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Fieldnotes

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

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Co-Funded Government–Industry Drilling Round 16

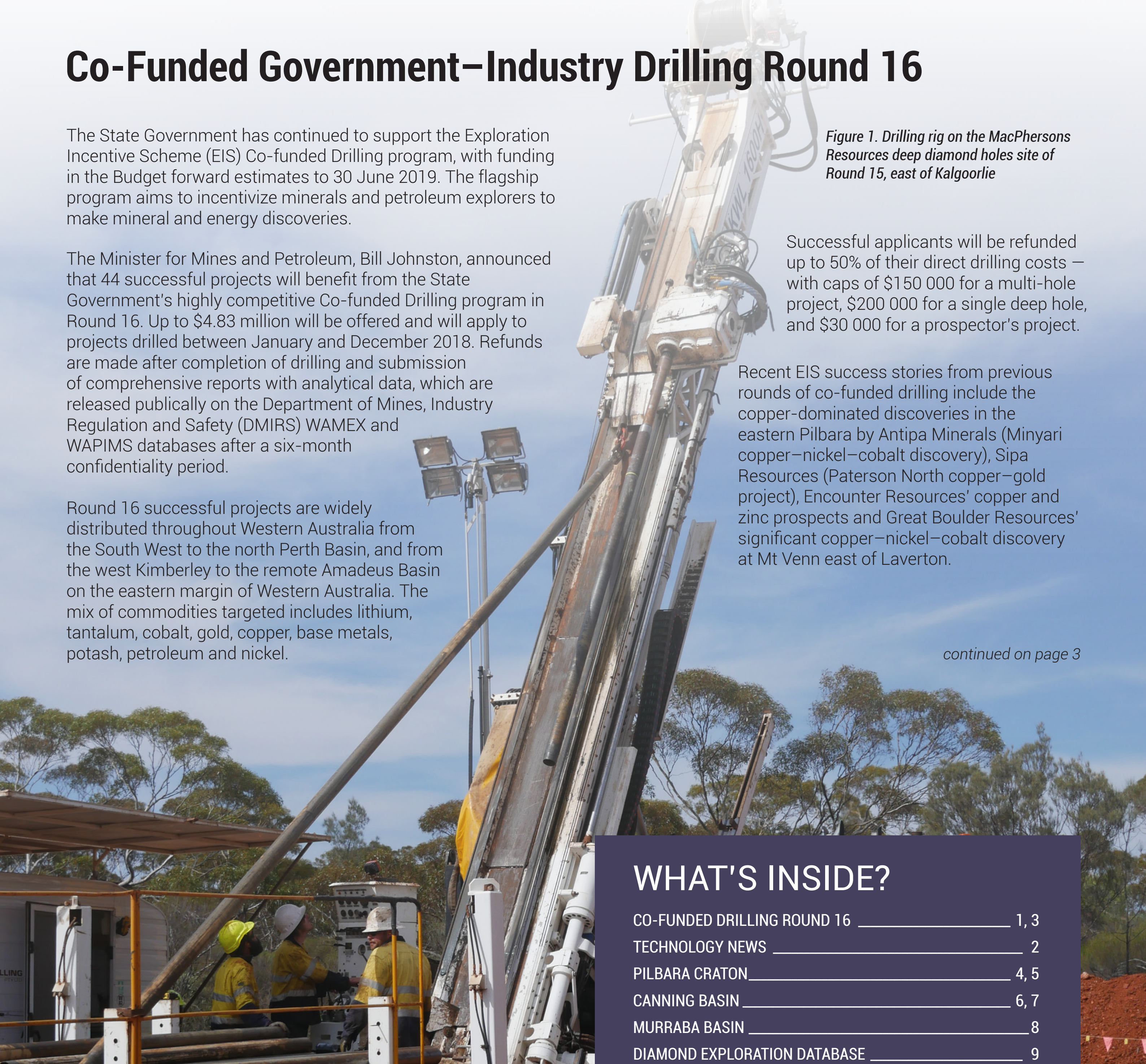

Figure 1. Drilling rig on the MacPhersons Resources deep diamond holes site of Round 15, east of Kalgoorlie

The State Government has continued to support the Exploration Incentive Scheme (EIS) Co-funded Drilling program, with funding in the Budget forward estimates to 30 June 2019. The flagship program aims to incentivize minerals and petroleum explorers to make mineral and energy discoveries.

The Minister for Mines and Petroleum, Bill Johnston, announced that 44 successful projects will benefit from the State Government's highly competitive Co-funded Drilling program in Round 16. Up to $4.83 million will be offered and will apply to projects drilled between January and December 2018. Refunds are made after completion of drilling and submission of comprehensive reports with analytical data, which are released publically on the Department of Mines, Industry Regulation and Safety (DMIRS) WAMEX and WAPIMS databases after a six-month confidentiality period.

Round 16 successful projects are widely distributed throughout Western Australia from the South West to the north Perth Basin, and from the west Kimberley to the remote Amadeus Basin on the eastern margin of Western Australia. The mix of commodities targeted includes lithium, tantalum, cobalt, gold, copper, base metals, potash, petroleum and nickel.

Successful applicants will be refunded up to 50% of their direct drilling costs — with caps of $150 000 for a multi-hole project, $200 000 for a single deep hole, and $30 000 for a prospector's project.

Recent EIS success stories from previous rounds of co-funded drilling include the copper-dominated discoveries in the eastern Pilbara by Antipa Minerals (Minyari copper–nickel–cobalt discovery), Sipa Resources (Paterson North copper–gold project), Encounter Resources' copper and zinc prospects and Great Boulder Resources' significant copper–nickel–cobalt discovery at Mt Venn east of Laverton.

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WHAT'S INSIDE?

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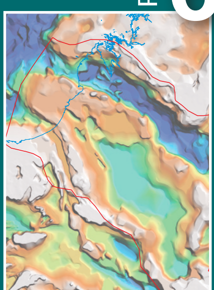

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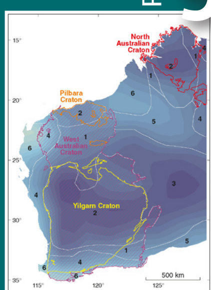

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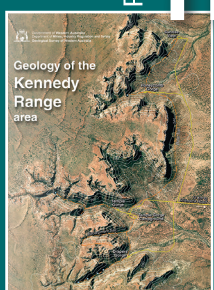


Geological Survey of Western Australia

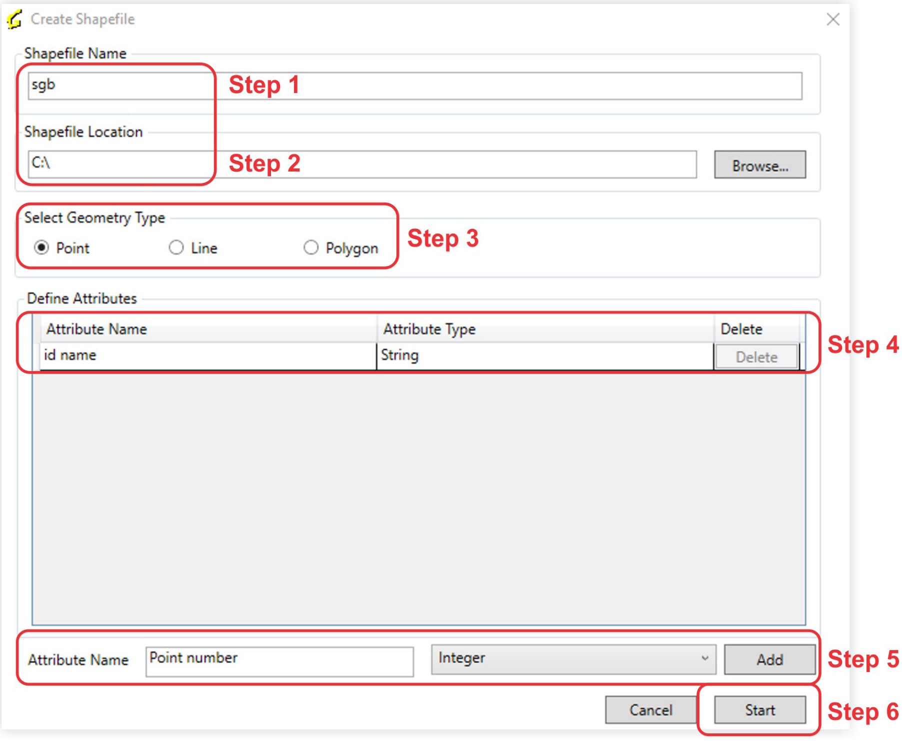
Creating shapefiles using GeoMap.WA

GeoMap.WA is the Geological Survey of Western Australia's (GSWA) free GIS-viewing tool for viewing, querying and printing Western Australia's geology and resource information. The latest release (version 1.9.14.0) allows users to create shapefiles.

