

The future of mineral exploration geoscience at GSWA: EIS 4 and MinEx CRC

by

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Introduction

The State Government announced in the May 2018 State budget that the Exploration Incentive Scheme (EIS) would continue at \$10 million per year, with ongoing funding raised from an increase in the Mining Tenement Rent (MTR). This new funding mechanism, starting in full from July 2019, represents the fourth phase of the scheme and is designated EIS 4 (Fig. 1).

EIS was launched in April 2009, with funding of \$80 million provided from the Royalties for Regions (RfR) program for a more than four-year initiative that ran until the end of June 2013 (Phase 1). An additional \$20.6 million was allocated to the scheme from RfR funds for 2013–14 (Phase 1A). Funding for EIS (Phase 2) was then extended for three years until the end of 2016–17 with \$30 million from the Consolidated Revenue Fund. A further extension to the scheme (EIS 3) saw an allocation of RfR funding of \$20 million in the 2017 budget for two years to the end of June 2019.

The proposed programs for EIS 4 include funding for the National Drilling Initiative (NDI) within the recently launched \$218 million Mineral Exploration Cooperative Research Centre (MinEx CRC; <www.minexcrc.com.au>). EIS 4 is aligned to the National Mineral Exploration Strategy (Geoscience Working Group, 2017) and National Petroleum Exploration Strategy (Geoscience Working Group, in prep.) of the Council of Australian Governments (COAG) Energy Council, and to the UNCOVER AUSTRALIA/AMIRA industry roadmap ‘Unlocking Australia’s Hidden Potential’ (AMIRA International, 2017) for exploration under cover. UNCOVER involved extensive consultation with, and input from, the mineral exploration industry and its representative bodies in Australia, together with Geoscience Australia (GA) and the other State and Territory geological surveys, CSIRO and Australian university research leaders.

Mineral exploration geoscience at the Geological Survey of Western Australia (GSWA)

The objective of EIS is to promote exploration in Western Australia, with a particular emphasis on greenfields areas that are underexplored for mineral deposits and on frontier petroleum basins. The aim is to maintain investment and exploration activity at levels required for the long-term sustainability of the State’s resources sector, requiring an increase in the discovery rate of economic deposits, with the opening up of new search spaces. EIS is integrated with GSWA’s recurrent geoscience, mineral systems, and basins and energy programs.

There is a recognition that near- or at-surface mineral deposits are becoming increasingly difficult to find in Australia, with exploration success declining relative to effort and expenditure (AMIRA International, 2015, 2017). In order to counter the perception among international investors that Western Australia might represent a mature exploration search space, GSWA has been involved with industry in the UNCOVER roadmap process, facilitated by AMIRA International. The UNCOVER roadmap identified six themes, together with a number of very high, and high-priority focus areas (AMIRA International, 2015, 2017). These will be addressed under EIS 4.

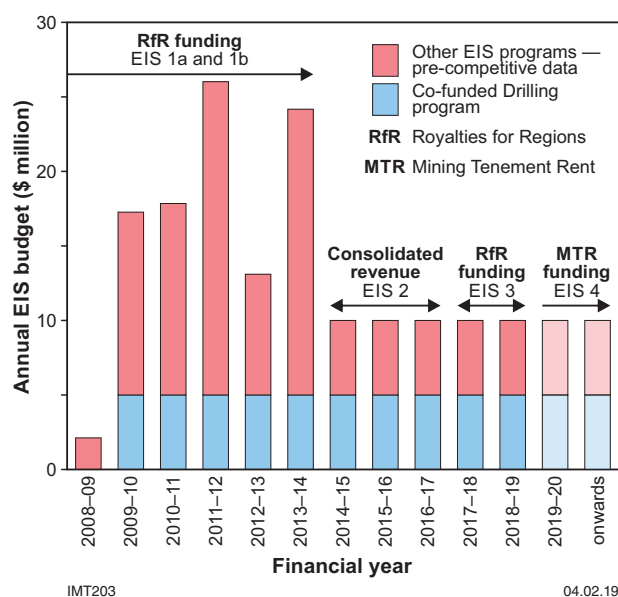


Figure 1. Funding sources for phases of the EIS from April 2009 to 2019–20 onwards

Priority areas for encouraging greenfields mineral exploration in Western Australia under EIS 4 are:

- the eastern margins of the Pilbara and Yilgarn Cratons
- bedrock elements of the margins of the North and West Australian Cratons in the remote Paterson, Granites–Tanami and Arunta Orogens (Fig. 2).

