for a formal definition is included. Preferably, complete a definition card online at the same time for all units in need of such while you're writing up, since that's when the information should be at your fingertips. Finally, advise the local subcommittee of the Aus Strat Commission (the Explan Notes Custodian will know who is currently in this role).

Appendix 2

Geoscience editors' references

What	What for	Where
External references		
Style Manual (Sixth edition)	General editing and style conventions	Book on shelf, E&P reference library
Glossary of Geology (5th Edition)	Preferred use and spelling of geological terms	Book on shelf
Geochronological timescale	Latest (and previous) International Chronostratigraphic Chart (PDF) from www.stratography.org, giving geological ages (international standards) and formal subdivisions of geological time	V:\GS80_PublicationServices\ProjectResources\Legends and map standards
GSWA references		
Recent GSWA maps	Compare and contrast standard practices; search for hard-to-find map objects	Map drawers, E&P reference library *or* V:\ProductArchive\MAPS\GEOLOGICAL_SERIES
Internal map process and standards — Chief Geoscientist rulings	• CG rulings and advice • Ordering regolith codes • ENS style sheet • ENS editing • Regolith master file • Basic guidelines to rock code construction	url:ourdocs:Central/000534.roger.hocking url:ourdocs:Central/000539.roger.hocking url:ourdocs:Central/000296.angela.riganti url:ourdocs:Central/000306.angela.riganti url:ourdocs:Central/000307.angela.riganti url:ourdocs:Central/000072.angela.riganti
GSWA style guides	House style and all style guides required for editing products	GSWA Intranet landing page
GSWA Code Builder	Verifying bedrock codes	Lithostratigraphic Units/_Dummy unit to work with/Code Building
GSWA Record 2013/7 Revised classification system for regolith in Western Australia	Regolith codes and interpretation; use on maps	DMIRS eBookshop
Map production manual	GSWA mapping and cartographic standards and conventions	V:\GS81_SeriesMapping\ProjectResources\Map_Production_Manual\ArcGIS\Section6_StandardsAndSpecifications

GeMPeT	Digital thesaurus for geoscience keywords	DMIRS website

Databases

PubStats K2	Status of published and current products	http://webapps/pubstats
Free distribution	Free distribution information on product quantities	url:ourdocs:Central/001204.Robin.BOWER
WA Geology Online	Explanatory Notes data entry form; rock codes, narratives, parent–child relationships, geochronology	http://ens.internal.dom/
MapSym_System2003	MS Access colour design database; past and present map unit colour design (includes regolith)	V:\Resources\Databases\GS80_PublicationServices\Colour_Design
Australian Stratigraphic Units Database	Formal lithostratigraphy	Geoscience Australia
Web and applications		
GeoVIEW.WA	Online GIS-based mapping system, for viewing GSWA geology datasets	Interactive geological map (GeoVIEW.WA)
GeoMap.WA	GSWA map application to view, query and interrogate geology and resource information	GIS viewer for Windows
Other		
Colour designs and legends	Excel spreadsheets and draft colour designs by project; MapSym upload template; PDFs of colour and pattern swatches	V:\GS80_PublicationServices\ProjectResources\Colour designs and legends

Government of Western Australia
Department of Mines and Petroleum

Map production manual

(1:100 000 geological map production using ArcMap 10)

Section 6

Standards and Specifications

November 2010

Contents

Software:

ESRI GIS (ArcMap, ArcInfo) version 10

Adobe Illustrator CS5

Author: Annick Jones
Map Production, GSWA
Telephone: 9222 3171
Email: annick.jones@dmp.wa.gov.au

Font styles and special characters

mainly used for marginalia

FONT			
Arial narrow	Symb	KEYSTROKE	
●	—	[ALT][0][1][6][1]	M dash
●	–	[ALT][0][1][6][0]	N dash
●	±	[ALT][0][1][7][7]	
●	°	[ALT][0][1][7][6]	degree
●	'	[2][0][3][2][ALT][X]	minute
●	"	[2][0][3][3][ALT][X]	second
●	·	[ALT][0][1][8][3]	
●	©	[ALT][0][1][6][9]	

*Type tag below in text box and subtitute 'My text' with number or letter

TAG	
^{My text}	superscript
_{My text}	subscript
<BOL>My text</BOL>	Bold
<ITA>My text</ITA>	italic

mainly used for geological codes

FONT			
Regolith Geological	Symb	KEYSTROKE	
●	a	[ALT][0][1][6][2]	subscript
●	b	[ALT][0][1][6][3]	
●	c	[ALT][0][1][6][4]	
●	d	[ALT][0][1][6][5]	
●	e	[ALT][0][1][6][6]	
●	f	[ALT][0][1][6][7]	
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●	0	[ALT][0][2][0][0]	superscript
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FONT			
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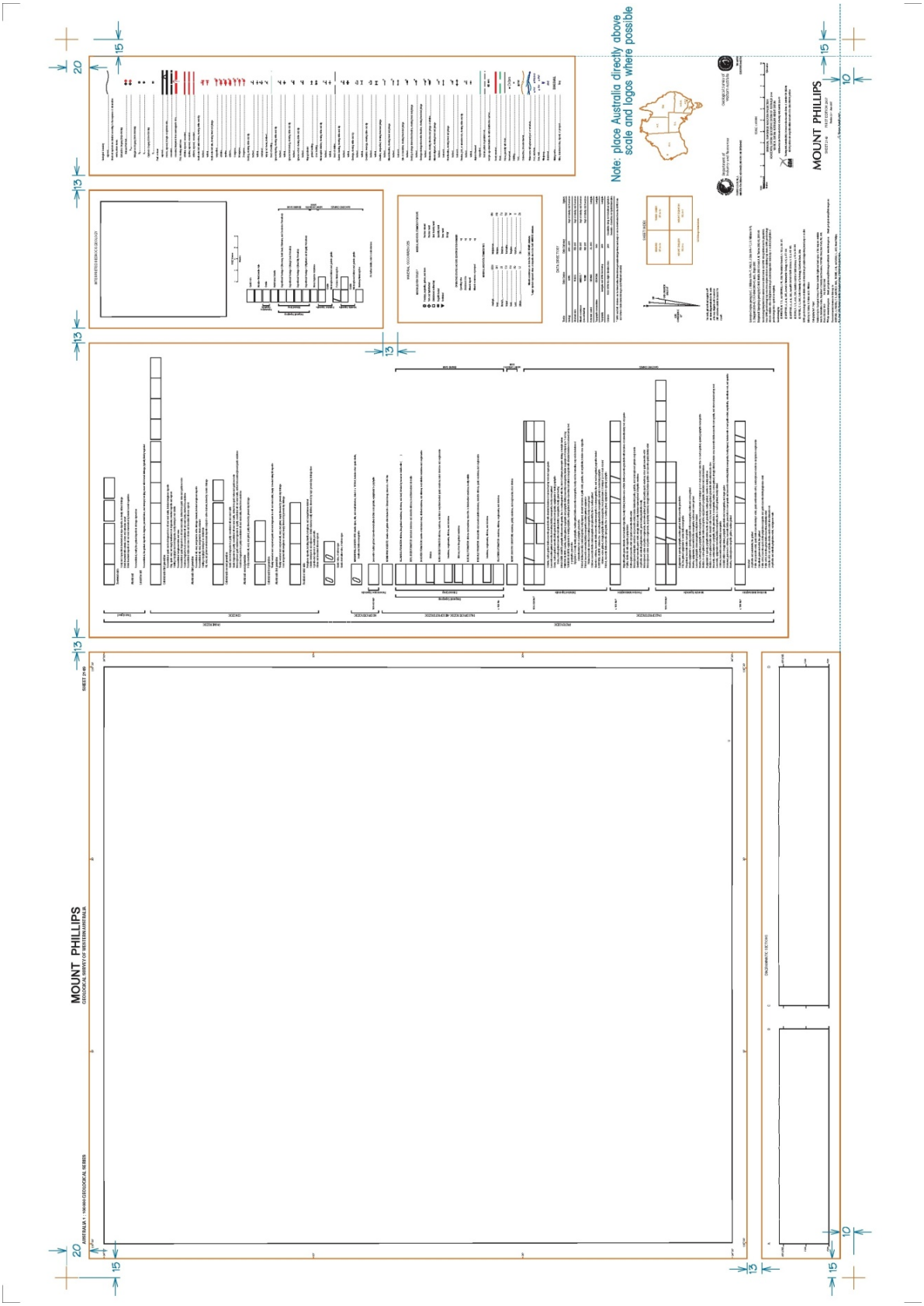
●	ᴂP	[ALT][0][2][4][4]	PALEOARCHEAN
●	ᴂE	[ALT][0][2][4][5]	EOARCHEAN

Font styles

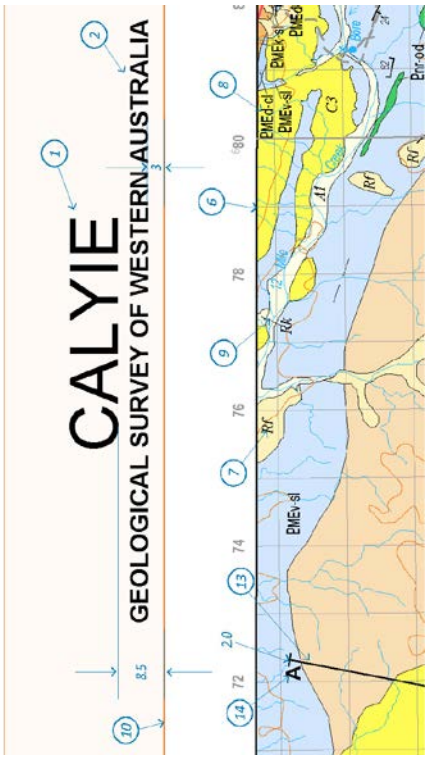
Style	Abbreviation
Arial	A
Arial italic	AI
Arial bold	AB
Arial bold italic	ABI
Arial narrow	AN
Arial narrow italic	ANI
Arial narrow bold	ANB
Century	C
Century italic	CI
GSWA Geological	Geol
GSWA Regolith	Reg
Optima	O

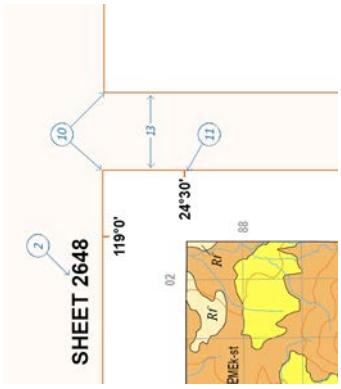
NOTE: All fonts are 100% width with the exception of GSWA Regolith and GSWA Geological which are at 80% width.

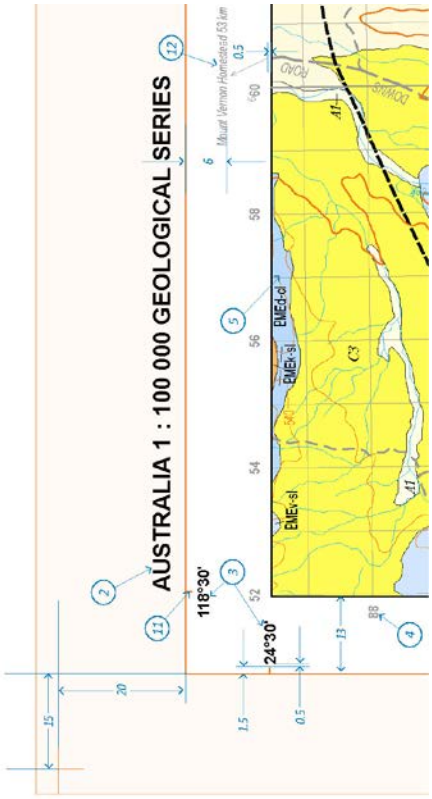
Full map format



Map layout design







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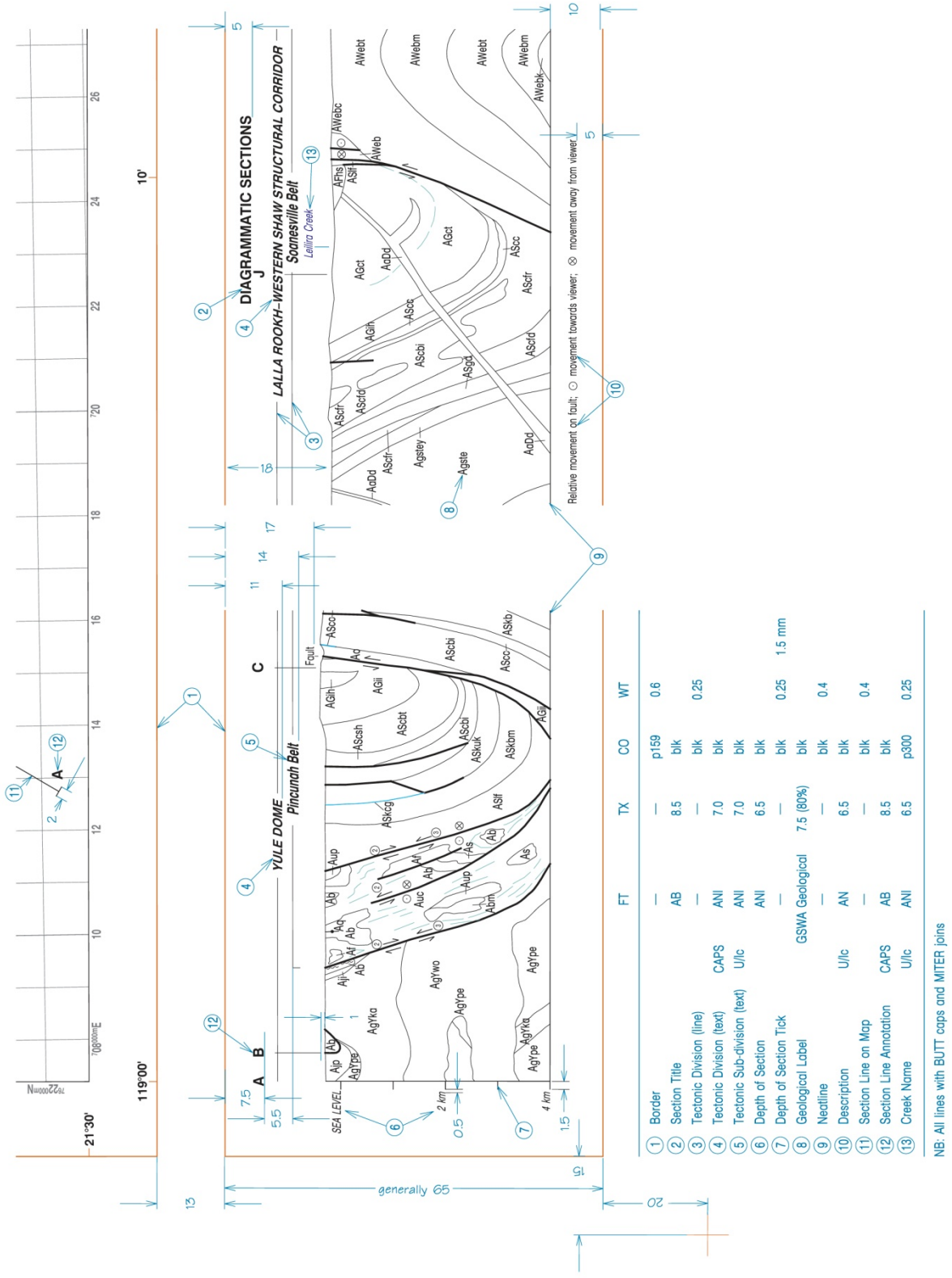
2	Map series info.	AB (CAPS)	10.5	blk	—
3	Latitude/Longitude	AB	7.0	blk	—
4	MGA coordinates	ANB	7.0	blk	—
5	MGA grid	—	—	blk 60	0.25
6	Neatline (shown on map)	—	—	blk	0.4
	Neatline (colour boundary)	—	—	—	—
7	Regolith label	GSWA Regolith	8.0 (80%)	blk	—
8	Geological label	GSWA Geological	7.5 (80%)	blk	—
9	Leadline	—	—	blk	0.25
10	Border	—	—	p159	0.6
11	Graticule tick	—	—	p159	0.6 1.5mm
12	Destination	ANI	6.5	blk	—
13	Section line on map	—	—	blk	—
14	Section line annotation	AB (CAPS)	8.5	blk	—