The [Create shapefile] button allows users to create and save point, line and polygon shapefiles with annotations.

After selecting this button,  the Create Shapefile dialog box will open. To begin annotating features into a shapefile, follow these simple steps:

1. Enter a shapefile name, something that is meaningful to represent the data to capture.

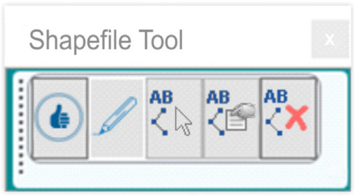


2. Click the [Browse] button to select a location on the computer to save the shapefile.

3. Select a geometry type, either POINT, LINE or POLYGON.

4. Enter attribute names and types by using the [Attribute Name] text field and [Data Type] dropdown, then select the [Add] button. Each attribute will appear in the [Define Attributes] list.

5. Once all attributes have been added, select the [Start] button and the shapefile editing tool dialog box will appear.



 Select the [Add feature] button to add a shapefile feature to the map.

 Select the [Select a graphic element] button to select a feature to perform an action.

 Select the [Edit attributes] button to populate the attributes for the feature. This requires two clicks in the relevant cell. Once the attribute information has been added, select the [Save] then [Close] button.

 Select the [Delete a selected graphic element] button to delete a selected feature.

 Select the [Finalise shapefile] button to complete all edits and save. You will be advised that once finalized you will not be able to make any more edits to the feature.

GeoMap.WA can be downloaded from the Department of Mines, Industry Regulation and Safety (DMIRS) website at <www.dmp.wa.gov.au/datacentre>.

For more information, contact Stephen Bandy (stephen.bandy@dmirs.wa.gov.au).

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GENERAL

1 Agnew Gold Mining Company
2 Alt Resources Ltd
3 Antipa Minerals
4 Antipa Minerals
5 Ausgold Exploration Ltd
6 Buxton Resources Limited
7 Dacian Gold Limited
8 Echo Resources Ltd
9 Encounter Resources
10 Encounter Resources
11 Excelsior Gold Limited
12 Explaurum Operations Ltd
13 FQM Exploration (Australia) Pty Ltd
14 Independence Newsearch
15 Intermin Resources Ltd
16 IronRinger (Tarraji) Pty Ltd
17 Kaili Gold Pty Ltd
18 Keras (Pilbara) Gold Pty Ltd
19 Key Petroleum (Australia) Pty Ltd
20 Kingston Resources Ltd
21 Lefroy Exploration Limited
22 Lodestar Minerals Limited
23 Overland Resources Limited
24 Pioneer Resources Limited
25 Red 5 Limited
26 Rox Resources Limited
27 Rox Resources Ltd
28 Sand Queen Gold Mines Pty Ltd
29 Saracen Metals Pty Ltd
30 Shenton Resources Ltd
31 Sipa Exploration NL
32 Southern Gold
33 Southern Gold Limited
34 St Ives Gold Mine
35 Syndicated Metals Limited
36 Tawana Resources NL
37 Venture Minerals Ltd
38 Yamarna West Pty Ltd

PROSPECTORS

39 Bacome Pty Ltd
40 David Rodney Pascoe
41 Kesli Chemicals Pty Ltd
42 Mark Selga
43 Mark Selga
44 Steven Kean

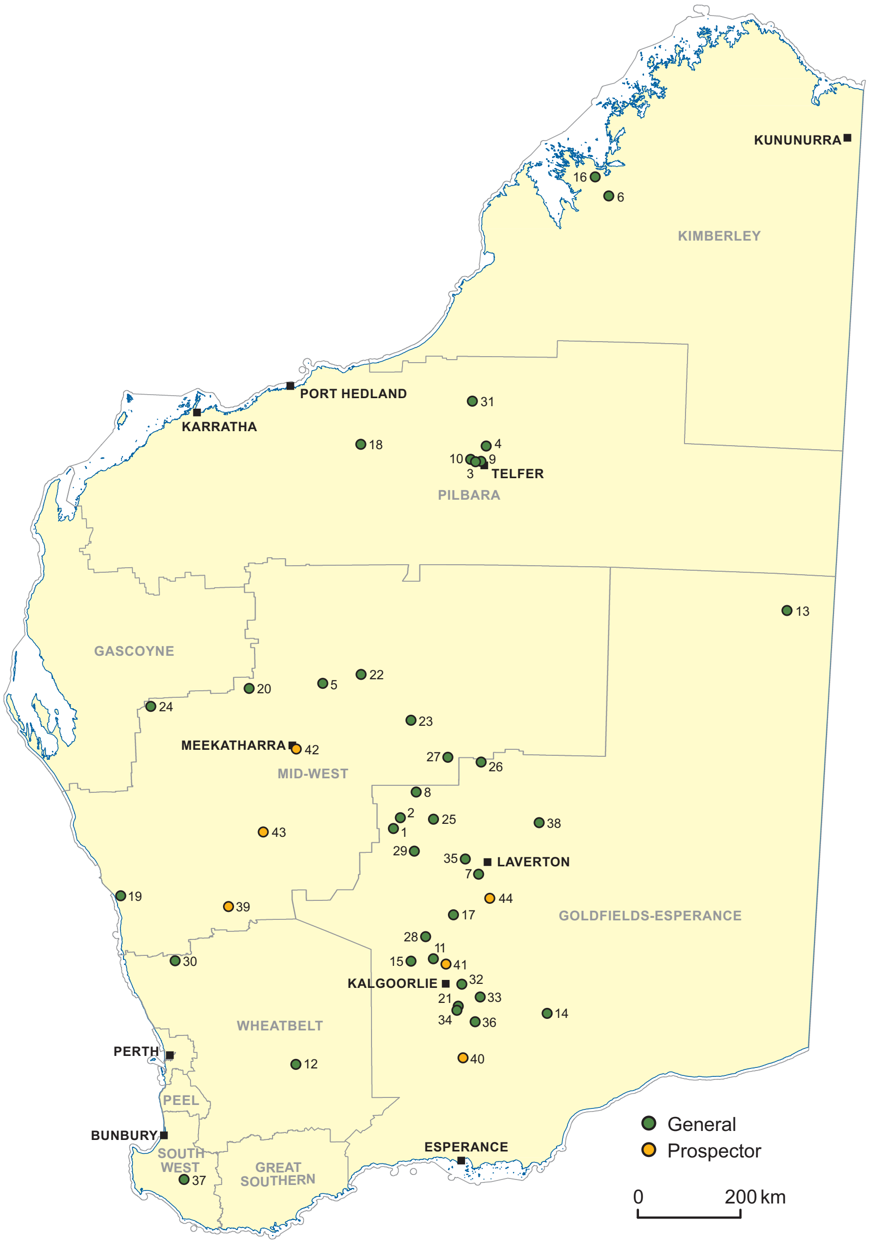


Figure 2. Location of projects granted co-funded drilling in Round 16

Funding of single deep holes has encouraged companies to drill for mineralization well below shallow surface anomalies and small pits. MacPhersons Resources recently intersected a dolerite target, with visible gold, 310 m below previous known gold mineralization. The single deep drillhole has prompted MacPhersons to consider the possibility of a larger mineralized system much earlier in the development of the project.

Companies that undertake diamond drilling with EIS co-funding are required to return half the core to the Kalgoorlie or Perth Core Libraries. All EIS core is scanned by the HyLogger. Access to (non-confidential) high-resolution hyperspectral logs and drillcore images from GSWA's HyLogger are available to the public at no cost. HyLogger spectral and image data can be viewed and downloaded through the department's online interactive map viewer GeoView.WA (under the tab Drillholes > HyLogger Drillholes). Drillholes scanned by the HyLogger are divided into those processed just to Level 1 (that is, masked, depth-logged, automated mineralogy) and those further processed to Level 2 (that is, interpreted by Geological Survey of Western Australia [GSWA] geoscientists). Level 2 datasets are also available through the online AuScope Portal (under the tab Boreholes > National Virtual Core Library). GSWA HyLogger datasets can also be directly copied upon request onto personal external hard drives at the Perth Core Library in Carlisle by contacting <HyLogger@dmirs.wa.gov.au>.