In previous EIS phases, GSWA has been part of a ‘Team WA’ approach to collaborative mineral exploration geoscience research in Western Australia involving CSIRO, Curtin University and The University of Western Australia (UWA), as well as collaborations with GA, other geological surveys and research institutions across Australia (Fig. 3). With the Centre for Exploration Targeting at UWA and CSIRO Mineral Resources, both world leaders in mineral systems studies, GSWA has undertaken innovative prospectivity and targeting studies that have been published as a series of GSWA Reports (e.g. Occhipinti et al., 2016; Lindsay et al., 2015, 2016; González-Álvarez, 2014; Walshe et al., 2014; Wells et al., 2016; Hollis et al., 2017).

EIS 4

Alongside the annual \$5 million EIS Co-funded Government–Industry Drilling program, a further annual \$5 million of EIS 4 will fund the acquisition and interpretation of pre-competitive geoscience data including geophysical data. The integrated interpretation of these data will be supported by petrophysical, mineralogical and geochemical analyses of samples obtained from stratigraphic and mineral potential drilling through cover as part of GSWA’s participation in MinEx CRC, and from industry legacy drillcores.

Program 1: innovative drilling

Program 1 consists of the Co-funded Government–Industry Drilling program, which is designed to stimulate geoscience exploration of underexplored greenfields regions in Western Australia, and contribute to their economic development by increasing exploration and new mineral discoveries. The program co-funds high-quality, technically and economically sound projects that promote new exploration concepts and new exploration technologies.

Program 2: geophysical surveys

A primary goal of EIS 4 is to complete the acquisition of airborne gravity coverage of the State at 2.5 km spacing, or better, over remote northern and northeastern parts of the State, with the assistance of GA. A targeted acquisition program for airborne electromagnetic surveys is planned in collaboration with GA as part of their Exploring for the Future program in northern Australia. Deep crustal reflection seismic and magnetotelluric surveys will provide insight into the deep crustal architecture by identifying major crustal boundaries that have the potential to act as fluid pathways. The data will be supported by passive seismic surveys, contributing to the building of a regional-scale, 3D understanding of the Western Australian crust.

Program 3: encouraging exploration through cover

Stratigraphic and mineral potential drilling will be funded as part of MinEx CRC, with the aim of developing new technologies and data systems to promote new exploration spaces under cover. Primary goals are categorizing and mapping the depth of cover (regolith and/or sedimentary basins) to identify key paleosurfaces, including the top of economic basement. NDI drilling programs will collect sample material from basement rocks for petrophysical, petrological, geochronological, geochemical and isotopic analyses to understand basement evolution through time (4D mapping). The development of smarter data management will allow integration and interrogation of multiple databases to optimize drilling and targeting and allow input of real-time data. Both historical and new data will be used to develop new tools and analytical techniques for use in exploration.

Program 4: 3D prospectivity mapping

Program 4 will enhance the understanding of the geological evolution of Western Australia and its mineral and petroleum prospectivity, and visualize and deliver that knowledge to explorers online. It will identify and map mineral and petroleum systems in Western Australia to understand distal footprints that will refine targeting and prospectivity mapping. The program also includes redevelopment or enhancement of the Department of Mines, Industry Regulation and Safety (DMIRS) geoscience databases through ‘WA Geology Online’ to ensure Western Australia maintains the world-class delivery and availability of geological datasets.

Program 5: promoting strategic research with industry

Program 5 will provide an annual grant of \$350 000 to the Minerals Research Institute of Western Australia (MRIWA) to support focused mineral research projects that develop new science and technology for mineral exploration in Western Australia.

MinEx CRC

DMIRS, through GSWA, will contribute \$350 000 annually over the 10 years of MinEx CRC from the EIS, for a total of \$3.5 million, as part of the NDI (MinEx CRC Program 3). In-kind support will consist mostly of the acquisition of targeted geophysical surveys up to a value of \$6 million over the life of the CRC. MRIWA is contributing \$1 million to Programs 1 and 2 of MinEx CRC, bringing the total contribution from Western Australia to \$4.5 million. GA is contributing \$10 million, the Geological Survey of New South Wales \$4.4 million and the Geological Survey of South Australia \$5 million as part of the NDI.

MinEx CRC participation is an integral part of GSWA’s ongoing plans for EIS through Program 3 (see above).