Cross section layout design



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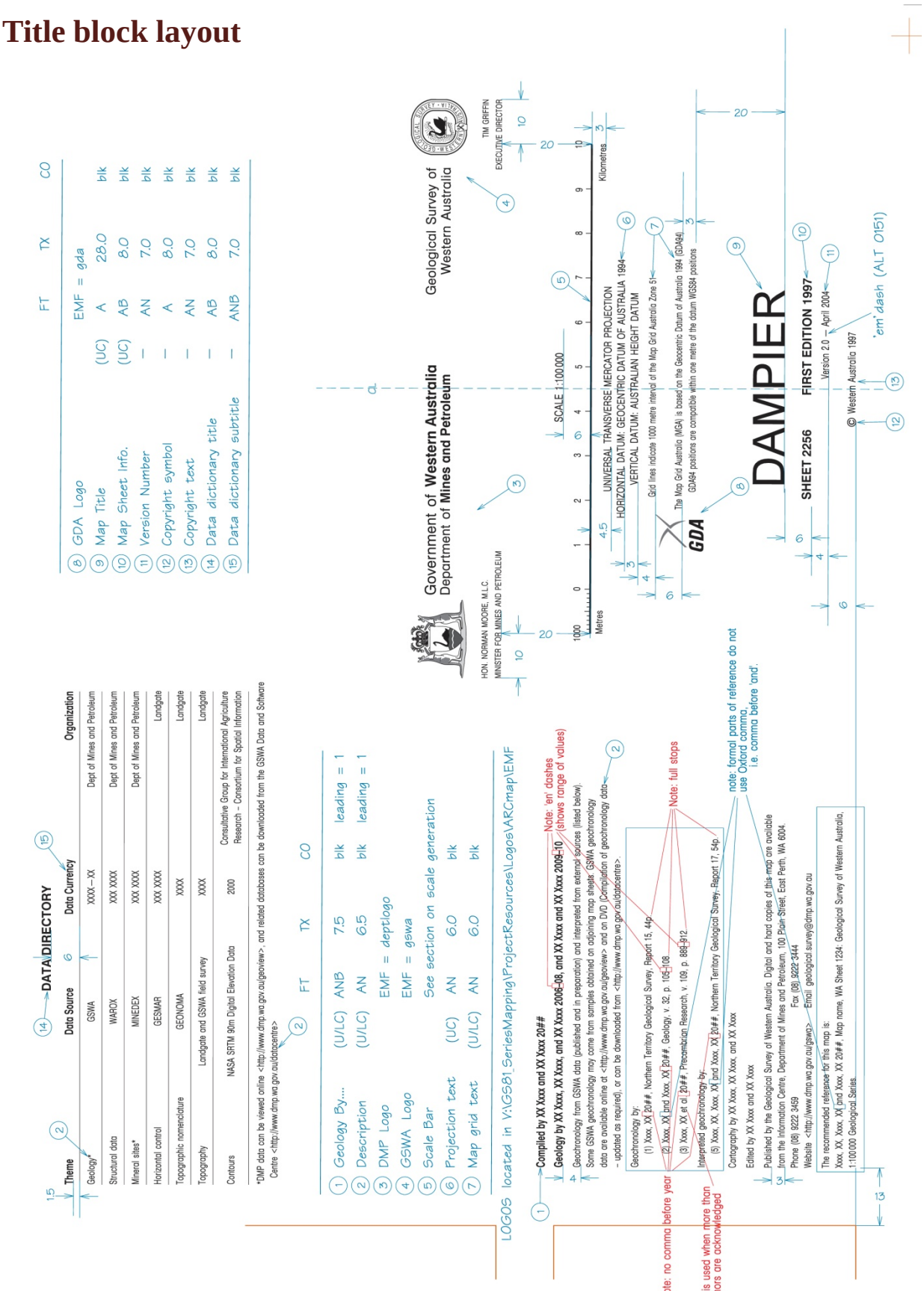
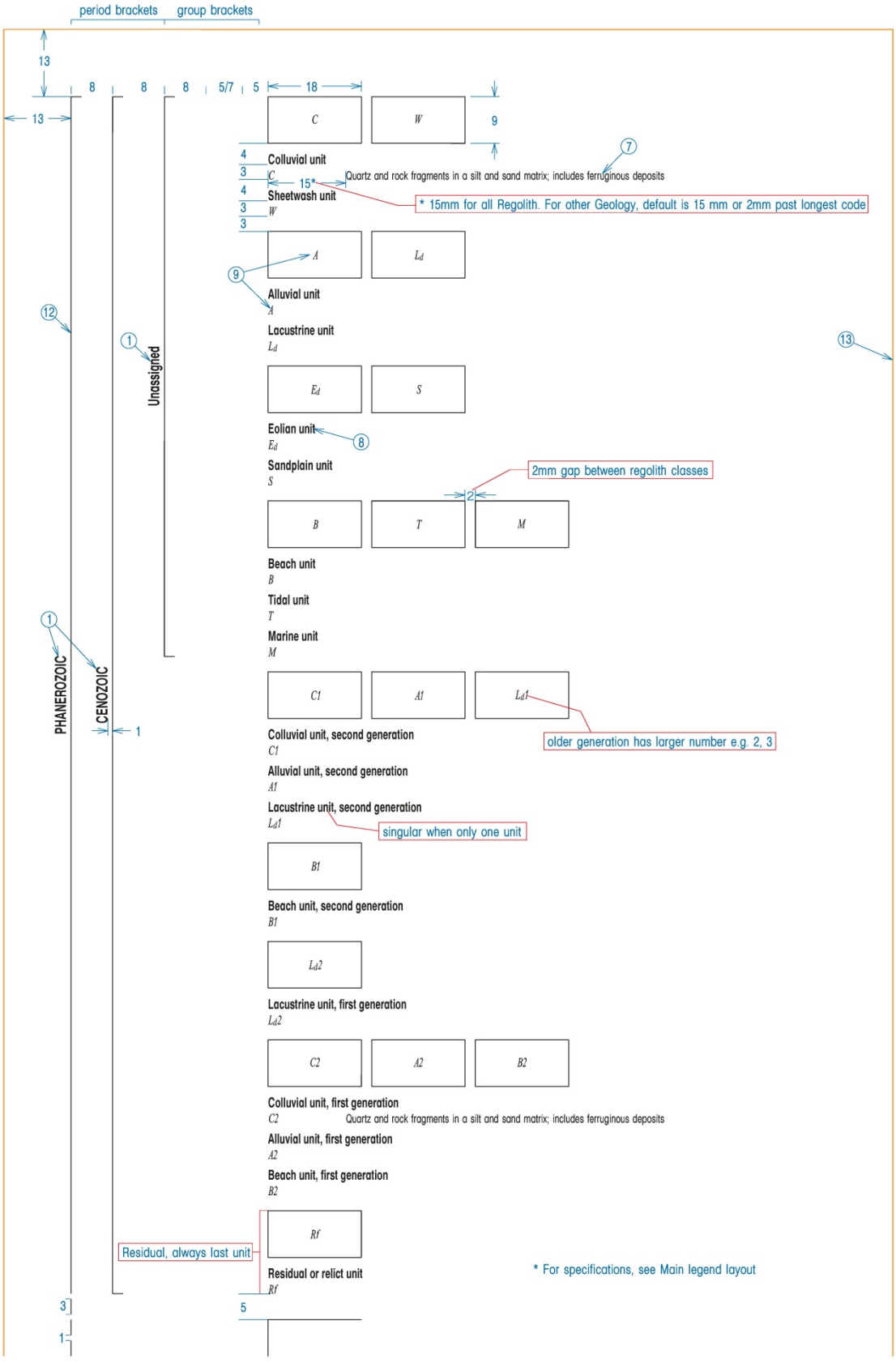
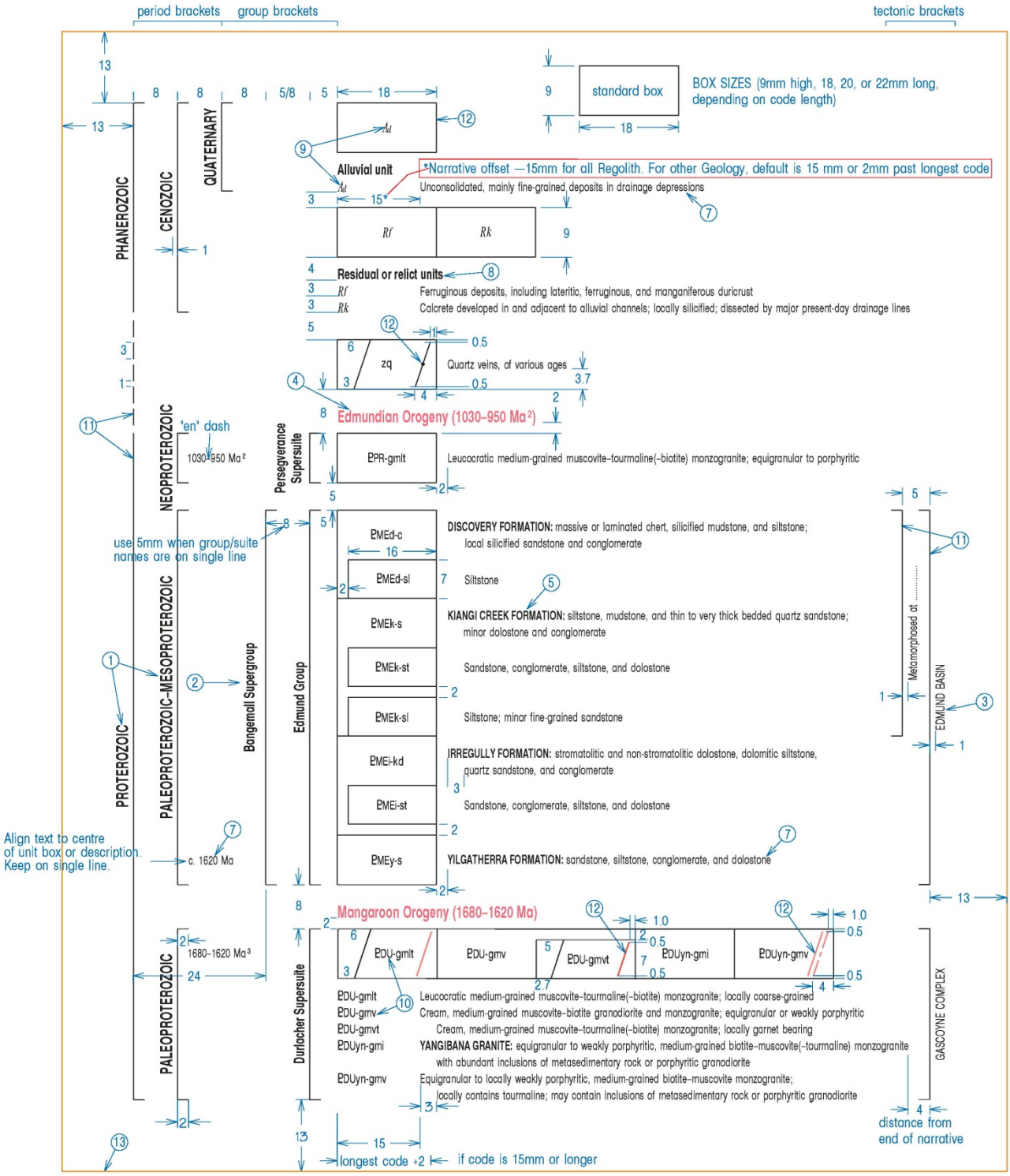
(1)	Border	—	—	p159	0.6	
(2)	Section Title	AB	8.5	blk		
(3)	Tectonic Division (line)	—	—	blk	0.25	
(4)	Tectonic Division (text)	CAPS	ANI	7.0	blk	
(5)	Tectonic Sub-division (text)	U/lc	ANI	7.0	blk	
(6)	Depth of Section		ANI	6.5	blk	
(7)	Depth of Section Tick		—	—	blk	0.25 1.5 mm
(8)	Geological Label	GSWA Geological		7.5 (80%)	blk	
(9)	Neatline	—	—	—	blk	0.4
(10)	Description	U/lc	AN	6.5	blk	
(11)	Section Line on Map	—	—	—	blk	0.4
(12)	Section Line Annotation	CAPS	AB	8.5	blk	
(13)	Creek Name	U/lc	ANI	6.5	p300	0.25

Title block layout



Geology reference





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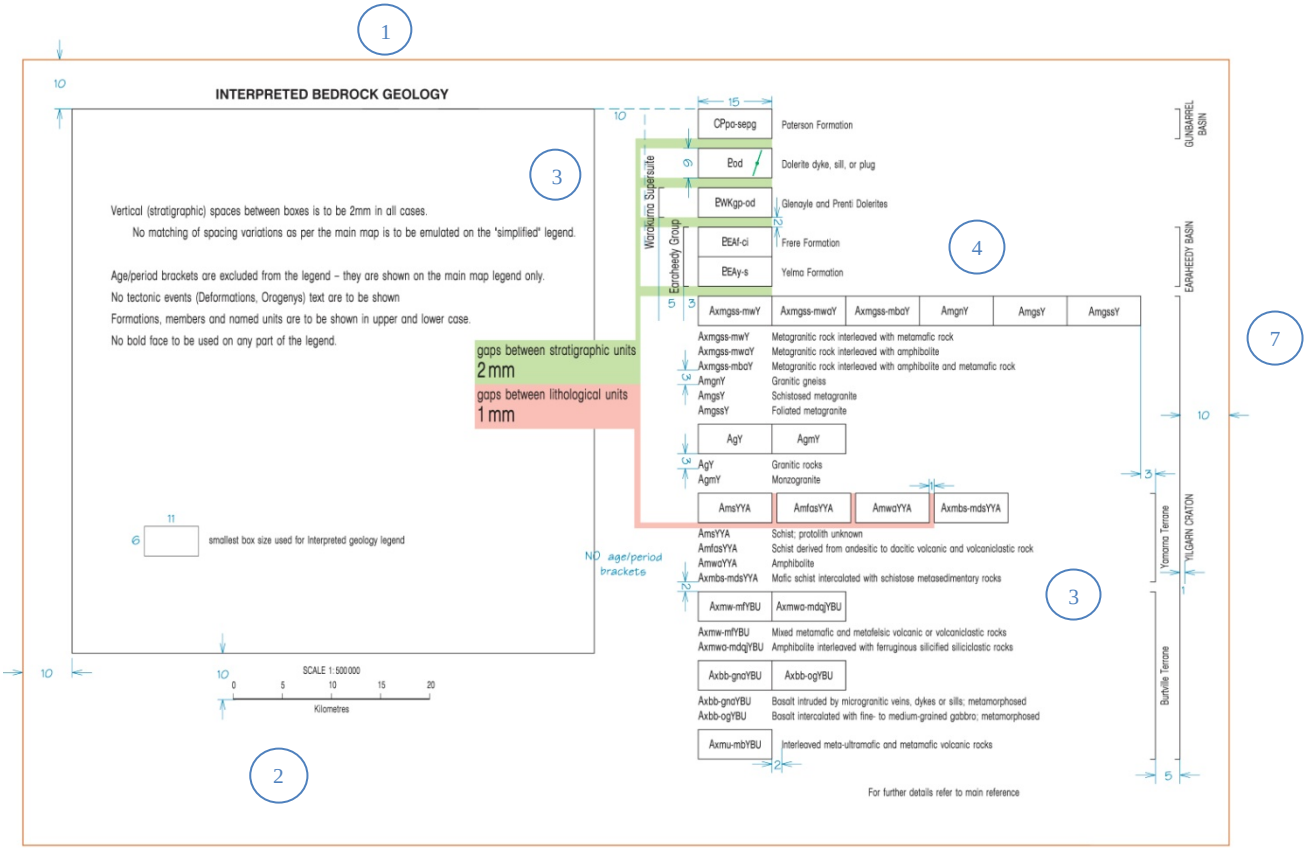
① Period text	CAPS	ANB	8.5	blk
② Group text	U/lc	ANB	7.5	blk
③ Tectonic text	CAPS	AN	6.5	blk
④ Orogeny	U/lc	ANB	8.5	p194
⑤ Formation	CAPS	ANB	6.5	blk
⑥ Member	U/lc	ANB	6.5	blk
⑦ Description	U/lc	AN	6.5	blk
⑧ Regolith heading	U/lc	ANB	7.5	blk

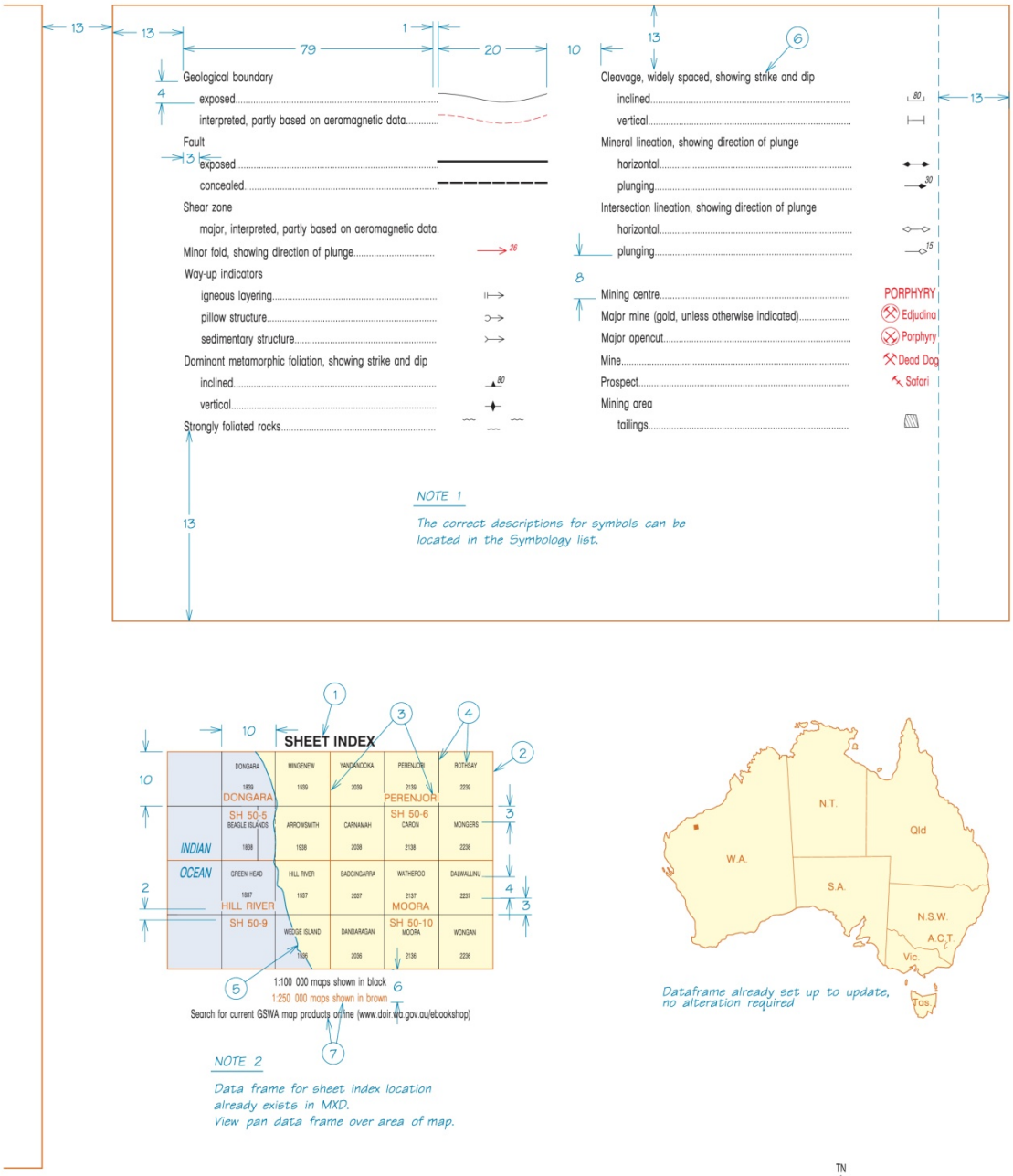
			FT	TX	CO	WT
⑨ Regolith label	U/lc	GSWA Regolith	8.0 (80%)	blk		
⑩ Geological label	U/lc	GSWA geological	7.5 (80%)	blk		
⑪ Brackets / box outlines			—	—	blk	0.4
* All lines use BUTT caps and MITER joins						
⑫ Dykes/veins	—	—	—	—	as per map face	
⑬ Panel border	—	—	—	—	p159	0.6

Interpreted bedrock geology layout



			FT	TX	CO	WT
1	Title	(UC)	AB	8.0	blk	
2	Scale	See section on scale generation				
3	Description	(U/LC)	AN	6.5	blk	
4	Geological Tag/Label	(U/LC)	GSWA Geological	7.5 (80%)	blk	
5	Fault name	(U/LC)	AN	6.5	blk	
6	Dykes/Veins	—	—	—	as per map face	
7	Brackets	NB: BUTT caps and MITER joins			blk	0.4

Symbology reference

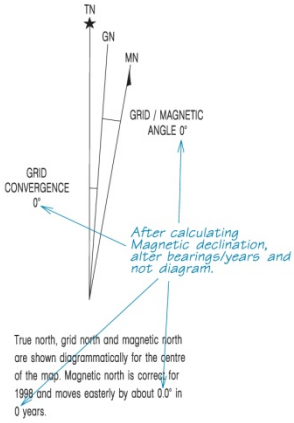


NOTE 2

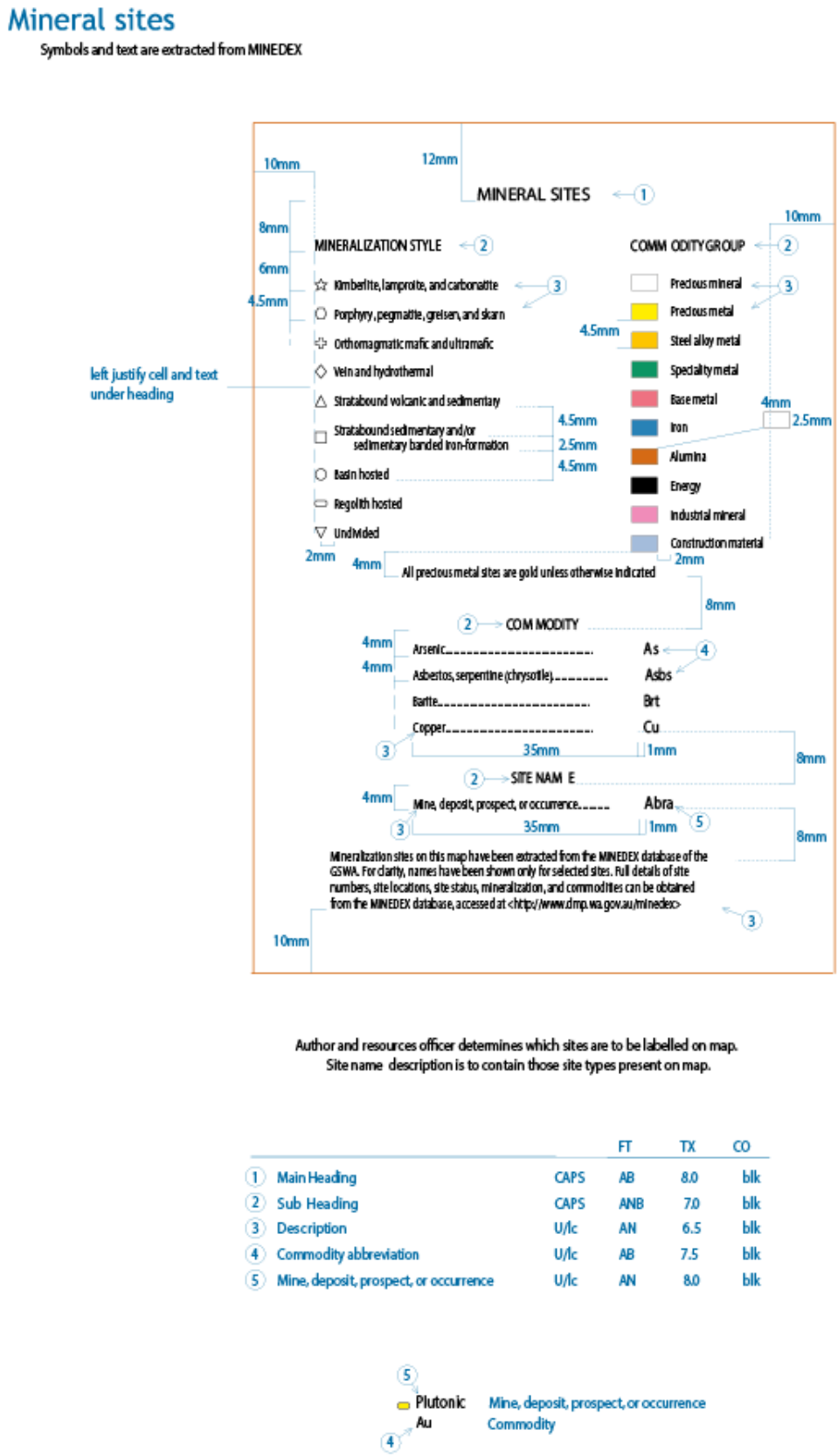
Data frame for sheet index location already exists in MXD.
View pan data frame over area of map.