Another round of co-funded drilling (Round 17) will be undertaken for drilling between July 2018 and June 2019. The application process for Round 17 will open on Friday 23 February 2018 for six weeks, closing at 5 pm WST on 6 April 2018.

For more information, contact Charlotte Hall, EIS coordinator (charlotte.hall@dmirs.wa.gov.au).

The setting of conglomerate-hosted gold in the Pilbara: not Western Australia's Witwatersrand Basin?

In July 2017 Artemis Resources, in a Joint Venture with Canadian explorer Novo Resources, reported the discovery of an 11-metre thick gold nugget-bearing conglomerate extending for 8 km at the base of the Mount Roe Basalt at Purdys Reward in the northwest Pilbara. Artemis subsequently reported the discovery of gold in conglomerate at Mount Oscar 20 km to the northeast giving rise to the current 'Pilbara gold rush'. Considerable publicity was generated in September 2017 by a video cross from Purdeys Reward live to the Denver Gold Forum. There are now numerous explorers and prospectors investigating the base of the Fortescue Group across the Pilbara, with enough public interest for the rush to create its own Pilbara Conglomerate Gold Conference in Perth in March 2018 (www.informa.com.au/event/pilbara-conglomerate-gold-conference/).

The discoveries have reignited speculation that an equivalent of the highly endowed Meso- to Neoarchean (3075–2715 Ma) Witwatersrand Basin in South Africa can be found in the Pilbara Craton. This is consistent with the concept of an Archean 'Vaalbara' continent, that may have included both the Kaapvaal Craton, on which the Witwatersrand Basin sits, and the Pilbara Craton.

Reconstructions must take account of the well-known geology of the Pilbara Craton (e.g. Hickman, 2016, GSWA Report 160; and references therein) in any attempts to match with depositional units, tectonic settings and mineralized horizons (such as the Ventersdorp Contact Reef) in the Witwatersrand Basin. The Geological Survey of Western Australia (GSWA), collaborating with Geoscience Australia, published extensive 1:100 000-scale mapping, accompanied by new SHRIMP U–Pb zircon geochronology and geochemistry, during an extensive remapping of the Pilbara in the 1990s and early 2000s. Results and geodynamic models were presented during field excursions for the 5th International Archean Symposium in 2010 (Hickman

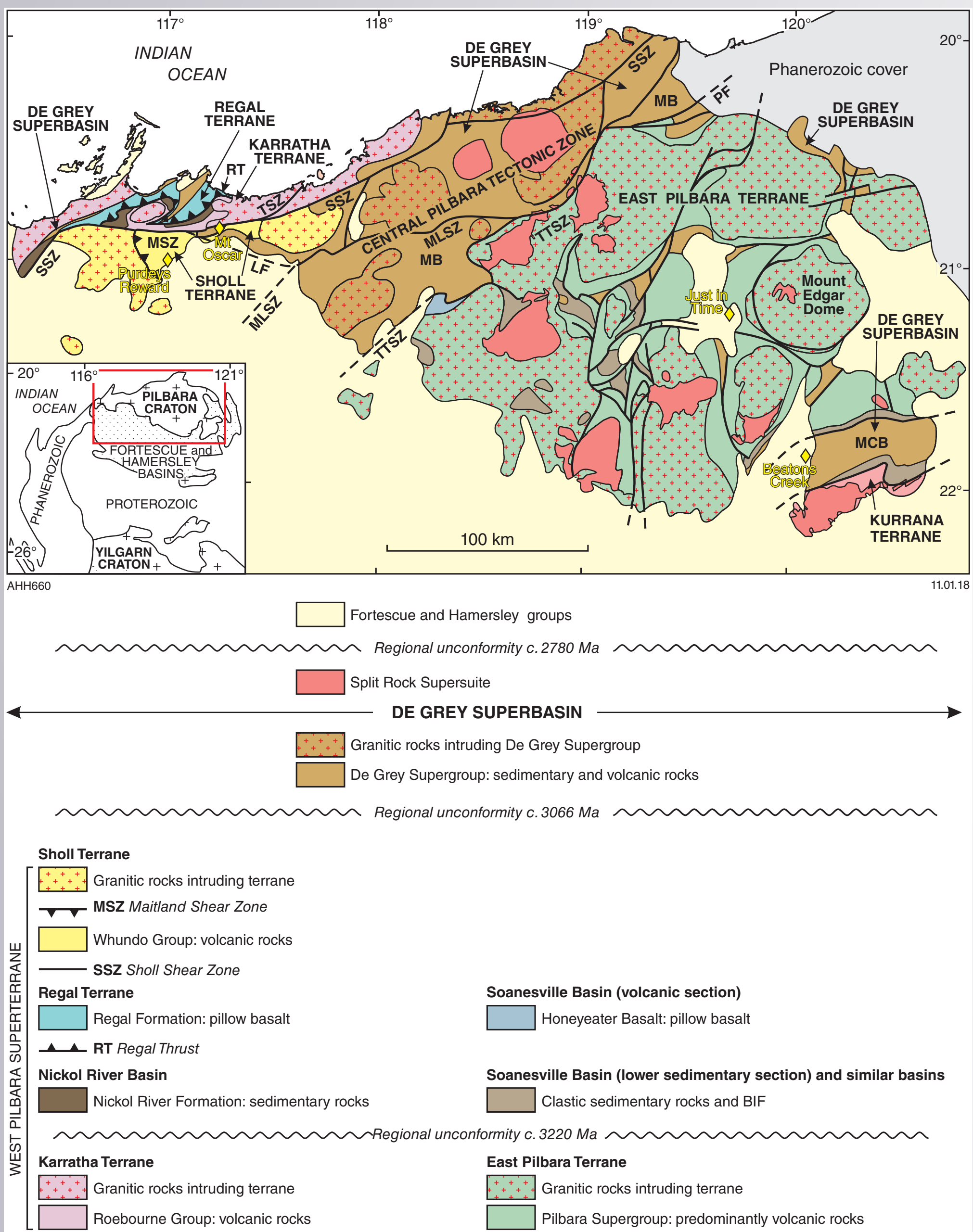


Figure 1. Major tectonic units of the northern Pilbara Craton. Abbreviations: LF, Loudens Fault; MB, Mallina Basin; MCB, Mosquito Creek Basin; MLSZ, Mallina Shear Zone; MSZ, Maitland Shear Zone; PF, Pardoo Fault (part of TTSZ); SSZ, Sholl Shear Zone; TSZ, Terenar Shear Zone; TTSZ, Tabba Tabba Shear Zone