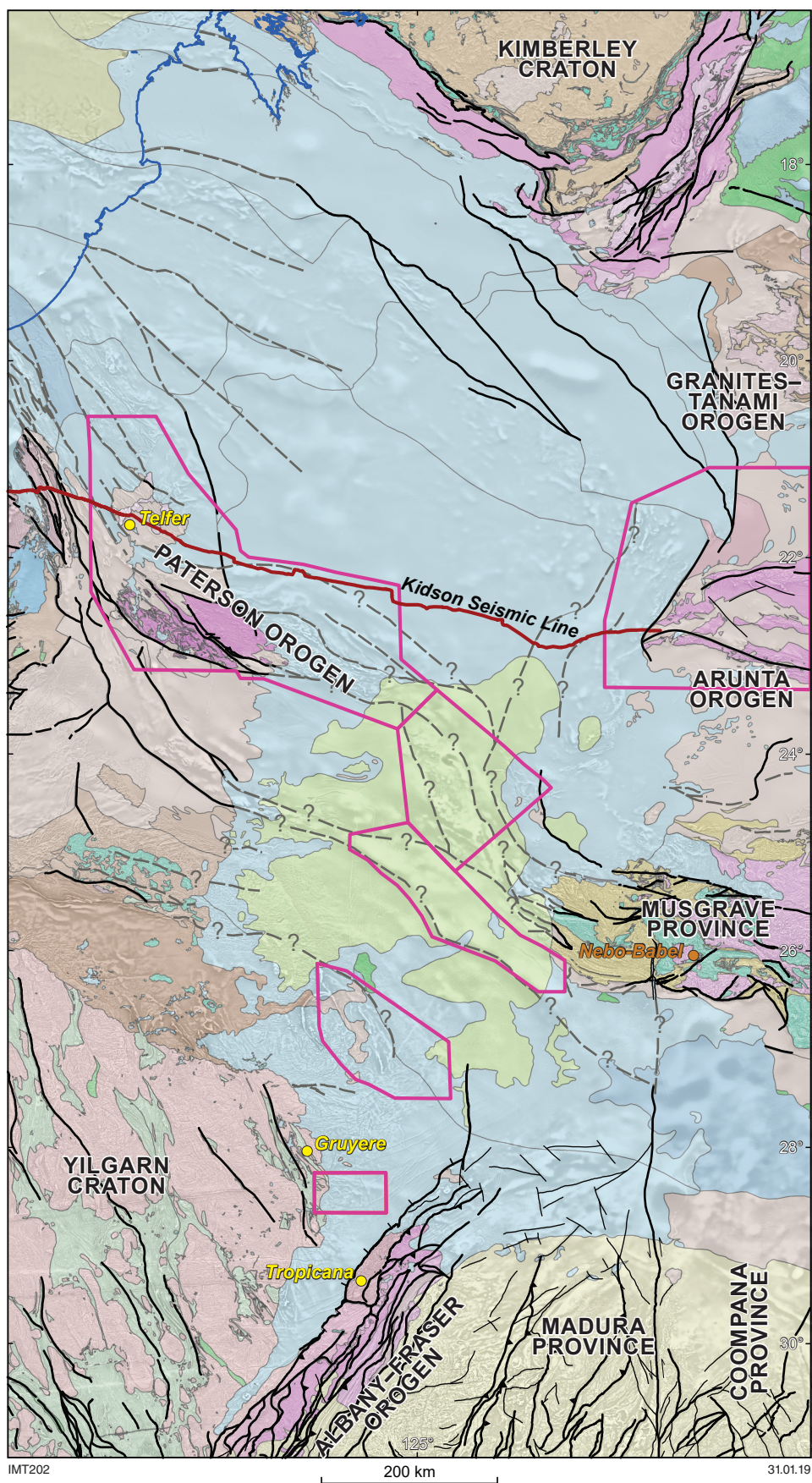


Figure 2. 'The Gap'. Mineral Exploration Cooperative Research Centre (MinEx CRC) National Drilling Initiative (NDI) priority areas in Western Australia (pink polygons). Background is Western Australian tectonic units over 1VD magnetic image



Figure 3. Collaborative research partners involved in EIS-funded projects up to June 2017

The entire \$3.5 million EIS contribution will be invested in drilling programs in Western Australia, and will leverage an equivalent amount of research at CSIRO and participating universities aimed around those drilling programs. Research programs under the NDI include:

- maximizing the value of data and drilling through cover
- geological architecture and evolution
- targeting mineral systems in covered terranes.

In Western Australia, GSWA will concentrate its NDI drilling programs in a region defined as 'The Gap' on the eastern margin of the Pilbara Craton (the Paterson Orogen, hosting the Cu–Au deposits including Telfer), and across the Canning Basin to the border region with the Northern Territory. The programs will be concentrated around the line of the recent GA/GSWA-funded Kidson deep seismic reflection survey (Fig. 2). The aim is to reduce risk for mineral explorers in a very remote greenfields setting in desert country covering the Proterozoic Paterson, Granites–Tanami and Arunta Orogens.

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