Dataframe already set up to update, no alteration required

			FT	TX	CO	WT	
1	Heading	(UC)	AB	8.0	blk		
2	Location Map Border		—	—	p159	0.4	
3	1:250000 Map	(UC)	A	5.5	p159	0.4	mask = 0.35 yel20
4	1:100000 Map	(UC)	AN	5.0	blk	0.25	mask = 0.35 yel20
5	Coastline		—	—	p300	0.6	
6	Reference description	(U/LC)	AN	6.5	blk		
7	Index description	(U/LC)	AN	6.0	blk/p159		



Mineral sites panel



			FT	TX	CO
1	Main Heading	CAPS	AB	8.0	blk
2	Sub Heading	CAPS	ANB	7.0	blk
3	Description	U/lc	AN	6.5	blk
4	Commodity abbreviation	U/lc	AB	7.5	blk
5	Mine, deposit, prospect, or occurrence	U/lc	AN	8.0	blk

Geology symbols reference list

AQUA TEXT: Symbology not available yet

Geological boundaries

	SYMBOL	TEXT FT	PT	STYLE	CO
Geological boundary					
exposed	—	—	—	—	blk
concealed	—	—	—	—	blk
concealed, interpreted	—	—	—	—	P192
concealed, interpreted from aeromagnetic data	—	—	—	—	P192
concealed, partly interpreted from aeromagnetic data	—	—	—	—	P192
approximate edge of subsurface unit, based on drilling and outcrop	—	—	—	—	P192
(Interpreted bedrock geology and MEOP maps)					
Geological boundary	—	—	—	—	blk

Deformation events

		SYMBOL	FT	PT	STYLE	CO
Structural symbols are labelled according to their age						
Holocene	H	FAR	—	—	—	blk
Phanerozoic	iP	FAPRO	—	—	—	blk
Proterozoic	E	FAP	—	—	—	blk
Archean	A	FAA	—	—	—	blk
Structural symbols are labelled according to the sequence of deformation events, where known						
local deformation events						
D_7	7	DB7,DR7	—	—	—	blk P192
D_6	6	DB6,DR6	—	—	—	"
D_5	5	DB5,DR5	—	—	—	"
D_4	4	DB4,DR4	—	—	—	"
D_3	3	DB3,DR3	—	—	—	"
D_2	2	DB2,DR2	—	—	—	"
D_1	1	DB1,DR1	—	—	—	"
Kimberley Region						
Alice Springs Orogeny (400–300 Ma)						
D_7	7	DB7,DR7	—	—	—	"
King Leopold Orogeny (*c.* 560 Ma)						
D_6	6	DB6,DR6	—	—	—	"
Yampi Orogeny (*c.* 1000 Ma)						
D_5	5	DB5,DR5	—	—	—	"
Halls Creek Orogeny (1835–1805 Ma)						
D_4	4	DB4,DR4	—	—	—	"
D_3	3	DB3,DR3	—	—	—	"
Hooper Orogeny (1870–1850 Ma)						
D_2	2	DB2,DR2	—	—	—	"
D_1	1	DBH	—	—	—	blk P192
Capricorn Orogen and Southwest Hamersley Basin						
Edmundian Orogeny (1020–755 Ma)						
Edmund Fold Belt	ED	EFB	—	—	—	blk
D_{2e}	2D	DC2,DRD2	—	—	—	blk P192
D_{1e}	1D	DC1	—	—	—	"
Mangaroon Orogeny (1685–1660 Ma)	M	MAGE/MAGER	—	—	—	blk
D_2	2	DBH2	—	—	—	blk P192
D_1	1	DBH1	—	—	—	"
Capricorn Orogeny (1830–1780 Ma)	C	CAGE/CAGER	—	—	—	blk
D_{4n}	4	DB4,DR4	—	—	—	blk P192
D_{3n}	3	DB3,DR3	—	—	—	"
D_{2n}	2	DB2,DR2	—	—	—	"
D_{1n}	1	DB1,DR1	—	—	—	"
Ashburton Fold Belt						
D_{3g}	5	DB5,DR5	—	—	—	blk P192
D_{2g}	4	DB4,DR4	—	—	—	"
D_{1g}	3	DB3,DR3	—	—	—	"
Ophthalmia Fold Belt						"
D_{2c}	2	DB2,DR2	—	—	—	"
D_{1c}	1	DB1,DR1	—	—	—	"
Glenburgh Orogeny (2005–1960 Ma)						
D_{2g}	2	DP2,DRP2	—	—	—	"
D_{1g}	1	DP1,DRP1	—	—	—	"

Use the same colour and level as the symbol it is associated with

1) Type in capital D, then subscript number, leaving a space before adding dots.
D_4 .....

2) Type subscript letter using FT=86, TH=124, TW=88, and place on origin of line string.
D_4 .....

3) Move to right so letter is in gap between subscript number and first dot.
D_{4n} .....

4) Move down .4mm i.e dx=,-40
D_{4n} .....

AQUA TEXT: Symbology not available yet

Deformation events cont...

		SYMBOL	TEXT FT	PT	STYLE	CO
Pilbara Craton						
Post-Fortescue event						
D_4	4	DB4,DC4	—	—	—	blk P192
Pre-Fortescue event						
D_3	3	DBC3,DRC3	—	—	—	"
D_2	2	DBC2,DRC2	—	—	—	"
Yilgarn						
unspecified	Y	YAGE/YAGER	—	—	—	"
D_3	3	DBC3,DRC3	—	—	—	"
D_2 and D_3	2/3	DBC23,DRC23	—	—	—	"
D_2	2	DBC2,DRC2	—	—	—	"
D_1	1	DBC1,DRC1	—	—	—	"
Paterson Orogen						
Paterson Orogeny (*c.* 550 Ma)						
D_6	6	DB6,DR6	—	—	—	"
local event						
D_5	5	DB5,DR5	—	—	—	"
Miles Orogeny (1132–800 Ma)						
D_4	4	DC4,DRD4	—	—	—	"
D_3	3	DC3,DRD3	—	—	—	"
Yapungku Orogeny (2000–1760 Ma)						
D_2	2	DP2,DRP2	—	—	—	"
D_1	1	DP1,DRP1	—	—	—	"

Use the same colour and level as the symbol it is associated with

Faults / Shears

Fault
Fault or shear — use only one on map

	SYMBOL	TEXT FT	PT	STYLE	CO
exposed	—	AN	7.0	U/lc	blk
normal, exposed, tick on downthrown side	—	—	—	—	"
normal, exposed, tick on downthrown side, showing dip	—	ANI	5.0	U/lc	"
thrust, exposed, triangle on upthrown side	—	—	—	—	"
thrust, exposed, triangle on upthrown side, showing dip	—	ANI	5.0	U/lc	"
reverse, exposed, triangle on upthrown side	—	—	—	—	"
reverse, exposed, triangle on upthrown side, showing dip	—	ANI	5.0	U/lc	"
normal, exposed, reactivated by thrust	—	—	—	—	"
thrust, exposed, reactivated by normal fault	—	—	—	—	"
thrust, exposed, reactivated by thrust	(DBC1,DBC3)	—	—	—	"
exposed, plane showing dip, no movement direction implied	—	ANI	5.0	U/lc	"
strike-slip, exposed, showing relative dextral horizontal displacement	SHSD	—	—	—	"
strike-slip, exposed, showing relative sinistral horizontal displacement	SHSS	—	—	—	"
concealed	—	—	—	—	"
concealed, position uncertain	—	—	—	—	"
normal, concealed, tick on downthrown side	—	—	—	—	"
normal, concealed, tick on downthrown side, position uncertain	—	—	—	—	"
thrust, concealed, triangle on upthrown side	—	—	—	—	"
thrust, concealed, triangle on upthrown side, position uncertain	—	—	—	—	"
reverse, concealed, triangle on upthrown side	—	—	—	—	"
reverse, concealed, triangle on upthrown side, position uncertain	—	—	—	—	"
strike-slip, concealed, showing relative dextral horizontal displacement	SHSD	—	—	—	"
strike-slip, concealed, showing relative dextral horizontal displacement, position uncertain	SHSD	—	—	—	"
strike-slip, concealed, showing relative sinistral horizontal displacement	SHSS	—	—	—	"
strike-slip, concealed, showing relative sinistral horizontal displacement, position uncertain	SHSD	—	—	—	
concealed, interpreted from aeromagnetic data	—	—	—	—	P192
normal, concealed, tick on downthrown side, interpreted from aeromagnetic data	—	—	—	—	"
thrust, concealed, triangle on upthrown side, interpreted from aeromagnetic data	—	—	—	—	"
reverse, concealed, triangle on upthrown side, interpreted from aeromagnetic data	—	—	—	—	"
strike-slip, concealed, showing relative dextral horizontal displacement, interpreted from aeromagnetica data	SHSD	—	—	—	"
strike-slip, concealed, showing relative sinistral horizontal displacement, interpreted from aeromagnetica data	SHSD	—	—	—	"

Faults / Shears cont...

	SYMBOL	TEXT FT	PT	STYLE	CO
concealed, interpreted from seismic data	—	—	—	—	P192
concealed, interpreted from seismic data, position uncertain	—	—	—	—	"
normal, concealed, tick on downthrown side, interpreted from seismic data	—	—	—	—	"
thrust, concealed, triangle on upthrown side, interpreted from seismic data	—	—	—	—	"
reverse, concealed, triangle on upthrown side, interpreted from siesmtic data	—	—	—	—	"
strike-slip, concealed, showing relative dextral horizontal displacement, interpreted from siesmic data	SHSD	—	—	—	"
strike-slip, concealed, showing relative sinistral horizontal displacement, interpreted from siesmic data	SHSD	—	—	—	"
(Interpreted bedrock geology and MEOP maps) Fault	—	AN	7.0	U/lc	blk

Shear zones

	SYMBOL	FT	PT	STYLE	CO
Shear zone					
exposed	—	—	—	—	blk
concealed, interpreted from aeromagnetic data	—	—	—	—	P192
Shear					
exposed	—	—	—	—	blk
concealed, interpreted from aeromagnetic data	—	—	—		P192
Strongly foliated rock	FOL10	AN	7.0	U/lc	blk
Strongly foliated rock, local mylonite	FOL10	AN	7.0	U/lc	"

Folds

	SYMBOL	FT	PT	STYLE	CO
Fold, showing axial trace and generalized plunge direction					
Folds may be displayed without generalized plunge direction: anticline, exposed	—	AN	7.0	U/lc	P192
syncline, exposed	—	AN	7.0	U/lc	P192
overturned anticline, exposed	—	AN	7.0	U/lc	P192
overturned syncline, exposed	—	AN	7.0	U/lc	P192
asymmetric anticline, exposed	—	AN	7.0	U/lc	P192
asymmetric syncline, exposed	—	AN	7.0	U/lc	P192
antiform, exposed	—	AN	7.0	U/lc	P192
synform, exposed	—	AN	7.0	U/lc	P192
overturned antiform, exposed	—	AN	7.0	U/lc	P192
overturned synform, exposed	—	AN	7.0	U/lc	P192
synformal anticline, exposed	—	AN	7.0	U/lc	P192
antiformal syncline, exposed	—	AN	7.0	U/lc	P192
monocline, exposed	—	AN	7.0	U/lc	P192
anticline, concealed	—	AN	7.0	U/lc	P192
syncline, concealed	—	AN	7.0	U/lc	P192
overturned anticline, concealed	—	AN	7.0	U/lc	P192
overturned syncline, concealed	—	AN	7.0	U/lc	P192
asymmetric anticline, concealed	—	AN	7.0	U/lc	P192
asymmetric syncline, concealed	—	AN	7.0	U/lc	P192
antiform, concealed	—	AN	7.0	U/lc	P192
synform, concealed	—	AN	7.0	U/lc	P192
overturned antiform, concealed	—	AN	7.0	U/lc	P192
overturned synform, concealed	—	AN	7.0	U/lc	P192
synformal anticline, concealed	—	AN	7.0	U/lc	P192
antiformal syncline, concealed	—	AN	7.0	U/lc	P192
monocline, concealed	—	AN	7.0	U/lc	P192
mesoscale folding	FMES	AN	7.0	U/lc	P192
Fold, exposed, interpreted from aeromagnetic data	—	AN	7.0	U/lc	P192
Fold, concealed, interpreted from aeromagnetic data	—	AN	7.0	U/lc	P192
Small-scale fold axial surface, showing strike and dip					
inclined	FASI	ANI	5.0	Num	P192
vertical	FASV	ANI	5.0	Num	P192
overturned	FASO	ANI	5.0	Num	P192

Folds cont...

	SYMBOL	TEXT FT	PT	STYLE	CO
Small-scale fold axis, showing trend and plunge					
unspecified	FHUN	ANI	5.0	Num	P192
anticline	FHAN	ANI	5.0	Num	P192
syncline	FHSY	ANI	5.0	Num	P192
antiform	FHAF	ANI	5.0	Num	P192
synform	FHSF	ANI	5.0	Num	P192
S-vergence	FHSV	ANI	5.0	Num	P192
M-vergence	FHMV	ANI	5.0	Num	P192
Z-vergence	FHZV	ANI	5.0	Num	P192
Kink fold, showing trend and plunge	KINK	ANI	5.0	Num	P192
Locality of superposed fold	LOSF	ANI	5.0	Num	P192
(Interpreted bedrock geology and MEOP maps only)					
Fold, showing axial trace and generalized plunge direction	—	AN	7.0	U/lc	P192

Structural symbols

	SYMBOL				
Bedding, showing strike and dip					
inclined	BEIN	ANI	5.0	Num	blk
vertical	BEVE	—	—	—	blk
horizontal	BEHO	—	—	—	blk
overturned	BEOI	ANI	5.0	Num	blk
horizontal, overturned	BEOV	—	—	—	blk
way-up not known, inclined	BEWU	ANI	5.0	Num	blk
strike and dip estimated from aerial photography	BEP1	—	—	—	blk
strike and dip estimated from aerial photography		—	—	—	
0–5°	BEP4	—	—	—	blk
0–15°	BEP1	—	—	—	blk
15–45°	BEP2	—	—	—	blk
45–90°	BEP3	—	—	—	blk
vertical	BEPV	—	—	—	blk
horizontal	BEPH	—	—	—	blk
overturned 0–5°	BEP10	—	—	—	blk
overturned 5–15°	BEI4	—	—	—	blk
overturned 0–15°	BEI4	—	—	—	blk
overturned 15–45°	BEI2	—	—	—	blk
overturned 45–90°	BEI3	—	—	—	blk
trend of bedding	—	—	—	—	blk
Trend of bedding or foliation	—	—	—	—	blk
Paleocurrent, showing trend and sence of direction					
from adhesion surface, sense of direction known	ASFT	—	—	—	blk
from current lineation, sense of direction known	DOMCA	—	—	—	blk
from fluting, sense of direction known	SMFT	—	—	—	blk
from clast imbrication, sense of direction known	CLIM/CIID	—	—	—	blk
from megaripples, sense of direction known	MEGK	—	—	—	blk
from asymmetrical ripple marks, sense of direction known	ARFT	—	—	—	blk
from scours, sense of direction known	SCRK	—	—	—	blk
from cross-bedding, sense of direction known	PCBD/TSFT	—	—	—	blk
from adhesion surface, sense of direction not known	DOMUA	—	—	—	blk
from current lineation, sense of direction not known	CLNP	—	—	—	blk
from fluting, sense of direction not known	DOMUF	—	—	—	blk
from clast imbrication, sense of direction not known	DOMUI	—	—	—	blk
from megaripples, sense of direction not known	DOMUM	—	—	—	blk
from asymmetrical ripple marks, sense of direction not known	DOMUR	—	—	—	blk
from scours, sense of direction not known	DOMUS	—	—	—	blk
from cross-bedding, sense of direction not known	DOMUX	—	—	—	blk
Paleowind direction, showing trend					
from cross-bedding, direction known	PCBD/TSFT				blk
Glacial striae, showing trend and direction of ice movement					
sense of direction known	GSIT	—	—	—	blk
sense of direction not known	GLASTR	—	—	—	blk
Igneous layering, showing strike and dip					
inclined	ILNI	ANI	5.0	Num	blk
vertical	ILVE	—	—	—	blk
horizontal	ILHO	—	—	—	blk
trend of igneous layering	—	—	—	—	blk

Structural symbols cont...

		SYMBOL	TEXT FT	PT	STYLE	CO
Igneous banding, showing strike and dip						
inclined		IBIN	ANI	5.0	Num	blk
vertical		IBVE	—	—	—	blk
horizontal		IBHO	—	—	—	blk
trend of igneous banding		—	—	—	—	blk
Igneous flow banding, showing strike and dip						
inclined		IFBI	ANI	5.0	Num	blk
vertical		IFBV	—	—	—	blk
horizontal		IFBH	—	—	—	blk
trend of igneous flow banding		—	—	—	—	blk
Igneous contact, showing strike and dip						
inclined		ICIN	ANI	5.0	Num	blk
vertical		ICVE	—	—	—	blk
Way-up indicator						
igneous layering		WAIG	—	—	—	blk
igneous differentiation		WAID	—	—	—	blk
pillow structure		WAYP	—	—	—	blk
sedimentary structure		WASE	—	—	—	blk
graded bedding		WAGB				blk
cross-bedding		WAYUPC	—	—	—	blk
fining upwards sequence		WAFS	—	—	—	blk
spinifex texture		WAST	—	—	—	blk
stromatolite growth direction		WASG	—	—	—	blk
Foliation, unspecified, showing strike and dip						
inclined		IGNI	ANI	5.0	Num	blk
vertical		IGNV	—	—	—	blk
horizontal		IGNHB	—	—	—	blk
trend of foliation		—	—	—	—	blk
Metamorphic foliation, showing strike and dip						
inclined		FOIN	ANI	5.0	Num	blk
vertical		FOVE	—	—	—	blk
horizontal		FOHO	—	—	—	blk
dip indeterminate		FODI	—	—	—	blk
dip unknown		FODU	—	—	—	blk
strike and dip estimated from aerial photography						
0–15°		FOP1	—	—	—	blk
15–45°		FOP2	—	—	—	blk
45–90°		FOP3	—	—	—	blk
vertical		FOPV	—	—	—	blk
horizontal		FOPH	—	—	—	blk
strike and dip estimated from aerial photography		FOP1	—	—	—	blk
trend of foliation		—	—	—	—	blk
Gneissic banding, showing strike and dip						
inclined		GNIN	ANI	5.0	Num	blk
vertical		GNVE	—	—	—	blk
horizontal		GNVH	—	—	—	blk
strike and dip estimated from aerial photography						
0–15°		GNP1	—	—	—	blk
15–45°		GNP2	—	—	—	blk
45–90°		GNP3	—	—	—	blk
vertical		GNPV	—	—	—	blk
horizontal		GNPH	—	—	—	blk
trend of gneissic banding or layering		—	—	—	—	blk
Trend of foliation or gneissic banding		—	—	—	—	blk
Cleavage, showing strike and dip						
inclined		CLIN	ANI	5.0	Num	blk
vertical		CLVE	—	—	—	blk
horizontal		CLHO	—	—	—	blk
C–S fabric; inclined		CSFI	AN	4.5	LC	blk
Crenulation cleavage, showing strike and dip						
inclined		CCIN	ANI	5.0	Num	blk
vertical		CCVE	—	—	—	blk
horizontal		CCHO	—	—	—	blk

Structural symbols cont...