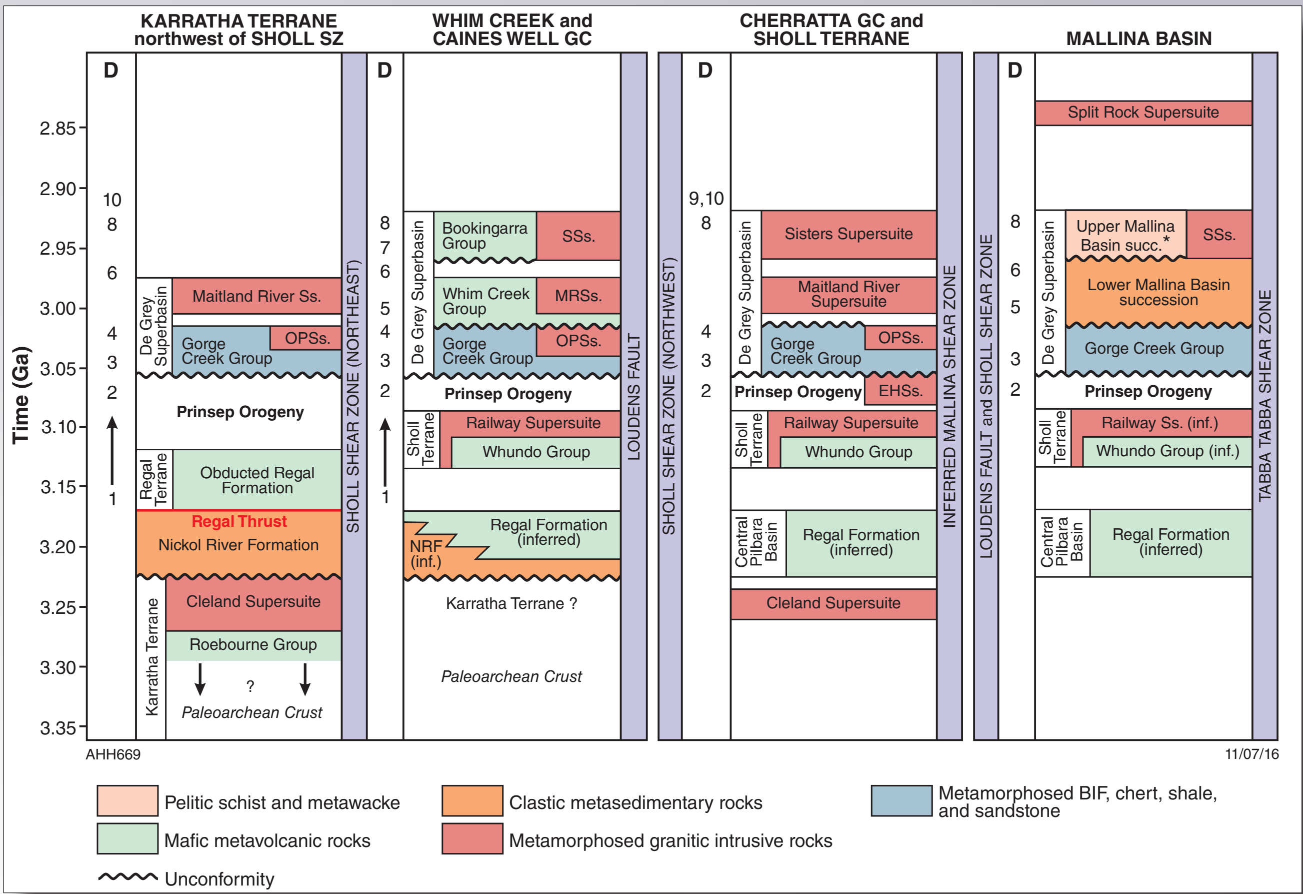


Figure 2. Time–space plot summarizing the stratigraphy and structural history of the four major fault-bounded terranes and basins of the northwest Pilbara Craton. Differences indicate significant strike-slip displacements along the major faults and regional variability of granitic intrusion, volcanism, and sedimentation following the Prinsep Orogeny (i.e. within the De Grey Superbasin). Abbreviations: GC, Granitic Complex; Ss, Supersuite; SSs, Sisters Supersuite; OPSs, Orpheus Supersuite; MRSs, Maitland River Supersuite; EHSs, Elizabeth Hill Supersuite; D, Deformation event (= succession)*

et al., 2010, GSWA Record 2010/3) and the 34th International Geological Congress in 2012 (Van Kranendonk et al., 2012, GSWA Record 2012/10).

During the Mesoarchean, the northwestern part of the craton evolved through a plate tectonic cycle of subduction, accretion and collision, leading to cratonization at 2900 Ma. The De Grey Superbasin represents extension and subsidence following collision of the 3270–3120 Ma West Pilbara Superterrane with the older (3525–3225 Ma) granite–greenstones of the East Pilbara Terrane during the 3070–3060 Ma Prinsep Orogeny. The superbasin includes the 3020 Ma Gorge Creek Basin, the 3010 Ma Whim Creek Basin, the 2970–2940 Ma Mallina Basin and the 2930 Ma Mosquito Creek Basin. The Gorge Creek, Whim Creek and Mallina Basins overlie a regional unconformity and form part of the Central Pilbara Tectonic Zone. The Sholl Shear Zone is a crustal-scale structure that was active during deposition within the superbasin, and represents reactivation of a suture.

The Sholl Shear Zone may have provided the pathway for volcanism and related gold mineralization sourced from underlying subduction-modified mantle. At the Mount Oscar prospect, gold-bearing conglomerates are interlayered with geochemically distinctive basalt and are part of the Warrambie Basalt of the 3010 Ma Whim Creek Group (Figs 1, 2). Deposition of the conglomerates and a subsequent 230-million-year history of basin formation, volcanism, metamorphism, fluid flow, and folding and faulting were driven by movements on the adjacent shear zone. This may represent one source for gold reworked into conglomerates in the unconformably overlying Fortescue Basin.

The 2780–2630 Ma Fortescue Basin was the subject of a major regional study by GSWA (Thorne and Trendall, 2001, GSWA Bulletin 144). It overlies a craton-wide regional unconformity and represents a rift, deepening to the south, which began with the deposition of dominantly subaerial continental flood basalts and associated fluvial and lacustrine sedimentary rocks. Post-cratonization erosion produced a rugged landscape with 500 m of relief. Small, high-grade lenticular gold-bearing conglomerates are present at the basal Fortescue Group unconformity as poorly sorted, channel-fill deposits such as at the Just-in-Time gold mine near Marble Bar. In the 1980s, CRA drilled eight deep holes through the Fortescue Group testing a Witwatersrand model. These cores are held in the GSWA core library (www.dmp.wa.gov.au/corelibrary).

Although the De Grey Superbasin and the lower Fortescue Basin are time equivalents of the Witwatersrand Basin, there appears to be little direct correlation between the two, possibly reflecting different geodynamic histories and tectonic settings. The base of the Fortescue Group and the base of the Klipriviersberg Group (Ventersdorp Supergroup) both occur at a post-cratonization unconformity at a similar time, compatible with the idea of the Vaalbara continent and with the potential for the continuation of the Ventersdorp Contact Reef onto the Pilbara Craton. However, the sedimentary environments appear to represent different settings and there is no evidence as yet that the conglomerate-hosted gold deposits on the Pilbara are anything other than localized channel-fill deposits.

For more information, contact Ian Tyler (ian.tyler@dmirs.wa.gov.au).

Canning Basin SEEBASE project — 2017

In 2005, Frogtech Geoscience completed a **S**tructurally **E**nhanced view of **E**conomic **BASE**ment (SEEBASE) project resulting in a continental-scale depth-to-basement grid highlighting the Phanerozoic basins across Australia. This OZ SEEBASE study of multidiscipline geoscientific data became a signature project showing the distribution of sedimentary basins and the depth-to-basement structural model.

With the acquisition since 2005 of many new potential field datasets and seismic surveys in the Canning Basin, the Geological Survey of Western Australia (GSWA) contracted Frogtech to revise the SEEBASE model of the Canning Basin, and with an extension over the west Amadeus Basin.

The aims of the 2017 Canning SEEBASE project were to increase the resolution of the Canning Basin depth-to-basement model compared to the 2005 version (Fig. 1); improve identification, and map major structures and basement faults; assess the crustal architecture; interpret the basement composition; and determine the basement heat flow. These new products form a valuable precompetitive dataset for both the minerals and petroleum industries.

The project incorporated potential field data (gravity and magnetics), a digital elevation model, petroleum well and mineral borehole information, surface geology, interpretation of seismic lines and technical publications.

Geophysical processing and enhancements

In order to better interpret the potential field datasets, the project extracted a number of enhancements customized to the datasets and the geology of the project area.

These enhancements included:

- Bouguer Gravity
- 1st vertical derivative of Bouguer Gravity
- Low-pass filters (20 km, 50 km, 100 km)
- High-pass filters (100 km, 200 km, 300 km)
- Isostatic regional and residual gravity
- Frogtech proprietary filters
- Frogtech Ternary Images of Bouguer Gravity
- Total magnetic intensity (TMI)
- Reduction to the Pole (RTP) of TMI
- High-pass and low-pass filters as relevant for the data
- Frogtech Ternary Images of proprietary filters.

Data interpretation

The structural interpretation of potential field data is constrained by well intersections, outcrop/surface geology and seismic data.

The basement interpretation included:

1. undertaking magnetic depth modelling to constrain depth to basement
2. interpreting the SEEBASE depth-to-basement model using the newly processed gravity and magnetics, and other relevant constraining datasets
3. constructing two crustal-scale gravity models to test the SEEBASE and Moho models.

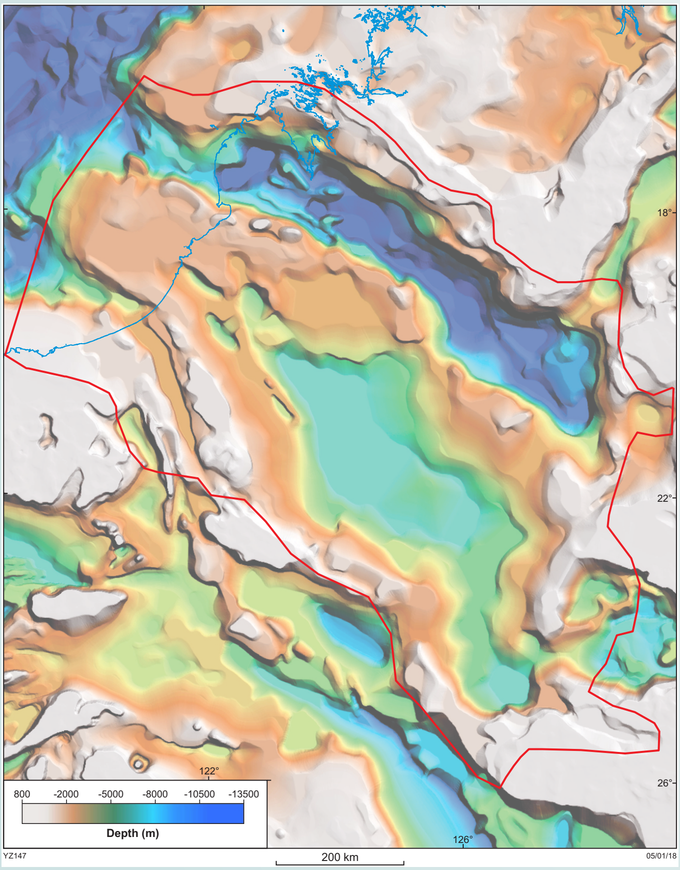


Figure 1. Depth to basement of the Canning Basin from the 2005 OZ SEEBASE

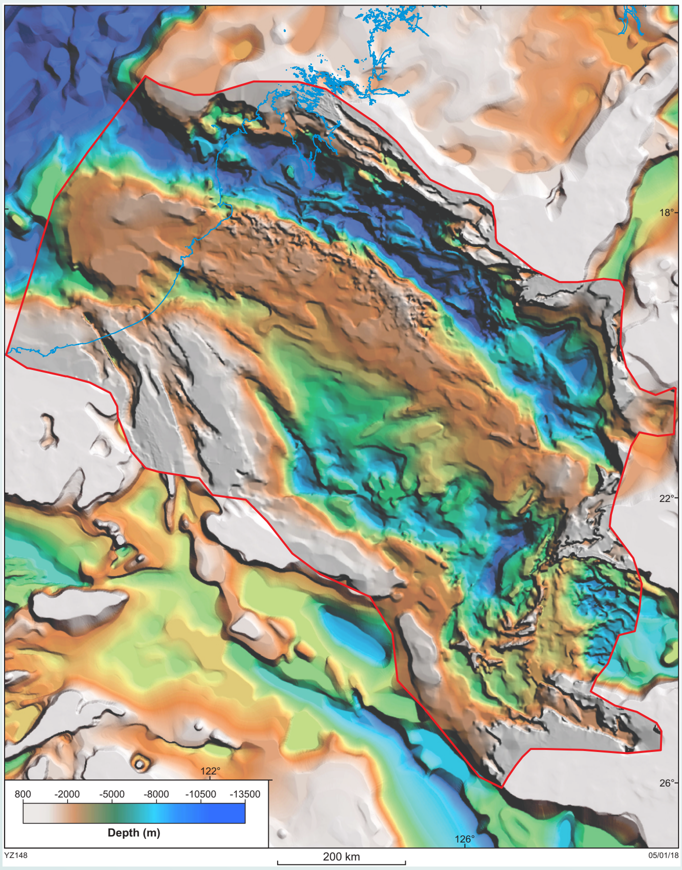


Figure 2. Depth to basement of the Canning Basin from the 2017 Canning Basin SEEBASE project

Derivative products from the SEEBASE and the depth-to-Moho model include:

1. total thickness of the sedimentary section
2. crustal thickness
3. basement thickness
4. β-factor (crustal stretching factor).

Results

The 2017 Canning Basin SEEBASE provides a significantly higher resolution interpretation of the basement surface beneath the Canning Basin compared to earlier versions (Fig. 2). The new 2017 SEEBASE incorporates a large volume of new magnetic and gravity data, as well as digital compilation of the heritage seismic data (Parra-Garcia et al., 2014 and GSWA in-house database), a well database with information on units at total depth and formation tops for many wells, and the latest surface geology mapping and bedrock interpretation (GSWA – digital bedrock geology, 2016).

The new SEEBASE model shows that the Kidson Sub-basin is a broad intracratonic basin overlying a stable craton; however, the basin deepens significantly, up to 8–10 km, in the southwest and southeast. The Fitzroy Trough is deepest along the Fenton Fault, which forms the west margin of the depocentre. Basement faults control local thickening of Ordovician and Devonian units on the Lennard Shelf. The Gregory Sub-basin is less well constrained, but several seismic lines indicate sediments to at least 4–5 sec TWT.

Several felsic to intermediate intrusives are interpreted within the basement to the Broome Platform, Crossland Platform and Kidson Sub-basin (Fig. 3). Under the Crossland Platform, intrusives are mostly narrow elongate bodies following a preferred north-northeast to south-southeast direction. Two distinctive sets of intrusive bodies are identified under the Broome Platform. One set contains intrusives that are elongated and aligned along a northwest to southeast orientation, whereas the other set is of larger and more circular plutons. The basement terrane underlying the Kidson Sub-basin is interpreted to represent a rigid cratonic block, with localized deformation around its margins.

The subcrustal (mantle) and crustal radiogenic components of the basement heat flow were modelled to calculate the present-day basement heat flow (Fig. 4). Calculated mantle heat flow values, based on seismic derived lithosphere thickness, range from 22 mW/m^2 under the thick Kimberley Craton lithosphere to 33 mW/m^2 below the thinnest area of the Kidson Sub-basin. Relatively low values measured in the Fitzroy Trough, 50–60 mW/m^2, are explained by the composition and reduced thickness of the underlying radiogenic crust. High values either side of the Fitzroy Trough are due to the presence of felsic intrusives. The presence of heat-producing radiogenic felsic or intermediate felsic rocks interpreted in this study from the potential field data has resulted in high heat flow values (100 mW/m^2) calculated for the Broome Platform.

Deliverables

The final products include crustal-scale gravity models, magnetic depth models, SEEBASE grid/image for depth to basement at 1:1 000 000 scale, and the basement-derived heat flow map. The final Report, together with the digital ARC GIS project and depth grids in ASCII format, are expected to be publically available for download via GSWA's eBookshop by early 2018.

For more information, contact Alex Zhan (alex.zhan@dmirs.wa.gov.au).