		SYMBOL	TEXT FT	PT	STYLE	CO
Shear-sense indicator						
dextral		SHSD	—	—	—	blk
sinistral		SHSS	—	—	—	blk
showing dip of igneous flow banding						
dextral						
inclined		SIDI	ANI	5.0	Num	blk
vertical		SIDV	ANI	5.0	Num	blk
sinistral						
inclined		SISI	ANI	5.0	Num	blk
vertical		SISV	ANI	5.0	Num	blk
showing dip of foliation						
dextral						
inclined		FODD	ANI	5.0	Num	blk
vertical		FODV	ANI	5.0	Num	blk
sinistral						
inclined		FOSI	ANI	5.0	Num	blk
vertical		FOSV	ANI	5.0	Num	blk
normal		FONO	ANI	5.0	Num	blk
reverse		FORE	ANI	5.0	Num	blk
showing dip of gneissic banding						
dextral						
inclined		GLDI	ANI	5.0	Num	blk
vertical		GLDV	ANI	5.0	Num	blk
sinistral						
inclined		GLSI	ANI	5.0	Num	blk
vertical		GLSV	ANI	5.0	Num	blk
normal		GLNO	ANI	5.0	Num	blk
reverse		GLRE	ANI	5.0	Num	blk
Lineation, unspecified, showing trend and plunge						
inclined		LINU	ANI	5.0	Num	blk
vertical		LINV	—	—	—	blk
horizontal		LINH	—	—	—	blk
Mineral lineation, showing trend and plunge						
inclined		MIEL	ANI	5.0	Num	blk
vertical		MILV	—	—	—	blk
horizontal		MILH	—	—	—	blk
Stretching lineation, showing trend and plunge						
inclined		STLI	ANI	5.0	Num	blk
vertical		STLV	—	—	—	blk
horizontal		STLH	—	—	—	blk
Axis of crenulation, showing trend and plunge						
inclined		CRHI	ANI	5.0	Num	blk
horizontal		CRHH	—	—	—	blk
Bedding-cleavage intersection lineation, showing trend and plunge						
inclined		BCIN	ANI	5.0	Num	blk
horizontal		BCIH	—	—	—	blk
Cleavage-cleavage intersection lineation, showing trend and plunge						
inclined		CLCL	ANI	5.0	Num	blk
Slickenside, showing direction and plunge of striation		SLIC	ANI	5.0	Num	blk
Mineral alignment, showing trend and plunge						
inclined		MAIN	ANI	5.0	Num	blk
vertical		MAVE	—	—	—	blk
horizontal		MAHO	—	—	—	blk
Flow lineation, showing trend and plunge						
inclined		FLIN	ANI	5.0	Num	blk
vertical		FLVE	—	—	—	blk
horizontal		FLHO	—	—	—	blk
Igneous lineation, showing trend and plunge						
inclined		ILIC	ANI	5.0	Num	blk
vertical		LIVT	—	—	—	blk
horizontal		ILHZ	—	—	—	blk
Metamorphic mineral defining stretching lineation						
Biotite	Bt	—	AN	5.5	U/lc	blk
Chlorite	Chl	—	AN	5.5	U/lc	blk
Talc	Tlc	—	AN	5.5	U/lc	blk

See Mineral Commodities for full listing (pg11.15)

Structural symbols cont...

		SYMBOL	TEXT FT	PT	STYLE	CO
Fracture, joint, or extension vein, showing strike and dip						
inclined	80	JOIN	ANI	5.0	Num	blk
vertical		JOVE	—	—	—	blk
horizontal		JOHO	—	—	—	blk
Airphoto lineament						
unspecified		—	—	—	—	blk
flow-top trend and ogive structure		—	—	—	—	blk
fracture pattern		—	—	—	—	blk
fracture pattern in granitic rock		—	—	—	—	blk
geomorphic circular feature		—	—	—	—	blk
Airphoto or satellite image lineament						
unspecified		—	—	—	—	blk
flow-top trend and ogive structure		—	—	—	—	blk
fracture pattern		—	—	—	—	blk
fracture pattern in granitic rock		—	—	—	—	blk
geomorphic circular feature		—	—	—	—	blk
Interpreted circular gravity feature		—	—	—	—	P266
Aeromagnetic lineament						
unspecified		—	—	—	—	P266
fracture pattern		—	—	—	—	blk
fracture pattern in granitic rock		—	—	—	—	blk
Aeromagnetic trend line		—	—	—	—	P266
Relative magnetic anomaly, triangle on the side of decreasing intensity		—	—	—	—	P266
Meteorite impact structure		CRYPT	—	—	—	blk
Shatter cones		SHAT	—	—	—	blk
Fossil locality		FOS	—	—	—	blk
Macrofossil locality		MAC	—	—	—	blk
Microfossil locality		MIC	—	—	—	blk
Trace fossil locality		FOST	—	—	—	blk
Wood fossil locality		FOSW	—	—	—	blk
Oncolite locality		ONCOL	—	—	—	blk
Palynomorph locality		PALY	—	—	—	blk
Plant fossil locality		FOSP	—	—	—	blk
Stromatolite fossil locality		STROM	—	—	—	blk
Vertebrate fossil locality		FOSV	—	—	—	blk
Fossil type locality		TYSECT	—	—	—	blk
Type section		TYSECT + line	—	—	—	blk
Isotopic age determination site with identification number	114358	ISOS	AN	5.0	Num	blk

Topography symbols reference list

Topographical features

	SYMBOL	TEXT FT	PT	STYLE	CO
Highway with national route marker; bridge	HWY1,94,95	ANI	6.5	UC	blk 40
Road; sealed	—	ANI	6.5	UC	blk 40
Road; unsealed	—	—	—	—	blk 40
Major track	—	—	—	—	blk 40
Track	—	—	—	—	blk 40
Fence, generally with track	—	—	—	—	blk 40
Vermin-proof fence	—	ANI	6.0	LC	blk 40
Railway, with siding	SIDING	ANI	6.5	U/lc	blk 40
Abandoned railway	—	—	—	—	blk 40
Telegraph line	—	—	—	—	blk 40
Powerline	—	—	—	—	blk 40
Underground gas pipeline	—	—	—	—	blk 40
Cut line	—	—	—	—	blk 40
Landing ground	LANDING	—	—	—	blk 40
Airfield	AIRFIELD	—	—	—	blk 40
Airport	AIRPORT	—	—	—	blk 40
Townsite					
population more than 10 000		AN	10.5	UC	blk 40
1 000 – 10 000		AN	8.5	UC	blk 40
less than 1 000		AN	8.0	U/lc	blk 40
Homestead	HMST	80	8.0	U/lc	blk 40
Locality	—	AN	6.5	U/lc	blk 40
Aboriginal community	HMST	AN	7.0	U/lc	blk 40
Aboriginal name	—	ANI	6.5	U/lc	P335
Building	BLD	—	—	—	blk 40
Yard	YARD	AN	6.5	U/lc	blk 40
Microwave repeater station	MICROWAVE	AN	6.0	U/lc	blk 40
Solar panel	SOLARPANEL	AN	6.0	U/lc	blk 40
Satellite tracking station	SATTELITE	AN	6.0	U/lc	blk 40
National park boundary	—	AN	7.5-11.5	UC	blk 40
Reserve boundary	—	AN	6.5-8.5	U/lc	blk 40
Local government area boundary	—	AN	6.5-8.5	UC	P192
Horizontal control; major, minor, with name	TRIGMAJOR, TRIGMINOR	(name)ANI	7.5	U/lc	blk 40
		(number)ANI	6.5	num	blk 40
		(height)ANI	5.5	lc	blk 40
Levee	—	—	—	—	blk 40
Breakaway	—	—	—	—	blk P159
Ridge	—	—	—	—	P159
Sand dune crest	—	—	—	—	P159
Swale line, axis of depression	—	—	—	—	P159
Contour line, 20 metre interval	—	ANI	6.0	NUM	P159
Contour, depression	—	ANI	6.0	NUM	P159
Watercourse with ephemeral pool or waterhole	—	ANI	6.5	UC	P300
Lake	—	ANI	6.5-7.5	UC	P300
Playa lake	—	ANI	6.5-7.5	UC	P300
Bathymetric contour, depth in metres	—	ANI	6.0	NUM	P300
Pool	POOL	ANI	6.5	U/lc	P300
Gnamma hole, rockhole, waterhole	GNAMMA, ROCKHOLE	ANI	6.5	U/lc	P300
Waterhole	WATERHOLE	ANI	6.5	U/lc	P300
Sinkhole	SINK	ANI	6.5	U/lc	P300
Waterfall	—	ANI	6.5	U/lc	P300
Soak, spring	SOAK, SPRING	ANI	6.5	U/lc	P300
Swamp	SWAMP	ANI	6.5	U/lc	P300
Mangrove					P300
Dam	—	ANI	6.5-7.5	UC	P300
Pipeline	—	ANI	6.5	UC	P300
Drain, channel	—	ANI	6.5	UC	P300
Bore, well	BORE, WELL	ANI	6.5	U/lc	P300
GSWA water exploration bore	GSWAEB	ANI	6.5	U/lc	P300
GSWA water exploration bore, showing subsurface data	GSWAEB	ANI	6.5	U/lc	P300 P192
GSWA water exploration bore with artesian flow	GSWAEA	ANI	6.5	U/lc	P300
Windpump, solar pump	WINDPUMP, SOLARPUMP	ANI	6.5	U/lc	P300

Not used on 1 : 100 000 Maps

Use the same text attributes as the feature on the map face.
Put Aboriginal name first on maps in a predominantly cultural area.

use lower case when name is of the trig — Heartbreak 321 m

use upper case when name is of a feature — MOUNT NORCOTT 421 m

AQUA TEXT: Symbology not available yet

Topographical features cont...

		SYMBOL	TEXT FT	PT	STYLE	CO
Dam, tank	□ Dam □ Tank	DAM, TANK	ANI	6.5	U/lc	P300
Artesian flow		ART1	ANI	6.5	U/lc	P300
Abandoned	(abd)		ANI	6.5	U/lc	P300
Position reliable	(PR)		ANI	6.5	U/lc	P300
Position doubtful	(PD)		ANI	6.5	U/lc	P300
Position approximate	(PA)		ANI	6.5	U/lc	P300
Suspended	(S)		ANI	6.5	U/lc	P300
Situation unidentified	(SU)		ANI	6.5	U/lc	P300
Lighthouse		LIGHT	ANI	6.5	UC	blk 40
Area of unsafe navigable water		—	AN	6.5	U/lc	blk 40
Boundary of shoal		—	AN	6.5	U/lc	blk 40
Prominent submerged reef		—	AN	6.5	U/lc	blk 40
Rock, exposed		ROCK	AN	6.5	U/lc	blk 40
Wreck, exposed		WRECK	AN	6.5	U/lc	blk 40

Petroleum

Gasfield or oilfield boundary		—	—	—	—	blk
Petroleum exploration well						
drilling in progress		DIP	AN	7.0	U/lc	blk
suspended		WS	AN	7.0	U/lc	blk
dry, abandoned		WDA	AN	7.0	U/lc	blk
show of oil		SOIL	AN	7.0	U/lc	blk
show of oil, suspended		SOILS	AN	7.0	U/lc	blk
show of oil, abandoned		SOILA	AN	7.0	U/lc	blk
show of gas		SGAS	AN	7.0	U/lc	blk
show of gas, suspended		SGASS	AN	7.0	U/lc	blk
show of gas, abandoned		SGASA	AN	7.0	U/lc	blk
show of oil and gas		SOAG	AN	7.0	U/lc	blk
show of oil and gas, suspended		SOAGS	AN	7.0	U/lc	blk
show of oil and gas, abandoned		SOAGA	AN	7.0	U/lc	blk
service		SERV	AN	7.0	U/lc	blk
completed as water bore		WB	AN	7.0	U/lc	blk
Stratigraphic well		STRAT2	AN	7.0	U/lc	blk
Petroleum production well						
oil		OIL	AN	7.0	U/lc	blk
oil, suspended		OILS	AN	7.0	U/lc	blk
oil, abandoned		OILA	AN	7.0	U/lc	blk
gas		GAS	AN	7.0	U/lc	blk
gas, suspended		GASS	AN	7.0	U/lc	blk
gas, abandoned		GASA	AN	7.0	U/lc	blk
oil and gas		OAG	AN	7.0	U/lc	blk
oil and gas, suspended		OAGS	AN	7.0	U/lc	blk
oil and gas, abandoned		OAGA	AN	7.0	U/lc	blk
gas and condensate		GAC	AN	7.0	U/lc	blk
gas and condensate, suspended		GACS	AN	7.0	U/lc	blk
gas and condensate, abandoned		GACA	AN	7.0	U/lc	blk

Mining symbols reference list

Mining		SDE code	SYMBOL	TEXT FT	PT	STYLE	CO
Mineral field boundary			—	C	12.5	UC	blk40
Mineral field district boundary			—	C	10.5	UC	blk40
Mining centre	MOUNT DOCKRELL		—	AN	8.0	UC	blk
Mining locality	Bardoc		—	AN	8.0	UC	blk
Battery or treatment plant, abandoned			BAT,BATA	AN	7.5	U/lc	blk 40
Opencut or quarry		Opencut	—	AN	7.0	U/lc	blk blk 40
Made ground or mining area		Made ground	—	AN	7.0	U/lc	blk blk 40
Tailings or stockpile		Tailings	—	AN	7.0	U/lc	blk blk 40
Limit of alluvial workings		Alluvial	—	AN	7.0	U/lc	P192
Check with chief geoscientist as to whether drillholes are to be shown on map before extracting							
Mineral exploration drillhole, costean, pit, or shallow trench	⊗Ab		DRHL	AN	6.5	U/lc	P192
Mineral exploration drillhole showing subsurface data	⊗AHc		DRHL	AN	6.5	U/lc	P192
Mineral exploration drill line showing subsurface data	⊗—⊗PYdm		DRHL				P192

Mineral commodities acronyms

Mineral Commodities

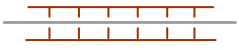
Agate	Aga
Aggregate, coarse	Aggc
Aggregate, crushed rock	Aggr
Aggregate, decorative	Aggd
Aggregate, fine	Aggf
Aggregate, marine	Aggm
Aggregate (undifferentiated)	Agg
Agricultural lime	Ag-lime
Alumina	Al203
Aluminium; Aluminun	Al
Alunite	Alu
Amazonite	Amaz
Andalusite	And
Anhydrite	Anh
Antimony	Sb
Apatite	Ap
Aquamarine rock	Arck
Arsenic	As
Asbestos, amphibole	Asba
Asbestos, chrysotile (serpentine)	Asbs
Asbestos, crocidolite (riebeckite)	Asbr
Asbestos, (undifferentiated)	Asb
Attapulgite	Atta
Ballast	Ball
Barite	Brt
Barium	Ba
Basalt	Bas
Bauxite	Bx
Bentonite	Bent
Beryl, aquamarine	Brla
Beryl, emerald	Brle
Beryl, heliodor	Brlh
Beryl, morganite	Brlm
Beryl, (undifferentiated)	Brl
Beryllium	Be
Bismuth	Bi
Black Granite	BlackGran
Borate	Bor
Boron	B
Bush rock	Brck
Cadmium	Cd
Calcite	Cal
Caliche	Cali
Carbon	C
Carnallite	Cnl
Celestite	Cls
Cerium	Ce
Cesium	Cs
Chalcedony, carnelian	Clcc
Chalcedony, onyx	Clco
Chalcedony, prase	Clcp
Chalcedony (undifferentiated)	Clc
Chalk	Chalk
Chert	Chert
Chlorite	Chl
Chromium	Cr
Chromium oxide	Cr2O3
Chrysoprase	Chrp
Clay	Cy
Clay, brick	Cybk
Clay, dolomitic	Cydo
Coal, black	Cbl
Coal, brown	Cbr
Coal, (undifferentiated)	Coal
Cobalt	Co
Conglomerate	Cgl
Construction materials	Cmat
Copper	Cu
Corundum	Cor
Corundum, emery	Core
Corundum, ruby	Corr
Corundum, sapphire	Cors
Crytobalite	Crs
Cryolite	Cry
Diamond	Dmd
Diamond, gem and cheap gem	Dmdg
Diamond, industrial	Dmdi
Diatomite	Diat
Dimension stone	Dst
Dolerite	Dl
Dolomite	Dol
Evaporite	Eva
Feldspar	Fel
Fluorine	F
Fluorite	Fl
Flux	Flux
Fuller's earth	Cyf
Gadolinium	Gd
Gallium	Ga
Garnet	Grt
Gemstones	Gems
Germanium	Ge
Glauconite	Glt
Gold	Au
Granite; Granitoid	Gran
Graphite	Gr
Gravel	Gvl
Gypsum	Gp
Hafnium	Hf
Halloysite	Hly
Heavy minerals	HM
Hematite	Hem
Hematite-micaceous iron oxide	Hem-MIO
Ilmenite	Ilm
Indium	In
Iridium	Ir
Iron	Fe
Iron ore	FeOre
Ironstone	Fest
Jade	Jade
Jarosite	Jar
Jasper	Jasp
Kaolinite; Kaolin	Kln
Kyanite	Ky
Lanthanides	LnO
Lanthanum	La
Lapidary Rock	Lapid-Rock
Lead	Pb
Lepidolite	Lpd
Leucoxene	Leu
Lignite	Lig
Limesand	Lsd
Limestone	Lst
Lithium	Li
Lithium oxide	Li2O
Magnesia (magnesium oxide)	MgO
Magnesite	MgCO3
Magnesium	Mg
Magnetite	Mag
Malachite	Mal
Manganese	Mn
Manganese ore	MnOre
Marble	Marb
Mercury	Hg
Mica	Mica
Mineral pigment	Mnpg
Mineral sands	Mnsd
Molybdenite	MoS2
Molybdenum	Mo
Monazite	Mnz
Moonstone	Moonstone
Moss agate	Agam
Neodymium	Nd
Nepheline syenite	Nsy
Nickel	Ni
Niobium	Nb
Niobium pentoxide	Nb2O5
Nitrate	Nitrate
Ochre	Ochre
Oil shale, torbanite	Osh
Olivine	Ol
Opal	Opal
Onamental stone	Osto
Osmium	Os
Palladium	Pd
Palygorskite	Plg
Peat	Peat
Pegmatite	Peg
Perlite	Perl
Petrified wood	Petw
Phosphate; Phosphate rock	Phos
Phosphorus	P
Pisolitic gravel	Pgvl
Platinum	Pt
Platinum Group Elements	PGE
Potassium	K
Pozzolan	Pz
Prehnite	Prh
Pumice	Pum
Pyrite	Py
Pyrophyllite	Prl
Quartz, amethyst	Qtza
Quartz, citrine	Qtzc
Quartz,rose	Qtzr
Quartz, smokey	Qtzs
Quartz (crystal)	Qtz
Quartzite	Qtze
Radium	Ra
Rare Earth Elements	REE
Rare Earth Oxides	REO
Rhenium	Re
Rhodium	Rh
Rhodonite	Rdn
Road metal	Rmet
Ruthenium	Ru
Rutile	Rt
Salt	Salt
Sand, construction	Sdc
Sand, foundry	Sdf
Sand (undifferentiated)	Sd
Sandstone	Sdst
Saponite	Spn
Sapphirine	Spr
Scandium	Sc
Selenium	Se
Sepiolite	Sep
Serpentine	Srp
Shale	Sh
Shells; Shell grit	Shell
Silica flour	Sif
Silica sand	Sisd
Sillimantle	Sil
Silver	Ag
Slate	Sl
Soda ash	Sash
Soil; loam	Soil
Spinel	Spl
Spodumene	Spd
Spongolite	Spon
Staurolite	St
Strontium	Sr
Sulfur	S
Sylvite	Syl
Talc	Tlc
Tantalum	Ta
Tantalum pentoxide	Ta2O5
Tellurium	Te
Thallium	Tl
Thorium	Th
Thunder eggs	Theg
Tiger eye	TiEye
Tin	Sn
Tin oxide (cassiterite)	SnO2
Titanium	Ti
Titanium dioxide	TiO2
Topaz	Toz
Tourmaline	Tur
Travertine	Trvn
Trona	Trn
Tungsten	W
Tungsten trioxide (wolframite)	WO3
Turquoise	Trq
Unspecified/Unknown	UN
Uranium	U
Uranium oxide	U3O8
Vanadium	V
Vanadium pentoxide	V2O5
Variscite	Vrs
Vermiculite	Vrm
Wollastonite	Wo
Xenotime	Xen
Yttrium	Y
Yttrium oxide	Y2O3
Zebra rock	Zeb
Zeolite	Zeol
Zinc	Zn
Zircon	Zrn
Zirconia	Zr02
Zirconium	Zr
Zoisite	Zo

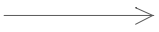
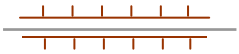
TOPOGRAPHIC SYMBOLS

Features	Symbol	Definition
		Colour Ft or Wt size (pt)
Abandoned	(abd)	Used where the feature is no longer in use. The drafting attributes are used as for the associated symbol.
Aboriginal Community	Warmun Community	An area used for human habitiation by indigenous (Aboriginal) people. EMF = HMST blk 40 AN 7.0 U/LC
Aboriginal Name	*Wolangnguru*	A topographical feature named by indigenous inhabitants p335 ANI 6.5 U/LC
Aboriginal Reserve	*FRASER RIVER RESERVE*	An area of land, set aside for human habitation by the indigenous (Aboriginal) people. p335 0.25pt p335 AN 6.5 U/LC
Airfield		A landing ground designated for National aircraft EMF = AIRF
Airport	 *Port Hedland*	A landing ground designated for National and International aircraft EMF = AIRP blk 40 ANI 6.5 CAPS
Archipelago	*DAMPIER ARCHIPELIGO*	An area of ocean, studded with small islands blk 40 ANI 8.5-14.5 UC
Bank	Grand Bank	A portion of the sea bed raised above the surrounding area, but still covered by water blk 40 AN 6.5-14.5 U/LC
Basin	*BASIN*	An almost landlocked area of water, leading off an inlet; A hollow or trough in the earth's crust, usually filled by water p300 ANI 7.5-14.5 UC
Bathymetric	*120*	An imaginary line joining points on the sea bed which have equal depth below the Lowest Low Sea Level p300 0.25pt p300 ANI 6.0 Num
Bay	*CONZINC BAY*	A comparatively gradual indentation in the coastline p300 ANI 6.5-14.5 UC

Features	Symbol	Definition
		Colour Ft or Wt size (pt)
Beach	Cottesloe Beach	The strip of land or terrace bordering the sea, usually recognized as the part which lies between the high and low water mark blk 40 ANI 6.5 U/LC
Bight	GREAT AUSTRALIAN BIGHT	A crescent shaped indentation in the coastline, usually of a large extent p300 ANI 6.5-14.5 UC
Bluff	Fitzroy Bluff	A headland or cliff with a bold and almost perpendicular front, usually applied to the steep slopes bordering a river blk 40 ANI 6.5 U/LC
Blowhole	Blowhole	A hole which has been formed in the roof of a cave by the movement of air or water, due to the rise and fall of the ocean tides EMF= WELL p300 ANI 6.5 U/LC
Bore	Bore	A small diameter hole drilled into the ground to obtain subterranean water by natural flow or mechanical pumping EMF = WELL p300 ANI 6.5 U/LC
Bore with windpump	Bore	EMF = BWW
Breakaway		The steep surface along which the rocks above a detachment surface have separated from the rocks that remain in place p160 0.25pt
Breakwater		A wall built along the coastline to break the force of the waves blk 40 0.25pt
Bridge		A structure supporting a road or railway over lower terrain EMF = BRIDGE
Brook	Jane Brook	A watercourse which is normally dry, but flows in the wet p300 0.25pt p300 ANI 6.5 U/LC
Building		A structure constructed of brick, steel, asbestos, wood, stone, etc. that supports or houses human activity EMF = BLD
Built-up Area		Residential, commercial and townsite, depicted by road network blk 40 0.4pt

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Buoy		A distinctively marked and shaped anchored float, sometimes carrying a light or bell			
		EMF = LANDMK	ANI	6.5	U/LC
Canal	canal	An artifical watercourse used for drainage, irrigation or for the transport of goods or passengers by boat or ship			
		p300	0.25pt		
		p300	ANI	6.5	LC
Camp	Settlers Camp	Building used for temporary or periodical human habitation			
		EMF = BLD	blk 40	AN	6.5 U/LC
Cape	Cape Lambert	A headland, or less pointed piece of land jutting out into the sea			
		blk 40	ANI	6.5	U/LC
Causeway	causeway	A raised path, road or railway, constructed across wetland areas			
		blk 40	0.4pt		
		blk 40	ANI	6.5	LC
Cave	Cave	Natural relief feature which are used for position and identification			
		EMF = LANDMK	blk 40	ANI	6.5 U/LC
Channel	channel	An artificial watercourse used mainly for irrigation			
		p300	0.4pt		
		p300	ANI	6.5	LC
Channel	channel	A comparatively deep waterway, natural or dredged through a river, harbour, strait, etc… or a navigable route through which affords the best and safest passage for vessels			
		p300	0.4pt		
		p300	ANI	6.5	LC
Claypan		A claypan is a feature formed by the presence of a stiff layer of impervious clay situated just below the ground surface, which holds water after rain			
		p300	0.4pt		
Cliff		A very steep slope, usually of rock which is a landmark or obstacle of movement			
		p160	0.25pt		
Coastline		The coastal outline of the land. Being the limit of land features at mean sea level			
		p300	0.6pt		

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Contour		An imaginary line joining points of equal elevation in relation to the Australian Height Datum (AHD)			
		p159	0.25pt		
		p159	ANI	6.0	Num
Contour Depression		An imaginary line joining points of equal elevation in relation to the Australian Height Datum (AHD)			
		p160	0.25pt		
		p160	ANI	6.0	Num
Conveyor		A continous belt mounted on rollers and used to move large qualities of goods			
		blk 40	0.4pt		
		blk 40	ANI	6.0	LC
Cove		A small indentation in the coastline, frequently with restricted seaward access, and surrounded by cliffs			
		p300	ANI	6.5	U/LC
Crater		A funnel shaped hollow (volcano)			
		p160	0.25pt		
Creek		A watercourse with a clearly defined channel, which is perennial			
		p300	0.25pt		
		p300	ANI	6.5	U/LC
Cut Line		A surveyed line cut through the terrain for the purpose of collecting scientfic data			
		blk 40	0.4pt		
Cutting		A landform produced by excavating through high ground, usually formed when constructing a road or railway line			
		p160	0.25pt		
Dam		A barrier built across a watercourse to arrest the flow of water, and to raise the level of water to form a reservoir			
		EMF = DAM	p300	ANI	6.5 U/LC
Desert	GREAT SANDY DESERT	An almost barren tract of land in which precipitation is minimal			
		blk 40	ANI	7.5+	UC

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Destination Arrow		An arrow indicating the direction of travel towards a feature that is on an adjoining map			
		blk 40	0.25pt		
		blk 40	ANI	6.0	U/LC
Downs	MAP DOWNS	An area of open, treeless, hilly land			
		blk 40	ANI	6.5	UC
Drain	drain	An artificial watercourse, used mainly for drainage			
		p300	0.25pt		
		p300	ANI	6.5	LC
Dredged Area	dredged area	An area of water that has been deepened by mechanical equipment	p300	0.4pt	
			p300	ANI	6.5 LC
Embankment		An artificial bank of earth or stone, built in regions of low relief, and designed to carry a road or railway			
		p160	0.25pt		
Entrance	Bouguer Entrance	The beginning or opening of a naturally formed passage or channel with the sea			
		p300	ANI	6.5	U/LC
Escarpment	DARLING SCARP	An inland cliff or steep slope, formed by the erosion of inclined strata of hard rocks, or as a direct result of a fault			
		blk 40	ANI	6.5	UC
Estuary	LAKE ESTUARY	An arm of the sea at the mouth of a tidal river, where the tidal effect is influenced by the river current			
		p300	ANI	7.5-14.5	UC
Fence		A structure which encloses, bounds, or divides a property			
		blk 40	0.4pt		
Flow Arrow / Dissipation point		An arrow indicating the direction of flow of a watercourse			
		EMF = FLOW	p300	0.25pt	

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Formed Road	GOLDFIELDS ROAD	A strip of land used as an avenue of transport or for physical communication between two or more places. It is usually constructed with a surface of bitumen, concrete, gravel, road metal or a similar bonded or unbonded material			
		blk 40	0.4pt		
		blk 40	ANI	6.5	UC
Gap	Coodardo Gap	An opening through a mountain range			
		blk 40	ANI	6.5	U/LC
Gorge	Winjana Gorge	A valley which is more than unusually deep and narrow, with steep walls			
		blk 40	ANI	6.5	U/LC
Bore		exploration drillholes			
		EMF = GSWAEB	p300	ANI	6.5 U/LC
Gully	Ferntree Gully	A long, narrow channel worn out by the action of water, particularly on a hillside			
		blk 40	ANI	6.5	U/LC
Gulf	CAMBRIDGE GULF	Part of the sea, enclosed by land, usually of a larger extent and greater penetration than a bay			
		p300	ANI	7.5-14.5	UC
Gnamma Hole	 Gnamma hole	Freshwater filled depressions, not associated with a watercourse			
		EMF = GAMMA	p300	ANI	6.5 U/LC
Groyne		A wall built along the coastline to break the force of the waves			
		blk 40	0.25pt		
Harbour	Hampton Harbour	A stretch of water where vessels can anchor, secure to a bouy, or alongside wharves to obtain protection from the sea and swell. The protection may be via natural features, or artificial works			
		p300	ANI	6.5	U/LC
Head - Headland	Vlaming Head	A prominent piece of land protruding out into the ocean			
		blk 40	ANI	6.5	U/LC
Height	560 m	A point of known elevation above the Australian Height Datum			
		blk 40	ANI	6.0	LC

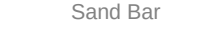
Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Highway	BRAND HIGHWAY	A strip of land used as a major avenue of transport or for physical communication between two or more places. It is constructed with a surface of bitumen, concrete, gravel, road metal or a similar bonded or unbonded material			
		blk 40	1.8pt		
		blk 40	ANI	6.5	UC
Hill	LOOKOUT HILL	A small portion of the earth's surface, elevated above the surrounding terrain			
		EMF = LANDMK	blk 40	ANI	7.5 UC
Homestead	Wanna	A building used for human habitation and associated agriculture orientated activities			
		EMF = HMST	blk 40	C	8.0 U/LC
Horizontal Control	Y145	A point on the ground, where the geographical position has been determined by a second order survey			
		EMF = VERT	blk 40	ANI	6.5 U/LC
Inlet	Swan Inlet	A small indentation in the coastline, usually tapering towards its head			
		p300	ANI	6.5-7.5	U/LC
Island	GARDEN ISLAND	A piece of land that is surrounded by water on all sides			
		blk 40	AN	6.5-7.5	UC
Jetty		Any construction designed to connect ships with the shore, so as to facilitate the transfer of cargo and passengers.			
		blk 40	0.25pt		
Knoll (Knob)	BLUFF KNOLL Hawkins Knob	A small rounded hill or mound			
		EMF = LANDMK	blk 40	ANI	7.5 U/LC
Lagoon	FRESH LAGOON	A shallow stretch of water which is partly or completely separated from the sea by a strip of land, or coral reef			
		p300	0.4pt		
		p300	ANI	6.5-10.5	UC
Lake	LAKE JASPER	An extensive body of water enclosed by land, occupying a hollow in the earth's surface			
		p300	0.4pt		
		p300	ANI	6.5-10.5	UC

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Landing Ground		An unlicensed aerodrome of a permanent nature, not open to general public use. It has a clearly marked, regularly used and maintained runway EMF = LAND	blk 40 blk 40	0.25pt ANI	6.0 LC
Ledge		A comparatively flat area of rock or coral contiguous to a coastline	blk 40	0.25pt	
Levee		Banks on either side of a watercourse which have been built up, either by man or natural deposition during flooding	blk 40	0.25pt	
Lighthouse		A prominent navigation light used by shipping and/or aircraft as a navigation aid EMF = LIGHT			
Locality (Place Name)	Yalenberine	An administrative area EMF = LOCALITY	blk 40	AN	6.5 U/LC
Lookout / Landmark		A feature having landmark or useful for position identification, which is not otherwise symbolised EMF = LANDMK	blk 40	ANI	6.0 U/LC
Major Track		A strip of land used as an avenue of transport or for physical communication. It is usually formed by frequent use, and is occasionally maintained	blk 40	0.4pt	
Mangrove Swamp	MAP PUBLISHER SCREEN	A tidal swamp occupied mainly by mangrove trees. Occurring in low-lying tropical coastal areas, in and around river mouths	p335	ANI	6.5-7.5 CAP
Meteorite Impact	Wolfe Creek Crater	A depression or crater formed by the collision between a meteor and the earth's surface	blk 100	AN	6.5 U/LC
Microwave Repeater Station		A building or part thereof, used for communication purposes eg: television, telecommunication…..etc EMF = MICRO			
Mole		A wall built along the coastline to break the force of the waves	blk 40	0.25pt	

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Monument	Memorial	A feature erected to the memory of a person or event of historical or archaeological importance EMF = LANDMK	blk 40	ANI	7.5 U/LC
Mountain	MOUNT MEHARRY	A mass of land, considerably higher than the surrounding terrain EMF = LANDMK	blk 40	ANI	7.5 UC
Narrows	The Narrows	The thinnest section of a river or body of water	blk 40	ANI	6.5 U/LC
National Park		A region reserved (water or land) for public use due to semi-aesthetic, recreational or conservation value. blk40 0.25pt blk 40 AN 7.5-11.5 UC			
National Route Marker	1	An identifying number assigned to nationally significant routes EMF = HWY1			
Nature Reserve		An area set aside for the conservation of flora and fauna blk 40 0.25 blk 40 AN 7.5-11.5 UC			
Oasis	Oasis	A fertile area which exists from a spring, surrounded by desert EMF = WELL	p300	ANI	6.5 U/LC
Ocean	INDIAN OCEAN	The body of salt water that covers 66% of the earth's surface, surrounding all the land masses.	p300	ANI	6.5-8.5 UC
Offshore Rock		The top section of a rock which is exposed at low tide EMF = ROCK			
Outcamp / Outstation	Settlers Outcamp outcamp	A building used for human habitation or associated agriculture orientated activities EMF = BLD	blk 40	AN	6.5 U/LC
Pass	Kyber Pass	A low and passable gap through a mountain range	blk 40	ANI	6.5 U/LC
Pass (Hydro)	TRAVELLERS PASS	A comparatively narrow channel, often with high ground or cliff on either side leading to a harbour or river	p300	ANI	6.5 UC

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Passage (Hydro)	Passage	A navigable channel, especially through reefs or islands			
		p300	ANI	6.5	U/LC
Peak	PEAK	The top of a mountain or hill			
		EMF = LANDMK	blk 40	ANI	6.5 UC
Peninsula	BURRUP PENINSULA	A stretch of land surrounded by water on three sides			
		blk 40	ANI	7.5+	UC
Pier		Any construction designed to connect ships with the shore, so as to facilitate the transfer of cargo and passengers.			
		blk 40	0.25pt		
Pinnacles	Beasley Pinnacles	Geological structures consisting of limestone columns sculptured by wind and rail			
		EMF = LANDMK	blk 40	ANI	6.5 UC
Pipeline (gas)	gas pipeline	A pipeline used for transfer of gases, or liquids other than water			
		blk 40	0.25pt		
		blk 40	ANI	6.0	LC
Pipeline (water)	pipeline	A pipeline used for the transfer of water			
		p300	0.4pt		
		p300	ANI	6.5	LC
Plain	HIGH PLAINS	An extensive area of level or gently undulating land			
		blk 40	ANI	6.5	UC
Plateau	PLATEAU	An extensive, level or mainly level area of elevated land,			
		blk 40	ANI	7.5	UC
Point (Coastal)	Woodman Point	A headland, a more or less pointed piece of land jutting out into the sea			
		blk 40	ANI	6.5	U/LC
Point (Inland)	Firestick point	A tapering extremity of land, higher than the surrounding relief			
		EMF = LANDMK	blk 40	ANI	6.5 U/LC
Pool	Pool	A water filled depression, in close proximity to a watercourse			
		EMF = POOL	p300	ANI	6.5 U/LC

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Port (Bay / Inlet)	Port	An inlet or protected bay, a place of refuge for ships			
		p300	ANI	6.5	U/LC
Port (Harbour facility)	Dampier Port	A commercial harbour, or the commercial part of a harbour where the facilities for handling cargo are situated			
		blk 40	AN	7.0	U/LC
Pound	Pound	An enclosed area, either by a fence, or by natural topographic features; i.e. cliffs			
		blk 40	ANI	6.0	U/LC
Powerline	Powerline 66000v	Continuous wire or wires supported by pylons, used for the bulk transmission of high voltage electricity			
		blk 40	0.25pt		
		blk 40	ANI	6.0	U/LC
Railway		A strip of land used as an avenue of transport or physical communication, which is constructed from cement sleepers and steel rails on which trains run			
		blk 40	0.25pt		
Railway Siding	Forrest	An area of railway track where trains can stop, and not be on the main railway line. Passengers and cargo may be loaded and unloaded			
		EMF = SIDING	blk 40	ANI	6.5 U/LC
Range	HAMERSLEY RANGE	A series of mountain ridges, with or without peaks, in which the crests are relatively narrow			
		blk 40	ANI	6.5-14.5	UC
Ravine	Ravine	A long, deep, narrow valley, generally eroded by water			
		blk 40	ANI	6.0	U\LC
Reach	Reach	A comparatively straight segment of river or channel			
		EMF = WELL	p300	ANI	6.5 U/LC
Reef	Fortescue Reef	An offshore area of rock or coral			
		blk 40	0.25pt		
		blk 40	AN	6.5	U/LC
Reserve		An area of land set aside for a specific purpose			
		blk 40	0.25pt		
		blk 40	AN	7.5-11.5	UC