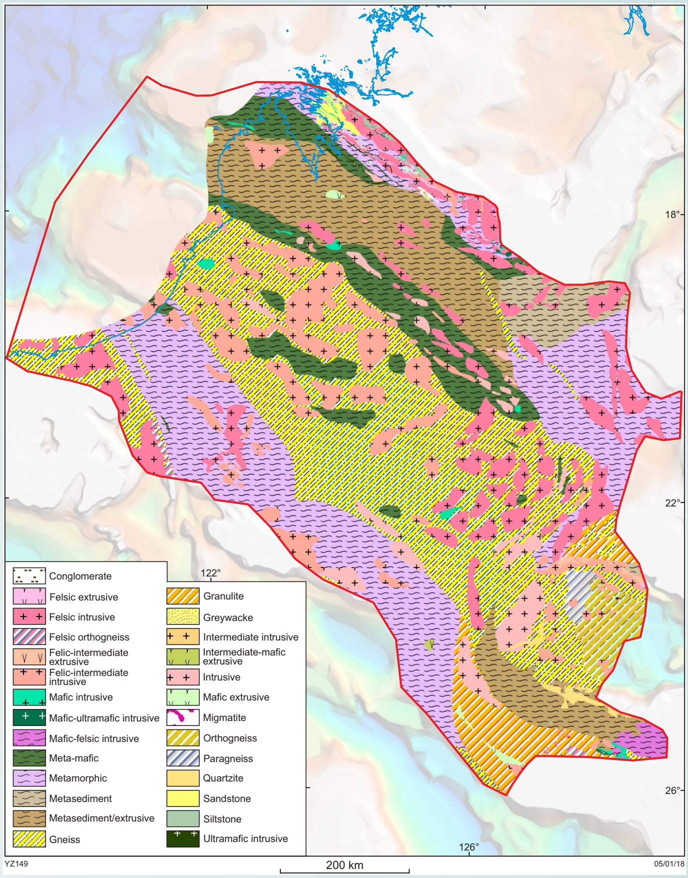


Figure 3. Interpretation of the basement composition to the Canning Basin

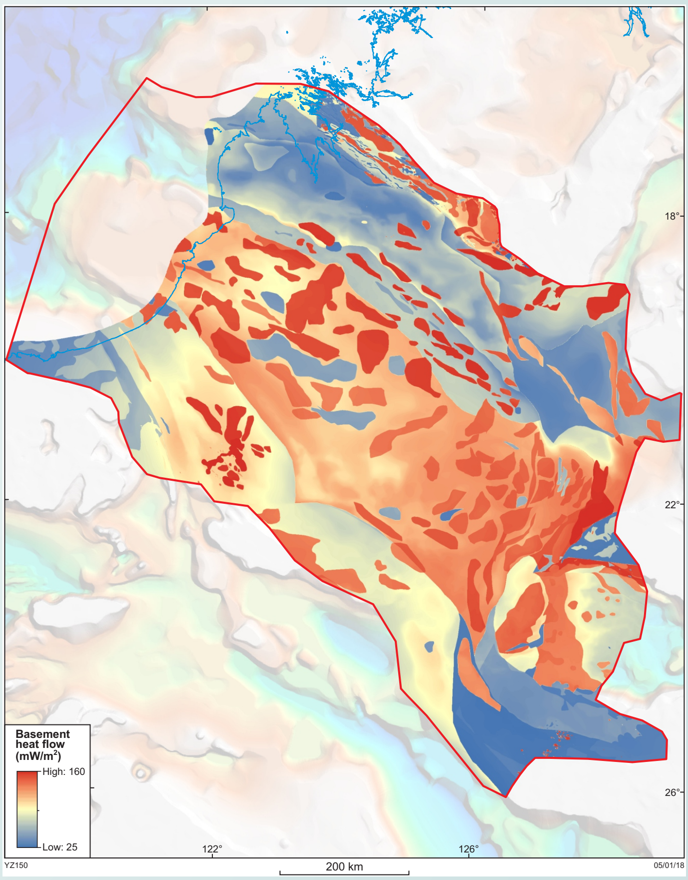


Figure 4. Calculated basement heat to the Canning Basin

Revised geology of the Murraba Basin

The helicopter-supported regolith geochemistry program over the Ngururrpa area of northeastern Western Australia (see Fieldnotes July 2016, October 2017) allowed an opportunity for Peter Haines and Heidi Allen of the Basins and Energy Geoscience team from the Geological Survey of Western Australia (GSWA) to undertake reconnaissance fieldwork in the remote and little-known southern Murraba Basin (Fig. 1). These rocks have seen little attention since 1:250 000-scale geological mapping in the 1970s.

The Murraba Basin succession was originally included in the Birrindudu Basin, but was defined as a separate entity in 2005. The latter is now restricted to a succession of mainly late Paleoproterozoic sedimentary rocks in the Northern Territory and adjacent eastern Western Australia that is inferred to connect eastwards with the McArthur Basin. The Murraba Basin is much younger, being mainly of Neoproterozoic age and part of the extensive Centralian Superbasin. Comparisons with other components of this superbasin, particularly the older part (Phase 1) of the nearby Amadeus Basin, suggest that the Murraba Basin has a much longer and more episodic depositional history than previously thought, although much of it is poorly exposed or expressed only as regolith (chart in Fig. 1). The recognition of regional stratigraphic breaks has led to a redefinition of the Redcliff Pound Group, restricting it to an apparently conformable package (Murraba Formation and Erica Sandstone) exposed in the Redcliff Pound area. The local Hidden Basin beds, previously inferred to overlie the Redcliff Pound Group, are likely pre-Murraba Basin, possibly correlative with the Birrindudu Basin.

These revisions have potential economic implications. For example, the lower Murraba Basin succession could host Neoproterozoic hydrocarbon source rocks as seen in the Amadeus Basin, and a salt seal, equivalent to the Gillen Formation salt unit of the Amadeus Basin, may be present at depth. Likewise, mineral exploration concepts used in the Amadeus Basin could be applicable to the Murraba Basin. See **GSWA Record 2017/4** for further details.

GSWA Record 2017/4 Geological reconnaissance of the southern Murraba Basin, Western Australia: revised stratigraphic position within the Centralian Superbasin and hydrocarbon potential is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Peter Haines (peter.haines@dmirs.wa.gov.au).

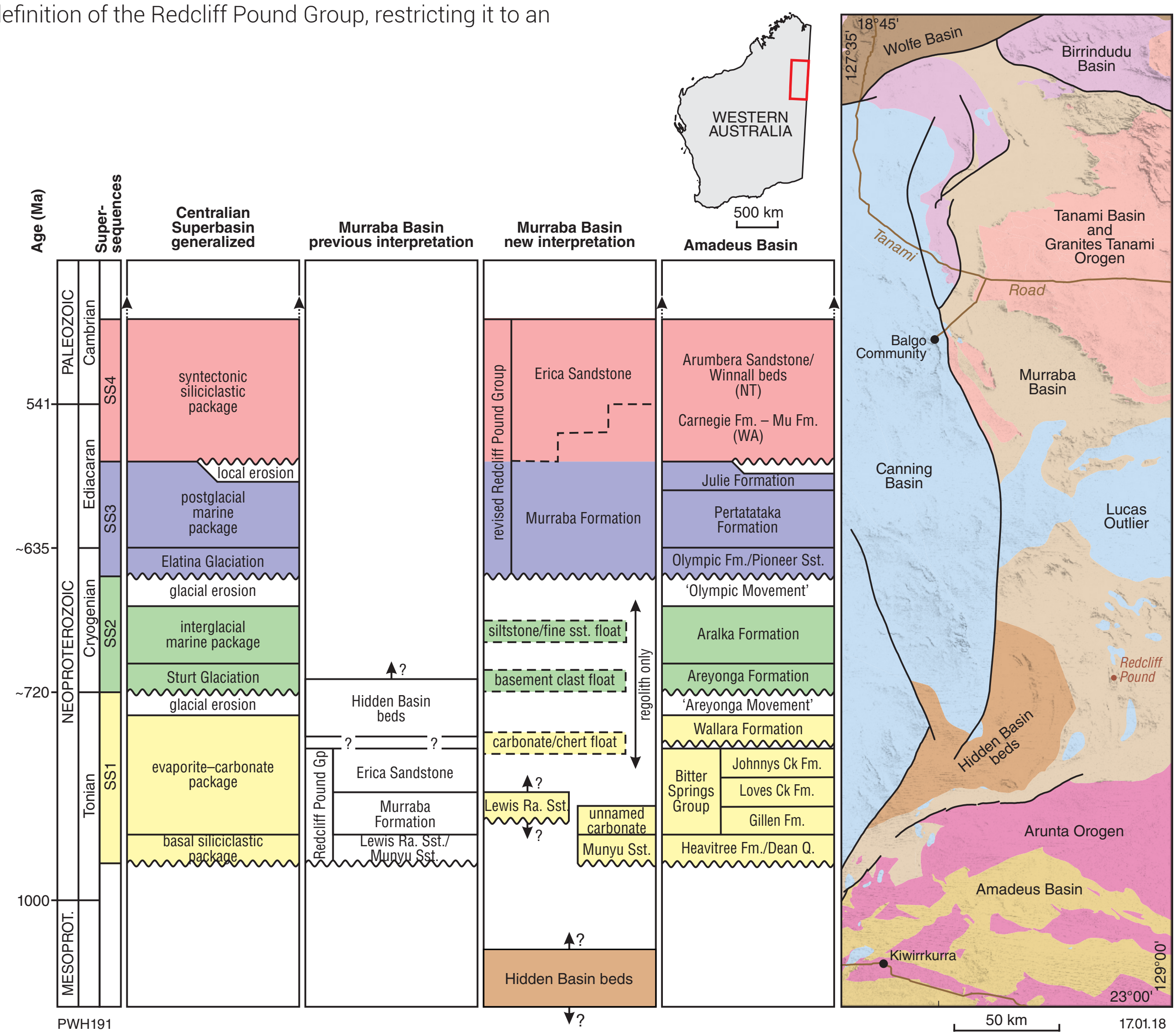


Figure 1. Map shows simplified bedrock geology of the Murraba Basin area; chart depicts original and revised stratigraphy of the Murraba Basin correlated with Centralian Superbasin general stratigraphy and the lower Amadeus Basin

The diamond exploration database, Western Australia

Approximately 11% of global rough diamond production by weight in 2015 came from the Ellendale and Argyle Diamond Mines in Western Australia, ranking the State fourth in the world after the Russian Federation, Botswana and the Democratic Republic of the Congo (DRC). With the closure of the Ellendale Diamond Mine in 2015, global production of fancy yellow stones was drastically curtailed, with no significant replacement source.