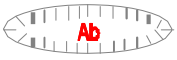
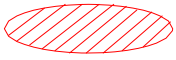
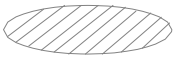
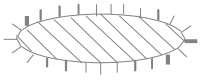
Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Ridge		The long and narrow upper part of a hill or mountain			
		p159	ANI	6.0	U\LC
River		A substantial stream of fresh water, larger than a creek, which flows downwards by a natural channel, into the sea or lake			
		p300	0.4pt		
		p300	ANI	6.5-12.5	UC
Roadhouse		A building or part there-of, used for commercial and accommodation purposes, adjacent to highways or major road			
		EMF = BLD	blk 40	ANI	6.0 U/LC
Roads (Hydro)		An open anchorage which may or may not be protected by shoals, reefs, etc. affording less protection than a harbour			
		p300	ANI	6.5-8.5	UC
Rock		Elevated, prominent rock outcrop			
		EMF = LANDMK	blk 40	ANI	6.5 U/LC
Rock, Offshore		The top section of a rock which is exposed at low tide			
		EMF = ROCK	blk 40	AN	6.5 U/LC
Rockhole		Water filled depression in rock, on or within close proximity to a watercourse			
		EMF = ROCKHOLE	p300	ANI	6.5 U/LC
Ruin		The broken down or decaying remains of a building			
		EMF = BLD	blk 40	ANI	6.0 U/LC
Salt Evaporator		A flat area, usually segmented, used for the commercial production of salt by evaporation			
		blk 40	AN	6.5	UC
Sand Bar		A ridge of sand formed across the mouth of a river, or the entrance to a bay			
		blk 40	AN	6.5	U/LC
Sand Dune		An area of loose sand which has been heaped up by the wind to form mounds, ridges or hills			
		p160	0.4pt		

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Satellite Tracking Station		A building, or part thereof, which is used for the tracking, observation and communication of satellites EMF = TRK			
Sea	TIMOR SEA	One of the smaller divisions of the oceans, especially if partially enclosed by land	p300	ANI	7.5-14.5 UC
Shoal	O'Grady Shoal	An area in a watercourse, lake or ocean where a piece of rising ground causes the water level to be shallow	blk 40	0.25pt	
			blk 40	AN	6.5 U/LC
Sinkhole		A depression in the earth's surface, usually found in a limestone region, through which water enters the ground EMF = SINK	p300	ANI	6.5 U/LC
Soak	Soak	Freshwater filled depression, not associated with a watercourse EMF = SOAK	p300	ANI	6.5 U/LC
Solar Panel		A structure comprising flat or curved panels that convert solar radiation into heat / energy EMF = SOLPAN	blk 40	AN	6.0 U/LC
Solar Pump		A structure comprising flat or curved panels that convert solar radiation into heat / energy EMF = SOLPMP	p300	ANI	6.5 U/LC
Sound	COCKBURN SOUND	A narrow passage between two areas of open water	p300	ANI	7.5-14.5 UC
Spit	Spit	A narrow low-lying tongue of sand or small point projecting out into the sea	blk 40	AN	6.5 U/LC
Spring	Spring	A continuous or intermittent natural flow of water from the ground EMF = SPRING	p300	ANI	6.5 U/LC
Spur	Spur	A ridge or line of elevation projecting from the main body of a hill or mountain	blk 40	ANI	6.0 U\LC

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Strait	BASS STRAIT	A narrow stretch of sea connecting two extensive areas of ocean	p300	ANI	7.5-14.5 UC
Swamp	Swamp	An area of land that is saturated with moisture and usually overgrown with vegetation			
		EMF = SWAMP	p300	ANI	6.5 U/LC
Tableland	GIBSON TABLELAND	A plateau bounded by steep, cliff-like faces which lead abruptly down to the sea, or adjoining lowlands			
			blk 40	ANI	6.5-14.5 UC
Tank	Fred Tank	The impounded body of water formed either by an artificial excavated depression, or constructed by steel and concrete			
		EMF = TANK	p300	ANI	6.5 U/LC
Telegraph line		Continuous wire or wires supported by pylons used for the transmission of messages by voice or keystroke.			
			blk 40	0.25pt	telgph1
Terminal	Barrow Is Terminal	Bulk cargo handling facility			
		EMF = TERMIN	blk 40	AN	6.0 U/LC
Town		Residential, commercial and town site			
greater than 10 000	BUNBURY		blk 40	AN	10.5 UC
1000 - 10 000	PINJARRA		blk 40	AN	8.5 UC
less than 1000	Eneabba		blk 40	AN	8.5 U/LC
Track		A strip of land used as an avenue of transport or for physical communication. It is usually formed by frequent use, and is not maintained			
			blk 40	0.4pt	
Trig Station	Table Hill CAC4 100 m	A point on the ground, the geographical position of which has been determined by Geodetic Survey on the Geocentric Datum of Australia 1994			
		EMF = TRIG	blk 40	AN	6.5 U/LC
Tunnel	Tunnel	A passage, usually cylindrical in shape, cut through or under a natural or man-made obstacle			
			blk 40	ANI	6.5 U/LC

		Colour	Ft or Wt	size (pt)
Unsafe Navigable Area	An area in a watercourse, lake or ocean where a piece of rising ground causes the water level to be shallow	blk 40	0.25pt	
Valley	A long narrow depression in the earth's surface, with a fairly regular downward slope. A river or stream usually flows down the centre of the depression	blk 40	ANI	6.5-14.5 UC
Vermin Proof Fence	A structure which encloses an area to stop the migration of feral animals	blk 40	0.25pt	
		blk 40	ANI	6.0 LC
Waterfall	A place where a sudden change in the gradient of the bed of a watercourse causes the water to fall almost vertically	p300	0.4pt	
		p300	ANI	6.5 UC
Waterhole	Water filled depression within or in close proximity to a watercourse	EMF = WATERHOLE	p300	ANI 6.5 U/LC
Well	A shaft of large diameter sunk into the ground, used to obtain subterranean water by natural flow of mechanical means	EMF = WELL	p300	ANI 6.5 U/LC
Well with windpump		EMF = WWW		
Wharf	Any construction designed to connect ships with the shore, so as to facilitate the transfer of cargo and passengers.	blk 40	0.25pt	
Windpump	A tower fitted with a wind driven fan that drives a pump to bring underground water to the surface	EMF = WNDP		
Wreck	The remains of a sunken vessel, part of which is exposed at low water	EMF = WRECK		
Yard	A fenced enclosure used for the holding of livestock	EMF = YARD	blk 40	AN 6.5 U/LC

MINING SYMBOLS

Features	Symbol	Definition			
		Colour	Ft or Wt	size (pt)	
Mineral Field Boundary		As promulgated under the Mining Act 1904, defining the extent of the gazetted Mineral Fields			
		blk 40	0.6pt		
		blk 40	C	12.5	UC
Mineral Field District		A Subdivision of the Mineral Field, areas of major mining activity			
		blk 40	0.6pt		
		blk 40	C	10.5	UC
Mining Centre	MENZIES	An area of gold mining activity which had/has a centre for the treatment of major gold production			
		p192	AN	8.0	UC
Mining Locality	BARDOC	The grouping together of Mining Centres, Mining Groups, Mines and significant Mineral Prospects due to their proximity to one another			
		p192	AN	7.0	UC
Mining Group	Plutonic	A collection of gold mining leases in a relatively confined group			
		p192	AN	7.0	U/LC
Opencut or pit, showing subsurface data		An area of deep open excavations, showing sub-surface material			
		blk 40	0.25pt		
		p192	AN	7.0	U/LC
Alluvial Workings		The extent of workings of alluvial deposits by dredging, hydraulics or drift mining			
		p192	AN	7.0	U/LC
Made Ground or Mining Area		Ground formed by filling in natural or artificial pits with sand and rock			
		blk 40	0.25pt		
		p192	AN	7.0	U/LC
Tailings or Stock Pile		The portions of washed or milled ore that are regarded as too poor to be treated further			
		blk 40	0.25pt		
		p192	AN	7.0	U/LC
Mineral Exploration Drillhole	⊗ Afv	A circular hole made by drilling, to explore for valuable mineral water or petroleum, or to obtain geological information			
		EMF = DRHL	p192	AN	7.0 U/LC

Edit stage 1 — checklist

Map name: .....

Author(s): ..... **Editor:**.....

Edit start (date): ..... **PubStats ID:**.....

	✓	Comments

At start and continually throughout edit

Update PubStats: check status of map production from Map Production Meeting minutes		

Edit stage 1 (pre-assembly edit)

1. Explanatory Notes System

Review Explanatory Notes entries for draft legend (WA Geology Online)
[Contact: Project Manager, WA Geology Online database adminstrator]

For all units in legend, check ENS to ensure:

• All map codes in draft legend are in ENS		
• Parent–child relationships complete and consistent		
• Maximum and minimum age fields populated		
• Tectonic unit entries approved for data entry		

2. Legend

Request and edit map sheet draft legend [*Contact: Manager Mapping*]

• Stratigraphic rankings match ENS		
• Stratigraphic and lithological relations shown correctly:		
(a) in box arrangement		
(b) in narrative structure		
• Rock codes match ENS		
• Regolith codes and narratives consistent with GSWA Record 2013/7 and recent published map sheets		
• Proofread carefully for spelling, punctuation, and grammar		
• **Box layout**		
(a) is consistent with this Guide (Appendix 7) and Mapping guidelines Section6_StandardsAnd Specifications		
(b) is consistent with recently published and in prep. maps		
(c) makes stratigraphic sense with respect to current litho- and chronostratigraphic understanding (ENS)		
(d) in absence of any other constraints, units are arranged alphabetically		

- Boxes correct for linear units (veins, dykes, beds)
- Time-scale brackets are shown and correctly placed
  - (a) Equivalent time intervals are correctly aligned; era with era, period with period, etc.
  - (b) Proterozoic and Archean divided into Paleo-, Meso-, and Neo- as appropriate
  - (c) Limits of age brackets correctly aligned with lithostratigraphic units
- **Isotopic dates** [refer to Use and reporting of geochronology and isotope results]:
  - (a) Cited dates are isotopic, not inferred or biostratigraphic
  - (b) align with the code of the correct unit and are left aligned
  - (c) use circa (c.; full stop, plain text) not ± value
  - (d) for date ranges do not use circa (c.)
  - (e) are consistent with ENS and are not rounded
- Brackets for Supergroups, Groups, and Subgroups positioned immediately left of rock unit boxes; like aligned with like
- Tectonic events with dates in bold, upper and lower case
- Tectonic brackets correctly aligned with related lithostratigraphic units
- Equivalent tectonic subdivisions are correctly aligned
- Superscript numbers used for age and date references (external geochronology sources to be cited in Reference panel)

3. Colour design (Appendix 3)

- Whole-project colour design is in MapSym and is up to date
- Colour and pattern of rock units
  - (a) existing units match published specifications [see MapSym_System2003 database]
  - (b) new units (existing codes, new to this map): added to colour design and colour designs applied
  - (c) new codes: colour design fits with related lithostratigraphic units, or is consistent with colour design principles
  - (d) no conflicts with other maps and projects
- Line units have the correct colour and symbology (with or without dot) [see Mapping guidelines Section6_StandardsAnd Specifications]
  - (a) veins and dykes of quartz – black; gossan – black
  - (b) veins and dykes of pegmatite, granite, porphyry – pinkish red (e.g. p192); for other granitoid units use the same base pink as for polygons
  - (c) beds of sedimentary rock – grey (e.g. As p410, P_s p437)
  - (d) beds of chert and BIF – blue (e.g. Acc, Acci p300; P_cc, P_cci p279)

(e) beds or dykes of felsic volcanic or volcaniclastic rock – orange-yellow (e.g. Af p123; P_f p151)		
(f) sills and dykes of gabbro or dolerite (outcrop and interpreted) – blue-green (e.g. d, P_od, Aod p335; Ao p335; P_o p321)		
(g) flows of mafic rock – green (e.g. Ab p354; P_b p575)		
(h) flows and dykes of ultramafic rock – purple (e.g. both Au and P_u p266)		

Further comments

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Geological Survey of Western Australia

Style sheet for writing and editing GSWA Explanatory Notes

Site coordinates	Do not use font reduction for initial two digits
Map names	• Use upper case (i.e. no small capitals) • Specify map scale only when not a 1:100 000 sheet
SHRIMP	Acronym is allowed in text (and is explained at end of each report)
Format for citing unpublished and published geochron records	• (GSWA 123456, GSWA preliminary data) • (GSWA 123456, Wingate et al., 2013; GSWA 678901, Kirkland et al., 2013) • (GSWA 142852, Nelson, 1998b; Sheppard and Swager, 1999)
Format for citing WAROX sites	• (AXRJAC000145, Zone 50, MGA 123456E 6700430N) • Sites with different ID formats (e.g. WRO9123) must specifically be identified as being a 'WAROX site'
List of rock codes within brackets	Separate with commas and do not use 'and'; e.g. (A-mg-Y, A-og-YSC, A-sc-YMU)
Approximation	'~' is allowed when in brackets, i.e. (~15%); cf. usage for 'about' and 'approximately' in the spelling guide
Using hyphens with measurements and their units	Avoid unnecessary use of hyphens: i) A rhyolite, typically with 10–15 mm-long phenocrysts of feldspar set in a matrix of… *best rearranged as:* a) A rhyolite, typically with feldspar phenocrysts (10–15 mm long) set in a matrix of… b) A rhyolite with feldspar phenocrysts typically 10–15 mm long set in a matrix of... (Editors take care not to change the meaning.) ii) A rhyolite with feldspar phenocrysts up to 5 mm long. iii) During the program, 5 km traverses were completed. Means → Each traverse was 5 km long Avoid writing '5 km-*long* traverses' *Best rearranged as:* During the program, traverses 5 km in length were completed.
Directions and trends	• Compass bearings always written in full (i.e. NNE is <u>not</u> acceptable) • Do not hyphenate simple directions (e.g. southeasterly, not south-easterly) • Examples with hyphens:

a) The dyke is exposed along a west-trending ridge.

Avoid strings of multiple hyphens by using an adverb ending in '-ly' and replacing an en dash with 'to':

a) The dyke forms an east-northeasterly trending ridge.

b) …an east-southeasterly to west-northwesterly trending rift axis.

Plural vs singular

- Massive medium- to coarse-grained tonalite and lesser medium-grained granodiorite forms… *should be*:

  Massive medium- to coarse-grained tonalite and lesser medium-grained granodiorite form…

- Volcanics or Metamorphics in a formal name are plural, not singular (e.g. the Moogie Metamorphics are found in…), unlike Formation or Group.

  …*but in general text use* 'volcanic rocks' (*not* 'volcanics').

- Lithologies in text are generally singular (e.g. 'sandstone is present in the area', not 'sandstones occur in the area').

References

- a/b/c are entered manually, in the order they appear in the text and geochron tables

  NB: this is unlike manuscripts where RefMan sorts things automatically and according to GSWA style

- Cited in the text chronologically
- (e.g. Riganti, 1998): e.g. is allowed, but should be used sparingly

Formatting

Formatting is not saved when pasting from MS Word into an ENS editing window as plain text.

Use ASCII or MS Word shortcuts to apply formatting directly in the database.

Useful formatting shortcuts (with Num Lock on)

- En dash Alt+0150 (or Ctrl+Num -)
- Em dash Alt+0151
- ± Alt+0177
- Non-breaking spaces Ctrl+Shift+SPACE

  Examples (underscore indicates position of non-breaking space):

  - Riganti_et_al.
  - 1895_±_2_Ma
  - c._2800_Ma
  - 10_cm
  - GSWA_123456
  - Zone_50
  - 1:100_000

Tectonic unit brackets: hierarchy of units in UPPER CASE vs those in upper/lower case

Style: UPPER CASE for CRATON and PROVINCE levels, upper/lower case for all units below those levels; all text roman (not bold)

Domain Foreland Terrane Fold Belt Zone Batholith Inlier/Outlier Ridge Sub-basin Platform Shelf Terrace

PROVINCE SUPERTERRANE BASIN

CRATON OROGEN SUPERBASIN

Less commonly, an additional CRATON bracket may be added

NORTH AUSTRALIAN CRATON

Edit stage 2 — checklist

Map name: .....

Author(s): ..... **Editor:**.....

Edit start (date): ..... **PubStats ID:**.....

	✓	Comments
At start and continually throughout edit		
1. Update PubStats database: check status of map production from Map Production Meeting minutes		
Edit stage 2 (full map edit)		
2. Marginalia		
• **Title block**		
Series maps:(a) position (lower right corner), name, edition, version, and year of publication; check font size		
(b) series name and scale placed outside border at top left; map name and sheet number outside border at top		
Project maps: (c) map title in the title block corresponds to manuscript title (if there is a manuscript)		
(d) abbreviated title, publication no., plate no. shown outside border at opposite end from title block		
• **Logos and details**		
(a) State government and GSWA logos are legible and greytones present		
(b) ministerial and directorial details are up to date		
(c) logos from other contributing agencies present and correct		
• Scale bar		
(a) correct scale and spacing of scale number (e.g. 1:100#000)		
(b) correct standard wording		
(c) both metres and kilometres on scale bar		
(d) end ticks to the scale bar are present		
(e) Grid Zone number correct		
• **Reference panel** (format, spelling) [see GSWA spelling guide and GSWA house style]		
(a) list of compiler(s) with year(s) of compilation under 'Compiled by'		
(b) list of contributors, GSWA and non-GSWA, with year(s) of field work under 'Geology by'		
(i) published GSWA geological maps used in compilation shown in index (applies to 1:250 000 and Project maps)		
(ii) for non-GSWA maps that were used in compilation, the author(s) are cited with date of publication under 'Geology by' (i.e. not with date of compilation)		

(c) external geochronology references are in standard format [see Use and reporting of geochronology and isotope results]
(d) drillhole data references (where used) are in standard format
(e) recommended reference is in standard GSWA format
(f) cartographic and geoscience editors included
(g) check spelling, punctuation, grammar

- **Data sources:** all themes shown, web addresses correct

- **Location information**
  (a) index map of standard map sheets

  Series maps: (i) title 'SHEET INDEX'
  (ii) colours of text, shading, and box outlines correct
  (iii) standard size index appropriate for each series

  Project maps: (i) size (not too large); check shaded map shape within index matches map area and position
  (ii) all GSWA maps used in compilation are shown and clearly differentiated

  (b) location map in Western Australia — position of map square is good
  (c) magnetic declination — true, magnetic, and grid north arrows and annual variations are reasonable. If an error is suspected, check online at http://www.ga.gov.au/oracle/geomag/agrfform.jsp

- **Reliability diagram** (used on some maps only) — confirm with author

3. Mineral sites (mineralization and commodity symbols)

[see Mapping guidelines Section6_StandardsAndSpecifications]

(a) shown as standard WAMIN mineralization symbols
(b) shown with standard rock and commodity abbreviations
(c) only selected commodities labelled
(d) only selected site names shown

4. Symbols list

- Proofread for errors in grammar, punctuation, and spelling, and compare with GSWA standard list of symbols [see Section6_StandardsAndSpecifications]
  (a) order and wording matches the standard
  (b) correct symbol and colour, including purple for structural symbols in regolith
  (c) need for a value next to the symbol
- Non-standard symbols — consult with editing team or map author

5. Regolith and rock units legend (see also **Edit stage 1**)

- Proofread all text carefully for errors in grammar, punctuation, and spelling (changes fed back into regolith lut, if applicable)
- Correct use and order of rock codes (refer to ENS and compare critically with recently published or in prep. adjacent maps)
- Unit codes correctly converted from database to map form
- **Box layout**
  - (a) matches recently published and in prep. maps
  - (b) makes stratigraphic sense with respect to current litho- and chronostratigraphic understanding (and with respect to outcrop geology on map face)
- Boxes correct for pods, veins, dykes, and beds
- Colour design is as previously agreed
  - (a) colour design 'works'
  - (b) no badly rendered overprints
- Time-scale brackets are shown and correctly placed
- Dates correctly placed and aligned
- Stratigraphic subdivision brackets are correct
- Tectonic brackets are correct
- Ages for tectonic events are correct and events are correctly placed in sequence
- **IBG**
  - (a) unit names, and stratigraphic and tectonic subdivisions, of all units accurately reflect up-scaling from main map legend
  - (b) legend narratives suitably adapted from main legend
  - (c) only unit names used if the unit features in main legend
  - (d) all text in plain font (no bold, uppercase)
  - (e) colour designs consistent with main map legend and GSWA conventions [*MapSym_System2003 database*]
- Structural names (e.g. faults, fold axes) are shown as required by map author(s)