Numerous diamondiferous lamproite and kimberlite fields occur in Western Australia, and emplacement of these rocks spans much of geological time, from 17 Ma for the Walgidee Hills lamproite, Noonkanbah field, West Kimberley to 1868 Ma for the Brockman Creek kimberlite in the Pilbara. Seismic tomography demonstrates that considerable portions of Western Australia are underlain by thick (220–240 km) mantle lithosphere, a prerequistite for the formation of diamonds. Most of the State could be prospective for diamonds.

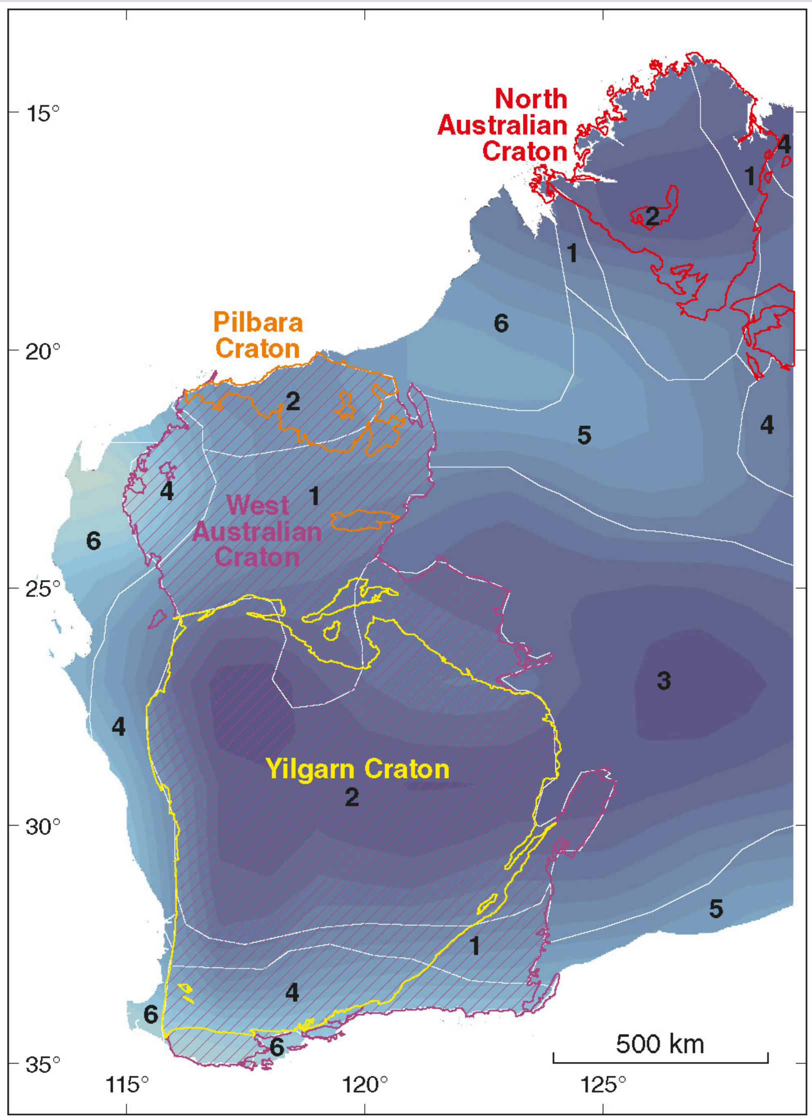


Figure 1. Map of estimated lithosphere thickness (from 70 km [light blue] to 240 km [dark blue] in 10 km increments). White-bordered polygons describe areas of differing diamond prospectivity (1 being most prospective to 6 being least prospective)

Exploration for diamonds dates back to at least the 1970s, so in order to assess the effectiveness of prior exploration and draw attention to underexplored yet prospective areas, the Geological Survey of Western Australia (GSWA) contracted Dr Mark Hutchison to create the Western Australian Diamond Exploration Database. This is a thorough compilation and interpretation of Western Australian diamond exploration data derived from 4200 open-file company reports, following the methodology used in 2013 to create the Northern Territory diamond database.

The diamond exploration database captures locations for more than 88 000 diamond exploration samples, the overwhelming majority (about 90%) being taken for separation of diamonds or other minerals indicative of diamond potential (chromite, diopside, garnet, ilmenite, monticellite, orthopyroxene, olivine, perovskite, phlogopite, pseudobrookite and tourmaline). Associated with these samples are over 30 000 good-quality chemical analyses of mineral separate grains. The database also compiles the surface expressions of 523 discrete, in-situ bodies having in-principal diamond potential (kimberlites, lamproites, ultramafic lamprophyres and carbonatites), of which 114 are confirmed to be diamondiferous, and 63 have ages determined.

In assessing prospectivity, the State is subdivided into 67 onshore tectonic units in four geographic areas, each ranked in terms of attractiveness for future diamond exploration on the basis of extent and results of sampling, in conjunction with the relative ages of country rocks and diamond-prospective rocks, and underlying mantle structure (see Figure 1 for a summary).

Favourable indicator mineral occurrences and chemistry, and in-situ bodies with diamond potential largely cluster in the north and west of the State in areas underlain by thick mantle lithosphere, particularly where there are significant changes in mantle thickness (reflecting structures favourable for diamond emplacement). The North Australian Craton, the location of Western Australia's diamond mines, scores well, but the distribution of prospective indicator minerals in undersampled regions suggests that parts of the West Australian Craton might be more prospective, most notably the boundary between the Capricorn Orogeny and the Archean Hamersley Basin, Eastern Goldfields Superterrane and the Goodin Inlier of the Yilgarn Craton. The far-west Kimberley and Arunta regions also score well, but given the range of kimberlite and lamproite emplacement ages, there is significant potential for diamond-affinity rocks to occur even within the large, underexplored sedimentary basins overlying thick mantle lithosphere. The results of the prospectivity analysis make a compelling case for renewed diamond exploration.

For more information, go to <www.dmp.wa.gov.au/ebookshop>, Posters and flyers, Diamond Prospectivity of Western Australia. This is Mark Hutchison's poster display from the 11th International Kimberlite Conference held in September 2017 in Gaborone, Botswana. The full diamond exploration database and associated reports will be released in early 2018.

GEOLOGICAL SURVEY

OPEN DAY 2018

Friday 23 February 2018

8.30 am – 4.30 pm

Followed by a Sundowner

Esplanade Hotel, Fremantle

Cnr Marine Tce & Essex St

This is a great opportunity to hear presentations on the latest results from GSWA's geoscience programs, including collaborative work with CSIRO, Geoscience Australia, Curtin University and the Centre for Exploration Targeting (CET).

Activities and results of the Exploration Incentive Scheme will be outlined including the launch of Round 17 of the Government Co-funded Exploration Drilling program.

Throughout the day there will be geological presentations, an extensive poster display, and demonstrations of online systems.

Register online at

www.dmp.wa.gov.au/gswa2018

For further information, call **(08) 9222 3168**

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

GSWA regional geophysics surveys: 2 January 2018 update

Data downloads

Located data — Geophysical Archive Data Delivery System <www.ga.gov.au/gadds>.

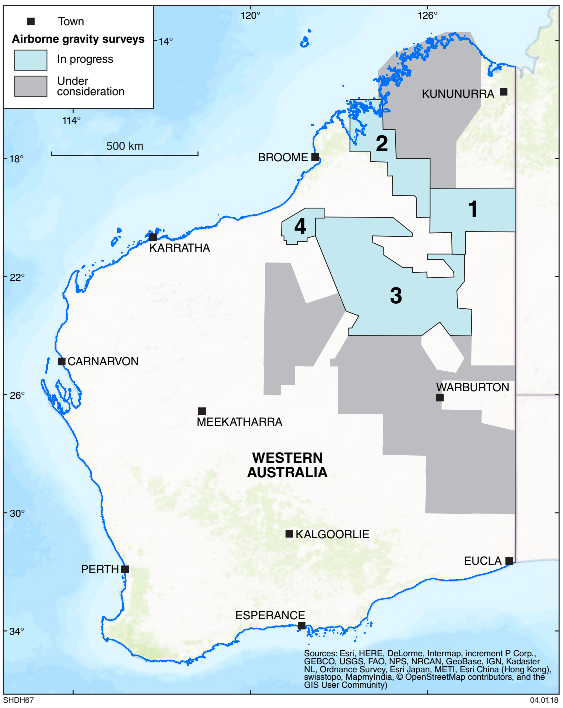
Grids and images — search in GeoVIEW.WA under Government Surveys layers.

Subscribe to the GSWA eNewsletter for alerts of preliminary and final data release dates. Go to <www.dmp.wa.gov.au/gswaenewsletter>.