6. Map face — check systematically

6.1 Grid system

- MGA grid — line and text are grey
- Latitude, longitude:
  - (a) correct values for map area; increments on all sides correct
  - (b) proper degree and seconds symbols are used; in black
- Name and distance markers to next significant population centres around the border
  - (a) if absent, check the border of the original compilations
  - (b) kilometre (km) is spaced from value (e.g. 36#km)

6.2 Geological units and symbols

Review items in Section 3 of this checklist and also check:

- All symbols on map, IBG, or diagrammatic section(s) are in the legend; query symbols in legend **not** on map, IBG, or section(s)
- All units on map are in the legend; no units in legend **not** on the map

- Units, codes, polygon boundaries, and structures in 1:100 000-scale interpreted solid geology match surface geology
- For all units:
  (a) adequate labels, particularly for small units
  (b) correct colour as defined in colour design list and as shown in legend
  (c) colour design 'works'; no badly rendered overprints
- All line units labelled, or clusters of line units unambiguously identified
- If line units do not stand out from other colours (e.g. underlying polygon), mark up for discussion with author
- Concealed boundaries shown as black dashed lines
- Aeromagnetic trend lines shown as purple (p266)

- **Faults and folds:**
  (a) correctly symbolized as fault, fault or shear, or shear zone, as appropriate
  (b) dashed where concealed beneath Phanerozoic units
  (c) fold axial traces are red
  (d) fold axial traces are red and dashed where concealed beneath younger units
- Structural data make geometric sense
- Structural symbols reflect the rocks in which they're shown and are sensibly placed (if structural symbols are placed in regolith, consult author)

6.3 Mineralization and commodity symbols

- All mineralization and commodity symbols on the map are in the legend; query mineralization and commodity symbols in legend **not** on map
- Mineralization and mining data (symbols and text)
  (a) shown as standard WAMIN mineralization symbols [see Section6_StandardsAndSpecifications]
  (b) shown with standard rock and commodity abbreviations
  (c) any structural data (except geochron sites) obscured by mineralization symbols should be hidden for the plotted product
  (d) accompanying text has been placed clear of other lettering (e.g. topo); shift the latter if necessary

6.4 Clarity of the map

- Resolution of the geological units
  (a) small polygons: check overprints are visible — if not possible to see overprint, make sure the label is turned on; for very small polygons, query author and cartographer about buffering
- No overprints missing or badly plotted
- Frequency of structural symbols (not cluttered) — no more than two structural symbols per site
- Frequency of the shown labels is suitable for polygon and line size and density
- Balance of hidden and shown labels for each unit

6.5 Map joins

- Compare edges of map with (recent) adjacent sheets at same scale
  (a) geological boundaries, faults, fold axes, and trend lines join up
  (b) units intersected by a map join are labelled the same on both maps; check rock codes match (but disregard old code formats)
  (c) topographic features (i.e. roads, drainage, contours) join up using 1:100 000 plots; refer queries to senior cartographic editor

6.6 Text and topography

- Topographic names are shown in standard colour and type of font (i.e. rivers — blue, all caps; drainage — blue, upper and lower case); refer queries to senior cartographic editor
- For project/regional maps, check all formal topographic names referred to in the related manuscript are shown on the map; liaise with manuscript editor and author [NB: not all project maps have accompanying notes] [Series maps are author's responsibility]
- Drainage does not waver out of alluvial (*A*) regolith units (except where channel is too small to be shown as polygon)

7. Interpreted bedrock geology (IBG)

- Overlay scaled-up IBG polyester plot alternately on 1:100 000 interpreted solid geology and surface geology tiles; check all features (polygons, line units, structures, etc.) are consistent with 1:100 000-scale geology
  (a) main structural features match those of the main map in form/shape and position
  (b) features interpreted from aeromagnetic data are taken into account
  (c) regolith units that reflect subsurface geology (e.g. _C-q, _R-g-pg) taken into account
  (d) drillhole data taken into account
  (e) all structural names on the section(s) are shown and are in standard colours; if names on the IBG are rare or absent, consult author to make sure no significant names are missing
- Margins of IBG consistent with recent, adjacent (including diagonal) map sheets [NB: seamless ArcSDE compilation should ensure this]
- Legend for IBG is consistent with the main 1:100 000 legend, and IBG legends on recently published adjacent maps, and 1:100 000 map legend
- All units on IBG are in the IBG legend, and vice versa
- All units
  (a) are labelled adequately, in particularly for small units and line units
  (b) have the correct colour [see MapSym database and 1:100 000 map legend]
  (c) that are not in the main legend, colour design fits with the standard lithological or stratigraphic (time or group) colour schemes
- Line units have correct colour [see MapSym_System2003 database and 1:100 000 map legend]

- Balance of hidden and shown labels for each unit over the whole IBG
- Symbols particular to IBG shown in a condensed symbol list below IBG
- Scale bar correct

8. Diagrammatic section(s)

- Orientation of diagrammatic section(s) correct according to 'looking north' convention (also check section lines on 1:100 000 map face)
- Vertical scale and depth are correct for the series
- Topographic profile is realistic
- All units
  (a) are labelled adequately, in particularly for small units and line units
  (b) are listed in main reference (or in special circumstances in a box below the section)
  (c) have the correct colour and overprint as the main legend
- All symbols are in the legend or adjacent reference
- Names for significant topographical (grey) and hydrological (blue) features, faults (black), and fold axes (red) are shown at the correct levels above section. Structural names match the names on IBG
- Align the section(s) to both main map and IBG (if major corrections are to be made, recheck the alignment of the section on the next plot)
  (a) main map: **all** units and geological boundaries, faults, major fold axes, and trend lines that are intersected by the section line on the main map are shown on the section
  (b) IBG overlay: **all** units, geological boundaries, faults, major fold axes, and trend lines that are intersected by the section line on IBG should be shown on the section
- Line units have the correct colour
- Balance of hidden and shown labels

9. Simplified regolith

(1:250 000-scale Geological Series maps only)

- Using polyester plot overlay over the final-scale colour plot, check units in the diagram match the general distribution of the units in the main map
- Joins with simplified regolith diagrams of adjacent map sheets (published and in prep.); use supplied plot joined with diagrams from adjacent maps at final scale
- Legend for the diagram is consistent with the main legend and simplified regolith legends on recently published adjacent maps
- All units on the diagram are in the diagram legend
- All units
  (a) are labelled adequately, in particular for small units
  (b) correspond with colour and overprint of the units in the main legend
- Scale bar
- Balance of hidden and shown labels

Further comments

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Appendix 1
Editing plots required from Mapping

(This list can be copied and given to the cartographer responsible for the map sheet)

1:100 000 Geological Series map

- ☐ 1 x 1:100 000 colour plot of the assembled map sheet
- ☐ 4 x 1:50 000 colour plots (enlarged) of the map face only (each a quarter of the map)
- ☐ 1 x 1:100 000 plot of interpreted solid geology (1:100k) from SDIDIV, including structure lines (1:100k; surface or interpreted, as editor requires) and line(s) of diagrammatic section(s); coloured using base colours only
- ☐ 1 x 1:100 000 plot on paper combining some or all of the following (editor tick layers required):
  - o structural (WAROX) and mineralization (MINEDEX) symbols ± drill holes (if used)
  - o fault and fold surface structure lines, symbolized
  - o topographic features
  - o MGA grid
  - o contours
- ☐ 1:500 000 IBG plot, colour, enlarged to 1:100 000, on polyester film
- ☐ 1 x 1:100 000 plot of diagrammatic section(s) on polyester film

1:250 000 Geological Series map

- ☐ 1 x 1:250 000 colour plot of the assembled map sheet
- ☐ 6 x 1:100 000 colour plots (enlarged) of the map face only (each a quarter of the map)
- ☐ 1 x 1:250 000 plot of interpreted solid geology (1:250k) from SDIDIV, including structure lines (1:250k; surface or interpreted, as editor requires) and line(s) of diagrammatic section(s); coloured using base colours only
- ☐ 1 x 1:250 000 plot on paper combining some or all of the following (editor tick layers required):
  - o structural (WAROX) and mineralization (MINEDEX) symbols ± drill holes (if used)
  - o fault and fold surface structure lines, symbolized
  - o topographic features
  - o MGA grid
  - o contours
- ☐ 1 x 1:250 000 plot of diagrammatic section(s) on polyester film

Non-series map

- ☐ Usually warrants only a single colour plot

102	104	107	109	110	115	121	123	124	129	131	137	138	139
1,2,89,0 252,250,29	25,29,96,0 192,181,10	1,4,75,0 252,245,65	1,12,96,0 253,224,11	9,23,98,0 232,196,6	1,9,82,0 252,232,45	1,12,75,0 253,225,64	1,23,95,0 253,196,14	6,31,95,0 239,176,13	1,20,83,0 253,203,44	11,35,96,0 228,167,11	1,29,89,0 253,182,29	5,37,95,0 242,160,14	18,42,93,0 210,148,19

140	141	142	143	145	147	150	151	152	153	155	157	158	159
33,48,88,0 170,132,31	1,17,60,0 253,212,102	1,24,71,0 253,195,75	1,29,80,0 253,181,52	8,39,93,0 234,156,18	44,55,87,0 142,116,32	1,33,79,0 253,170,54	1,38,85,0 253,157,38	4,42,91,0 246,149,24	16,49,90,0 215,130,26	1,13,36,0 253,223,164	1,35,67,0 253,166,84	1,42,79,0 252,149,53	7,46,82,0 237,137,45

160	161	163	165	166	167	170	171	172	173	174	175	178	179
18,51,85,0 208,125,37	41,59,85,0 150,105,37	1,35,55,0 253,167,115	1,47,82,0 253,136,46	3,51,82,0 248,125,47	12,57,82,0 224,110,46	1,44,49,0 253,143,131	1,53,63,0 253,119,94	1,57,78,0 253,110,55	7,62,77,0 237,96,58	21,66,81,0 201,86,49	38,68,80,0 158,82,51	1,60,49,0 253,102,130	3,71,64,0 248,73,93

180	181	184	185	186	191	192	193	194	197	199	200	203	204
12,72,67,0 225,72,83	31,73,75,0 176,70,63	1,66,32,0 253,87,174	1,82,47,0 253,46,135	5,82,50,0 241,45,128	1,71,30,0 253,74,178	1,83,38,0 253,43,158	9,84,47,0 231,41,135	22,80,56,0 200,50,113	1,38,20,0 252,157,203	3,83,40,0 248,44,153	10,84,47,0 230,40,134	1,30,11,0 252,179,228	2,55,17,0 250,116,212

206	207	208	210	213	214	215	216	218	219	221	225	226	231
4,89,29,0 245,28,182	13,86,38,0 221,35,157	27,80,47,0 187,52,136	1,35,7,0 252,165,236	1,80,18,0 252,52,210	7,83,24,0 237,43,194	16,83,34,0 214,43,169	32,79,51,0 173,54,126	2,45,5,0 250,141,243	4,72,10,0 246,72,230	22,87,30,0 199,34,178	2,65,2,0 249,88,249	5,85,5,0 243,39,242	2,48,4,0 249,133,246

232	234	240	245	246	250	251	252	253	254	258	265	266	267
3,61,2,0 247,99,249	20,80,17,0 203,52,212	18,72,2,0 209,71,249	9,42,2,0 231,148,251	16,60,2,0 215,101,251	3,19,2,0 247,207,251	11,33,1,0 228,170,252	17,47,1,0 212,136,252	26,60,1,0 189,102,253	34,67,2,0 169,83,250	28,45,7,0 183,139,236	37,40,2,0 161,152,251	47,51,2,0 136,124,251	55,62,2,0 116,97,250

268	272	279	284	285	286	289	290	295	297	299	300	304	306
69,76,14,0 80,62,220	41,36,4,0 151,164,246	53,27,1,0 119,185,252	41,18,1,0 150,209,253	69,33,1,0 79,172,252	96,60,5,0 10,101,243	96,81,45,0 9,48,139	36,4,1,0 164,244,252	98,68,47,0 5,82,134	37,5,1,0 203,247,252	73,22,1,0 69,200,252	96,39,4,0 9,155,245	27,1,4,0 185,252,245	64,4,2,0 91,246,250

307	312	313	314	315	319	320	321	325	326	327	328	335	339
98,28,14,0 6,183,220	73,3,7,0 70,247,236	97,8,13,0 8,234,221	98,19,22,0 6,206,199	98,37,40,0 6,161,152	51,1,12,0 124,252,224	90,3,24,0 25,247,193	97,14,36,0 8,219,162	51,1,18,0 124,252,208	71,4,29,0 75,244,181	93,10,49,0 18,230,130	94,22,56,0 15,199,113	90,22,62,0 26,198,98	66,4,44,0 86,244,142

341	343	344	345	348	352	353	354	355	356	357	358	360	361
91,27,71,0 22,187,74	87,49,72,0 34,130,71	27,1,25,0 187,252,191	35,1,31,0 166,252,175	95,19,86,0 13,206,35	33,1,36,0 170,252,164	40,1,43,0 153,252,146	78,1,78,0 56,253,56	92,9,88,0 20,231,31	96,26,91,0 9,189,23	85,44,84,0 39,143,42	27,1,46,0 186,253,137	47,2,65,0 134,251,89	61,4,80,0 99,246,50

364	365	371	375	383	384	385	388	389	394	397	399	409	410
83,34,94,0 44,169,16	14,1,43,0 219,252,146	64,43,89,0 91,145,27	42,1,92,0 147,253,21	38,16,96,0 159,213,10	40,26,95,0 152,188,12	40,38,87,0 152,157,34	8,1,82,0 235,252,47	17,1,93,0 212,253,18	3,1,75,0 247,252,65	22,12,97,0 199,224,7	32,29,96,0 174,180,10	34,43,46,0 169,146,137	38,48,52,0 157,133,123

419	425	429	430	431	432	436	437	440	442	444	450	451	455
67,68,75,0 84,81,63	54,53,52,0 118,119,122	34,29,26,0 169,182,188	45,36,32,0 141,164,173	54,44,41,0 117,142,151	63,56,50,0 95,113,127	24,33,29,0 195,171,180	38,51,47,0 157,125,136	59,67,68,0 105,84,81	24,18,22,0 195,208,200	47,38,41,0 134,157,151	47,49,81,0 135,131,49	27,29,57,0 185,180,110	44,51,89,0 143,125,29

456	457	458	463	464	467	471	472	476	478	479	482	484	492
25,34,89,0 192,168,29	18,29,91,0 209,181,24	7,15,67,0 237,218,85	35,50,81,0 167,128,49	20,38,76,0 203,157,62	7,18,41,0 236,209,150	9,45,77,0 231,139,59	4,37,60,0 244,161,103	52,67,81,0 122,85,48	27,54,72,0 185,118,71	18,41,50,0 210,150,127	3,15,22,0 247,216,198	20,67,77,0 205,83,58	22,69,59,0 199,79,104

499	500	505	506	507	535	541	543	551	575	576	577	581	582
31,66,67,0 176,87,84	14,46,36,0 220,138,163	34,73,60,0 168,69,101	25,69,49,0 192,78,129	11,49,26,0 226,131,189	36,27,13,0 163,185,223	97,73,29,0 8,70,181	43,19,5,0 146,207,243	29,11,10,0 182,228,230	60,33,85,0 101,170,39	52,20,78,0 123,203,56	31,11,55,0 176,226,115	49,47,90,0 131,134,25	34,27,91,0 169,186,22

blk	blkop	cyn	gre	mag	orng	pblu	pred	pur	rblu	red	rho	rub	white
0,0,0,100 0,0,0	0,0,0,80 51,51,51	79,12,3,0 53,225,248	82,2,44,0 45,251,142	4,82,12,0 244,45,224	1,44,93,0 253,142,17	97,19,4,0 8,206,244	0,79,51,0 254,54,126	23,59,1,0 196,105,253	96,73,6,0 11,70,239	1,67,67,0 253,83,85	4,71,2,0 245,74,250	4,86,13,0 244,35,221	0,0,0,0 255,255,255

yel	7496
1,3,91,0 252,248,22	53,28,91,0 121,183,24

Pantone Colour
C,M,Y,K value
R,G,B value

ArcMap Pantone Colours for HP z6200
(Use with Application Managed colour setting)

Use SOLID uncoated tab when using HP Professional PANTONE Emulation
for RGB values, fromHPz6200

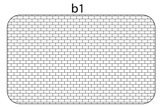
FOR USE ON COATED PAPER (UN95)

February 2014

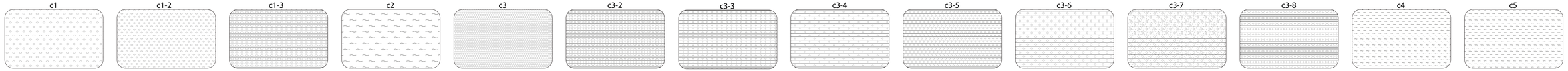
GSWA - Series Mapping Patterns — March 2018

Constructed with Adobe Illustrator CC 2018

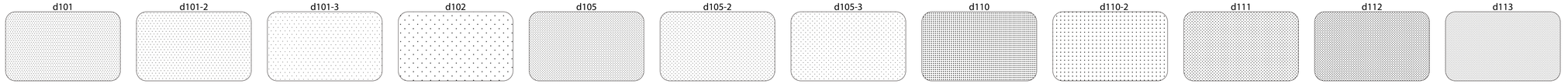
'b' Patterns



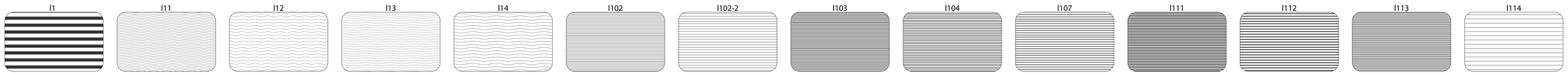
'c' Patterns



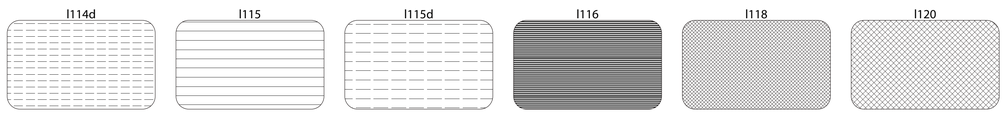
'd' Patterns



'l' Patterns

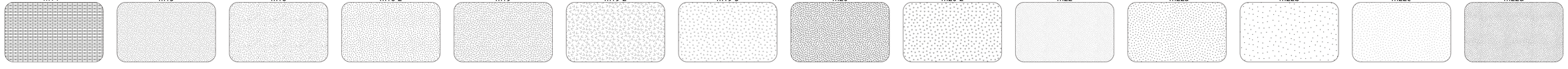


'l' Patterns (cont.)

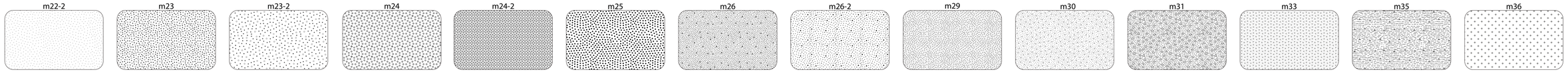


'm' Patterns

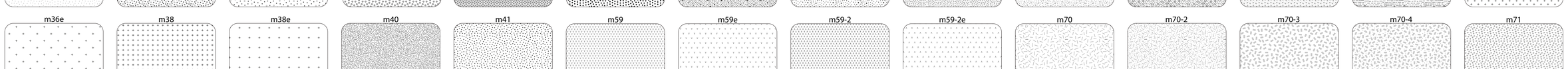
'm' Patterns (cont.)



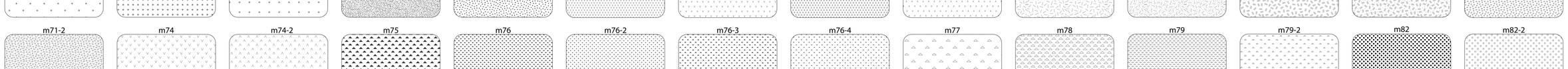
'm' Patterns (cont.)



'm' Patterns (cont.)

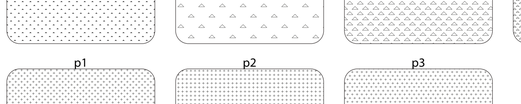


'm' Patterns (cont.)



'm' Patterns (cont.)

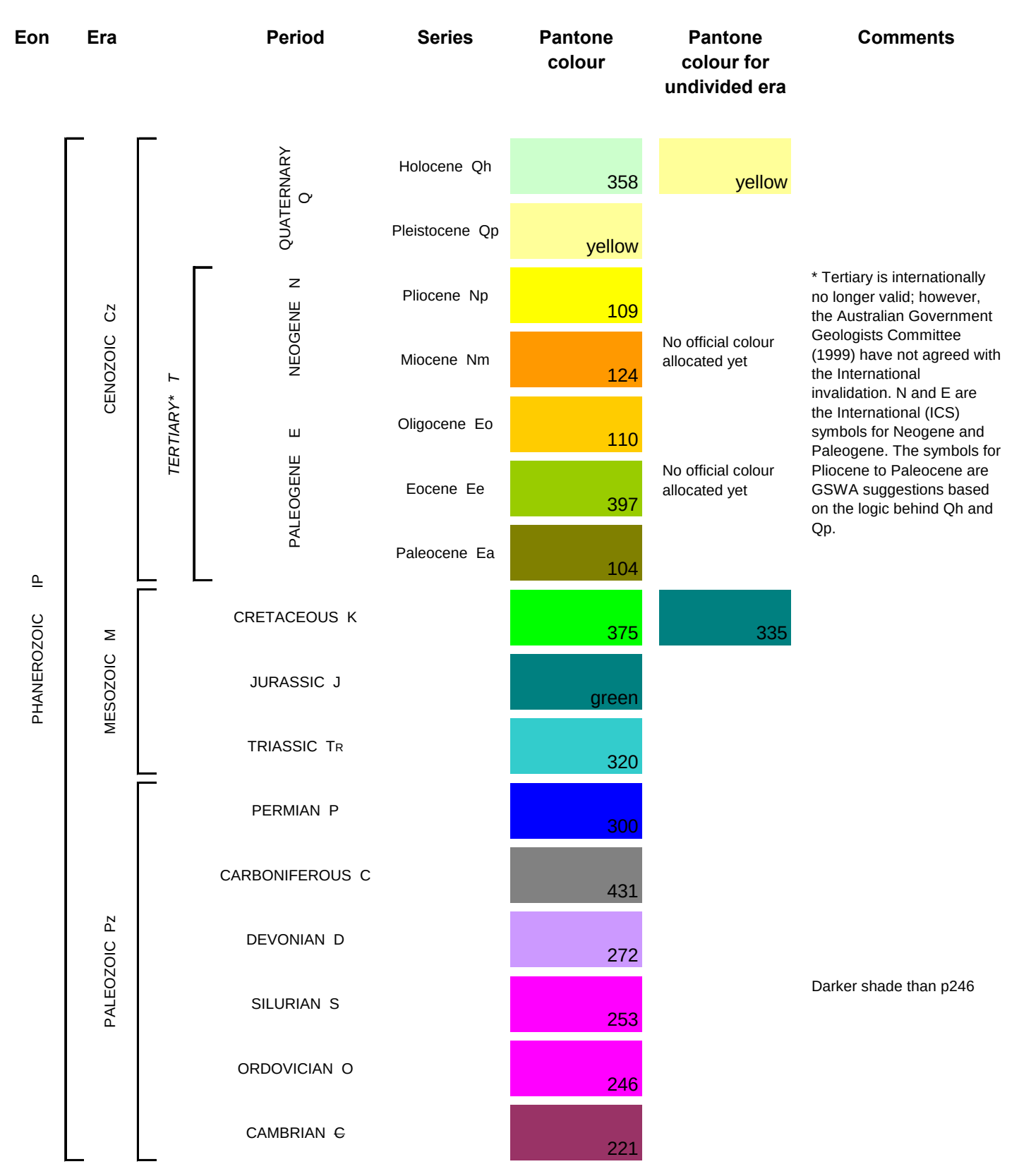
'p' Patterns

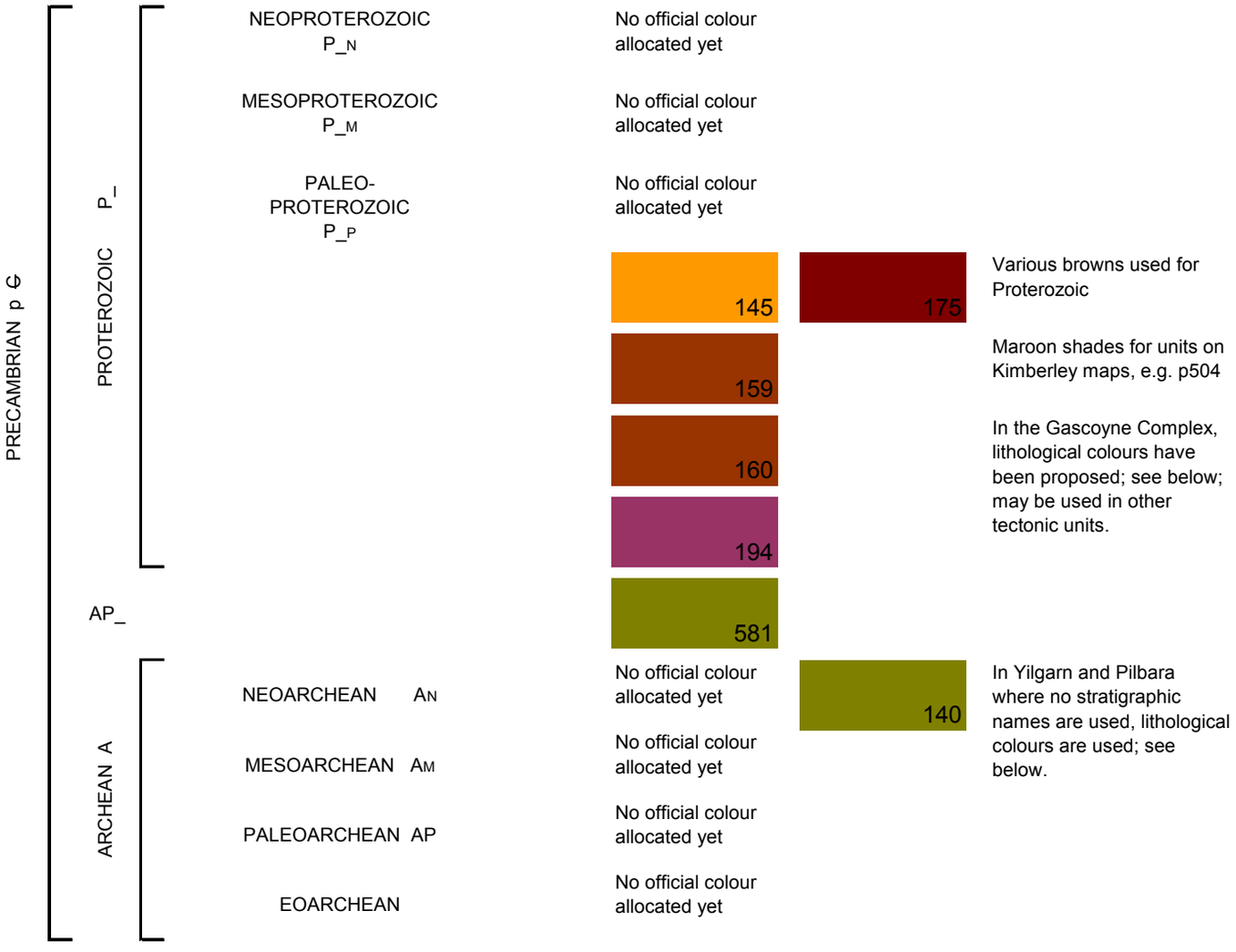


'x' Patterns

named Patterns

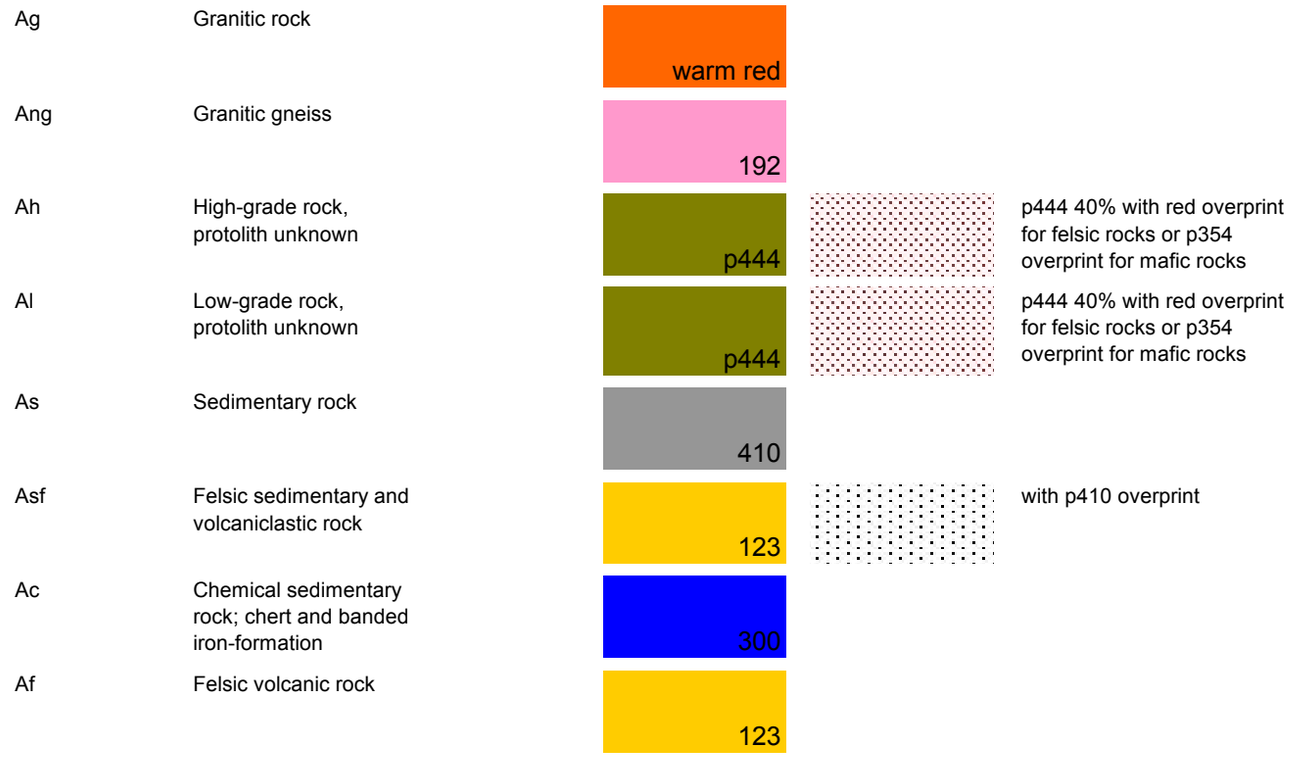
March 2018

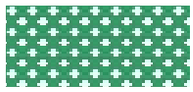

Eon
Era
Period
Series
Pantone colour
Pantone colour for undivided era
Comments
PHANEROZOIC IP
CENOZOIC Cz
MESOZOIC M
PALEOZOIC Pz
TERTIARY* T
QUATERNARY Q
NEOGENE N
PALEOGENE E
Holocene Qh
Pleistocene Qp
Pliocene Np
Miocene Nm
Oligocene Eo
Eocene Ee
Paleocene Ea
CRETACEOUS K
JURASSIC J
TRIASSIC TR
PERMIAN P
CARBONIFEROUS C
DEVONIAN D
SILURIAN S
ORDOVICIAN O
CAMBRIAN Є
358
yellow
109
124
110
397
104
375
green
320
300
431
272
253
246
221
yellow
No official colour allocated yet
No official colour allocated yet
335
* Tertiary is internationally no longer valid; however, the Australian Government Geologists Committee (1999) have not agreed with the International invalidation. N and E are the International (ICS) symbols for Neogene and Paleogene. The symbols for Pliocene to Paleocene are GSWA suggestions based on the logic behind Qh and Qp.
Darker shade than p246



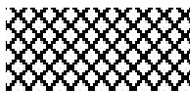
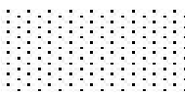
Lithological codes and colours – based on Australian standards, updated to GSWA standard

This is based on Archean rock codes used in the Yilgarn and Pilbara. These colours have also been used for significant horizons within stratigraphic units; for example a felsic subunit in a named formation that consists mainly of mafic flows. These colours may also be used for overprint patterns.



Afi	Felsic rocks of intermediate composition	123		with p354 overprint
Ao	Gabbro and dolerite	335		
Ab	Mafic rock	354		
Au	Ultramafic rock	266		Dark purple

The following colours have been proposed for Proterozoic lithological units in the Gascoyne Complex. They may be used in the future for Proterozoic units in other tectonic units. These colours may also be used for overprint patterns.

P_ g	Granitic rock	204	232	
P_ng	Granitic gneiss	232		with p437 overprint
P_s	Sedimentary rock	437		
P_sf	Felsic sedimentary and volcaniclastic rock	151		with p437 overprint
P_c	Chemical sedimentary rock; chert and banded iron-formation	279		
P_f	Felsic volcanic rock	151		
P_o	Gabbro and dolerite	321		
P_b	Mafic (basic) rock	575		
P_u	Ultramafic rock	266		with p476 overprint

Geological age	——— Age symbol ——— *Database code* [#]	*GSWA narrow*	*Keystroke*
Phanerozoic	IP	IP	Alt + 0210
Cenozoic	CZ	Cz	Alt + 0211
Quaternary	Q	Q	Alt + 0212
Holocene	QH	Qh	Alt + 0213
Pleistocene	QP	Qp	Alt + 0214
Tertiary*	(T)*	T	Alt + 0215
Neogene	N	N	Alt + 0216
Pliocene	NP	Np	Alt + 0217
Miocene	NM	Nm	Alt + 0218
Paleogene	G	G	Alt + 0250
Oligocene	GO	Go	Alt + 0251
Eocene	GE	Ge	Alt + 0252
Paleocene	GP	Gp	Alt + 0253
Cretaceous–Cenozoic	KCZ	KCz	Alt + 0225/Alt + 0211
Mesozoic	MZ	Mz	Alt + 0254
Cretaceous	K	K	Alt + 0225
Jurassic–Cretaceous	JK	JK	Alt + 0226/Alt + 0225
Jurassic	J	J	Alt + 0226
Triassic–Jurassic	RJ	ŦRJ	Alt + 0227/Alt + 0226
Triassic	R	Ŧ R	Alt + 0227
Paleozoic	PZ	Pz	Alt + 0228
Permian	P	P	Alt + 0229
Carboniferous–Permian	CP	CP	Alt + 0230/Alt + 0229
Carboniferous	C	C	Alt + 0230
Devonian–Carboniferous	DC	DC	Alt + 0231/Alt + 0230
Devonian	D	D	Alt + 0231
Silurian–Devonian	SD	SD	Alt + 0232/Alt + 0231
Silurian	S	S	Alt + 0232
Ordovician–Silurian	OS	OS	Alt + 0233/Alt + 0232
Ordovician	O	O	Alt + 0233
Cambrian–Ordovician	EO	€O	Alt + 0234/Alt + 0233
Cambrian	E	€	Alt + 0234
Precambrian*	(PE)*	p€	Alt + 0235
Proterozoic–Cambrian	P_E	Þ€	Alt + 0236/Alt + 0234
Proterozoic	P_	Þ	Alt + 0236
Neoproterozoic–Cambrian	P_NE	ÞN€	Alt + 0237/Alt + 0234
Ediacaran–Cambrian	P_DE	Þd€	Alt + 0246/Alt + 0234
Ediacaran	P_D	Þd	Alt + 0246
Cryogenian	P_C	Þc	Alt + 0247
Neoproterozoic	P_N	ÞN	Alt + 0237
Mesoproterozoic–Neoproterozoic	P_MN	ÞMN	Alt + 0248
Mesoproterozoic	P_M	ÞM	Alt + 0238
Paleoproterozoic–Mesoproterozoic	P_PM	ÞPM	Alt + 0249
Paleoproterozoic	P_P	ÞP	Alt + 0239
Archean–Proterozoic	AP_	ÆÞ	Alt + 0240
Archean	A	A	Alt + 0241
Neoarchean	AN	AN	Alt + 0242
Mesoarchean	AM	AM	Alt + 0243
Paleoarchean	AP	AP	Alt + 0244
Eoarchean	AE	ÆE	Alt + 0245

[#] Based on Geology database Geotimes table 08/06/2012; update based on Explanatory Notes System 14/06/2016

* Not preferred term; avoid or use more specific term

	——— Regolith symbol ——— *Database code* *(Plain text)*	*Map code** *(GSWA Regolith font)*	*Keystroke*
Colluvial	_C	*C*	C
Sheetwash	_W	*W*	W
Alluvial	_A	*A*	A
Lacustrine	_L	*L*	L
Eolian	_E	*E*	E
Sandplain	_S	*S*	S
Residual/Relict	_R	*R*	R
subscript a	a	*a*	Alt + 0162
subscript b	b	*b*	Alt + 0163
subscript c	c	*c*	Alt + 0164
subscript d	d	*d*	Alt + 0165
subscript e	e	*e*	Alt + 0166
subscript f	f	*f*	Alt + 0167
subscript g	g	*g*	Alt + 0168
subscript h	h	*h*	Alt + 0169
subscript i	i	*i*	Alt + 0170
subscript j	j	*j*	Alt + 0171
subscript k	k	*k*	Alt + 0172
subscript l	l	*l*	Alt + 0174
subscript m	m	*m*	Alt + 0175
subscript n	n	*n*	Alt + 0176
subscript o	o	*o*	Alt + 0177
subscript p	p	*p*	Alt + 0178
subscript q	q	*q*	Alt + 0179
subscript r	r	*r*	Alt + 0180
subscript s	s	*s*	Alt + 0181
subscript t	t	*t*	Alt + 0182
subscript u	u	*u*	Alt + 0184
subscript v	v	*v*	Alt + 0185
subscript w	w	*w*	Alt + 0186
subscript x	x	*x*	Alt + 0187
subscript y	y	*y*	Alt + 0188
subscript z	z	*z*	Alt + 0189
0	0	*0*	Alt + 0190
1	1	*1*	Alt + 0191
2	2	*2*	Alt + 0192
3	3	*3*	Alt + 0193

* Non-subscripted, lower case code letters entered as 'normal' characters using GSWA Regolith font

General symbols *Symbol*	*Name*	*Keystroke*
Using plain text font:		
–	en dash	Alt + 0150
—	em dash	Alt + 0151
±	plus/minus	Alt + 0177
°	degree	Alt + 0176
"	minute	
'	second	
·	centred point	Alt + 0183
©	copyright	Alt + 0169
†	dagger	Alt + 0134
‡	double dagger	Alt + 0135
‰	per mil	Alt + 0137
²	superscript 2/squared	Alt + 0178
³	superscript 3/cubed	Alt + 0179
…	ellipsis	Alt + 0133
Using symbol font:		
≤	less than or equal to	Alt + 0163
≥	greater than or equal to	Alt + 0179
×	multiplication	Alt + 0180
≠	not equal to	Alt + 0185
≈	approximately equal to	Alt + 0187
δ	delta for isotopes	Alt + 0100
f	fugacity	Alt + 0166
∑	sum or total	Alt + 0229
β	Greek lower case beta (as in β-quartz)	b on keyboard