Survey outline shapefiles are available online at <www.dmp.wa.gov.au/geophysics>.

For more information, contact David Howard (david.howard@dmirs.wa.gov.au).

EXPLORATION INCENTIVE SCHEME



ID	Area/Name	Method	Configuration	Size	Status*	Start	End	Release
1	Tanami 2017	Air Grav	2500 m, N-S	26 000 km	Prelim data	15-06-17	13-08-17	09-01-18
2	NE Canning 2017	Air Grav	2500 m, N-S	24 000 km	Processing	17-08-17	15-11-17	(Jan-18)
3	Kidson 2017	Air Grav	2500 m, N-S	70 000 km	Survey 67%	21-07-17	(Feb-18)	(Apr-18)
4	Kidson extn	Air Grav	2500 m, E-W	5 500 km	Pending	(Feb-18)	(Feb-18)	(Apr-18)
	Under consideration	Air Grav	2500 m	Various	Tender request closed 18 Dec 2017 http://tenders.gov.au ATM ID GA2017/4223			

Dates in parentheses are estimates.

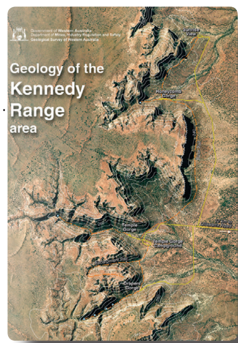
Publication

Geology of the Kennedy Range area

Some 300 million years ago the Kennedy Range area was covered by an ice sheet, and was later inundated by the sea. In the last 20 million years, the region has experienced significant changes in climate. See the evidence for these events in the rocks at Kennedy Range.

Although Kennedy Range National Park is extensive, only a small portion along the eastern margin is readily accessible to visitors in 2WD vehicles. In the tourist area, the spectacular escarpment soars to 100 m and is dissected by gorges with walking trails to rocky pools, seasonal waterfalls and intricate textures at Honeycomb Gorge. Wind and water have sculpted the rocks into remarkable shapes, and the rocky walking trails are strewn with boulders that have broken away from the sandstone cliffs. It is a rugged and remote place.

Today the range shows evidence of many phases of climatic change — from 300-million-year-old glaciation to recent warmer and wetter climates when much of the ironstone and mookaite formed. The range began to develop as a response to uplift and erosion more than 130 million years ago. Weathering and erosion by wind and water continue to slowly modify its shape.



To download a PDF of **Geology of the Kennedy Range area** by A Mory and RM Hocking, go to <www.dmp.wa.gov.au/bookshop>.

For more information, contact Arthur Mory (arthur.mory@dmirs.wa.gov.au).

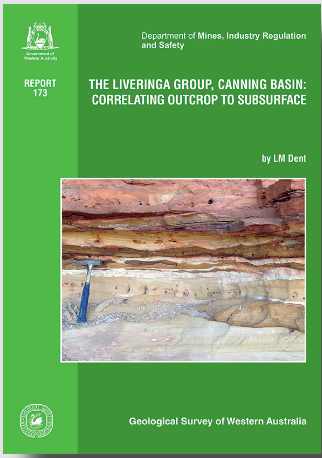
Kennedy Range at dawn

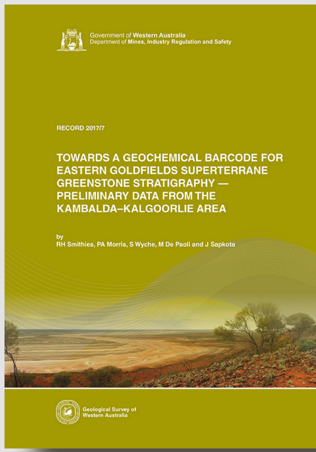
Product releases

ISSN 1325-9377 ISBN 978-1-74168-793-4 (PRINT)
ISSN 1834-2272 ISBN 978-1-74168-790-3 (PDF)

• REPORTS •

Report 173 The Liveringa Group, Canning Basin: correlating outcrop to subsurface (with accompanying zip file)
by Dent, LM





• RECORDS •

Record 2017/7 Towards a geochemical barcode for Eastern Goldfields Superterrane greenstone stratigraphy — preliminary data from the Kambalda–Kalgoorlie area (with accompanying zip file)
by Smithies, RH, Morris, PA, Wyche, S, De Paoli, M and Sapkota, J

Record 2017/8 The deep seismic reflection profile 11GA-Y01 in the west Musgrave Province: an updated view
by Quentin de Gromard, R, Howard, HM, Smithies, RH, Wingate MTD and Lu, Y

Record 2017/9 Metamorphosed VMS mineralization at Wheatley, southwest Western Australia (with accompanying zip file)
by Hassan, LY

Record 2017/10 Alteration associated with the Austin–Quinns VMS deposits (with accompanying zip file)
by Hassan, LY

Record 2017/11 NW biogeochemistry and beyond project
by Lintern, M, Ibrahimi, T, Pinchand, T and Cornelius, A

Record 2017/12 Controls on hydrothermal alterations and gold mineralisation at Coyote deposit, Western Australia
by Roll, H

Record 2017/13 Compilation of geophysical modelling records, 2017
by Murdie, RE and Brisbout, L

Record 2017/14 SGTSG 2017 Albany–Fraser Orogen pre-conference field trip: transect across an Archean craton margin to a Proterozoic ophiolite
by Quentin de Gromard, R, Spaggiari, CV, Munro, M, Sapkota, J and De Paoli, M

Record 2017/17 SGTSG Denmark 2017 abstract volume: Biennial meeting of the Specialist Group in Tectonics and Structural Geology, Geological Society of Australia, 8–12 November 2017, Denmark, Western Australia
compiled by Pearce, MA

• NON-SERIES BOOKS •

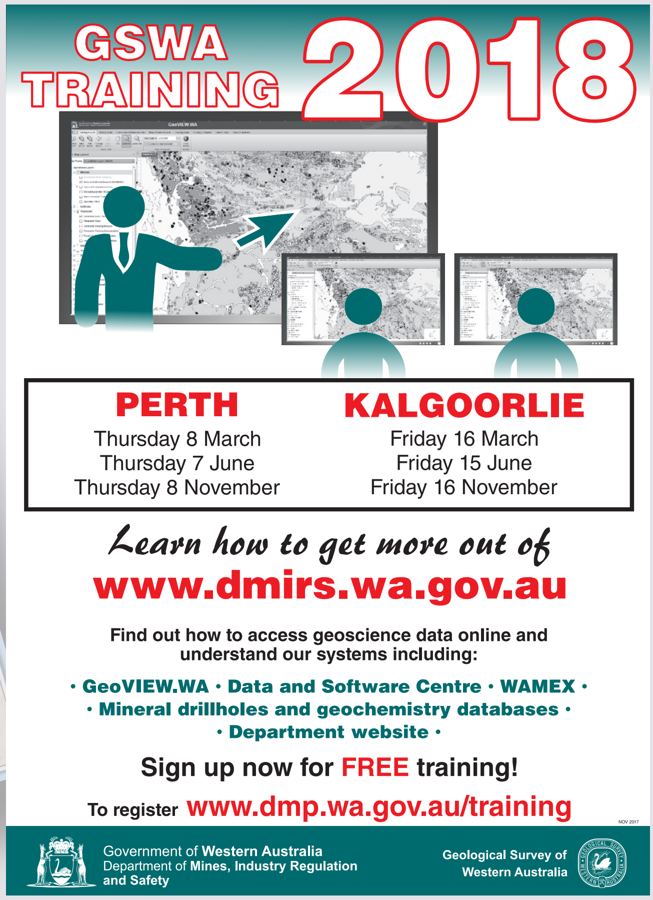
Geology of the Kennedy Range area
by Mory, AJ and Hocking, RM

• NON-SERIES MAPS •

Resource projects, Goldfields region — 2017

• GRAVITY DATA •

Preliminary data for the Tanami 2017 airborne gravity survey (26 000 line km)



The Geological Survey of Western Australia (GSWA) has released almost 5000 geological products including books, maps and data packages. These can be found on our website at <www.dmp.wa.gov.au/GSWApublications>.

Maps, USB data packages, and selected premium publications are available to purchase as hard copies via the online cart on the eBookshop at <www.dmp.wa.gov.au/ebookshop>. Alternatively, these products can be purchased from the Information Centre, First Floor, Mineral House, 100 Plain Street, East Perth, WA 6004, Australia, Phone: +61 8 9222 3459; Fax: +61 8 9222 3444.
Records, Reports, Bulletins and non-series books cannot be purchased in hard copy but are all available as PDFs to view, and as a free download.