



Australian Government

Geoscience Australia

19 December 2022

Cnr Jerrabomberra Avenue
and Hindmarsh Drive,
Symonston ACT 2609

GPO Box 378,
Canberra ACT 2601
Australia

+61 2 6249 9111
www.ga.gov.au

ABN 80 091 799 039

To the Australian Universities Accord Panel,

Thank you for the opportunity to provide Geoscience Australia's contribution to the *Australian Universities Accord: Higher Education Review*. Our relationship with universities comes from our fundamental foundations in STEM and the support of its delivery and performance. The skills and knowledge for most of our ~600 employees derive from their education and training experiences in universities. Our work program and delivery are enhanced further by our university research partnerships that increase the impact and value of our programs and in turn provide an awareness and source for the future recruitment of staff from universities.

Geoscience Australia: introduction and context for this review

Geoscience Australia is one of the nation's trusted sources of information on Earth sciences, and as such we empower decision making by government, communities, and industry to contribute to a strong economy, a resilient society, and a sustainable environment. The value and trust in our advice comes from the quality of our data and information and in turn, the quality and relevance of our science and the scientists and supporting staff that we employ. These skills especially originate from staff with an education that extends to university qualifications where Geoscience Australia employs graduates from many Australian universities as well as internationally at all levels of career including through its graduate program. We therefore aspire to be the employer of choice for university graduates, post-graduates, and researchers. Further to this, we also rely on collaboration with university students, post-graduates and researchers for the delivery and success of our projects, programs, and operations.

Through Geoscience Australia's Decadal Plan [Strategy 2028](#), and the [supporting Science Strategy 2028](#), we have clear, measurable targets, which includes our commitment to pursuing science excellence and more specifically the impact area of *Enabling an informed Australia*. This impact area includes the target to *ensure future generations are informed in science, technology, engineering, and mathematics by equipping them with Earth science knowledge and resources*. This impact area links closely with our relationships with universities as the geosciences, space and spatial sciences (here called Earth science) sectors utilise skills across all facets of STEM as well as other areas of tertiary education such as communication, project management, leadership and human resources.

Geoscience Australia's Perspectives pertaining to the High Education Review's Terms of Reference

1. Meeting Australia's knowledge and skills needs, now and in the future

Geoscience Australia's priority projects such as Exploring for the Future, Digital Earth Australia, and Positioning Australia especially show where current and future opportunities for new skills, recruitment and capacity building are needed. These also highlight the opportunities for Australian industries, universities, and governments to work together to provide a skilled and diverse (in people and expertise) workforce to ensure Australia's future economic and environmental pathways. Although we have a strong skills-base across our staff at Geoscience Australia we have also found the availability of skilled candidates for recruitment to be limited in many areas, especially in fields of digital science, geoscience (especially geology and geophysics), spatial science (including surveying, geodesy) and space science (including Earth Observation). It would be an important priority to see graduates and post-graduates with these critical skills increasing in Australia, however at the same time we are seeing many universities closing or reducing the footprint of courses in these fields. One aspect that seems to have been missing from making these courses sustainable has been a clear awareness of key, strategic goals or targets required of these courses and university departments. ***The further recognition of critical and high-priority fields followed by the prioritisation of developing strategic plans and goals with measurable targets for courses and departments in these fields would be valuable to helping to sustain the production of graduates and post-graduates in these fields.***

As part of Geoscience Australia's 2022-23 Science Evaluations, we conducted a "deep dive" exercise in mapping the science capability and capacity of our staff. This was valuable for demonstrating our skills strengths, dependencies and gaps as well as providing an evidence-base for consideration of our future needs, vulnerabilities, and areas where we should prioritise seeking partnerships with groups such as universities. Upon approaching universities to discuss partnership needs and opportunities we have found that the articulation of their key capabilities and capacity has been of low confidence and poorly supported by evidence. This highlights that there has been limited mapping of priority capability and capacity in our universities across the country and how we can best provide either dispersed or concentrated "hubs" of university expertise, as well as clearly identifying major gaps in present and future capability and capacity needs. ***A systematic mapping of university capability and capacity across Australia at least in areas of national priority would help fuel evidence-based decision within the university sector as well as assist in linking government and industry needs with the university sector.***

2. Access and opportunity

We support the value proposition and priority of improving access to higher education, across teaching, learning and research. We directly invest in our own Education Centre that not only hosts school and teacher visits from across the nation, but we also provide teaching materials through online access that

especially helps all teachers and students. This is especially beneficial to teachers in regional areas that may not otherwise have the ability to travel to our Canberra headquarters. Because our work programs extend across all of Australia, we especially see first-hand, regional areas and First Nations Australians as under-represented in higher education access but are potentially the groups that can contribute new opportunities to the nation through this access. ***Finding effective ways to engage and have impact for regional and First Nations Australians*** is a major challenge and one that we have been attempting to address through our remote and regional education and outreach programs that have become an integrated component of our priority programs such as Exploring For The Future.

Research, including Handley et al (2020)¹ has shown that women will not typically stay in Earth sciences past 30-35 years of age, despite close to equal gender representation at the time of university graduation. This results in a sector with most of the senior and highly experienced staff being male, and in many cases close to retirement. There is a need for a more sustainable sector that upskills and develops staff to help address future skills shortages. To further assist here, Geoscience Australia is actively working to increase the diversity of its staff. We have just received our first Science in Australia Gender Equity (SAGE) Cygnet award, which is the first step in becoming a SAGE Silver accredited organisation, committed to advancing the careers of women, trans- and gender-diverse individuals, including achieving equity in decision-making forums. ***Geoscience Australia encourages Australian Universities to engage with SAGE and other diversity and inclusion organisations to increase the diversity of the Earth science sector and its graduates.***

3. Investment and affordability

We support the call in the review to explore funding and contribution arrangements that deliver equity, access, quality, and longer-term investments to meet priorities in teaching, research, workforce, and infrastructure. We are especially supportive of this being applied to the broader Earth Science fields where there is high competition for a small number of graduates being produced each year. We have seen some great examples of Cooperative Research Centre Education & Training programs that have invested to make a large impact in increasing research student numbers and quality, such as in Cooperative Research centre for Landscapes Environment and Mineral Exploration (CRC LEME), Deep Exploration technology Cooperative Research Centre (DET CRC) and the current MinEx CRC program. Another notable example that includes the action of industry peak bodies has been the Minerals Council of Australia's investment in the highly successful National Exploration Undercover School (NEXUS) hosted at the University of Adelaide. ***We therefore recommend that the review builds a portfolio of successful examples to help focus future programs of collaborative investment (between universities, industry, and government) in priority higher education programs.***

¹ In Australasia, gender is still on the agenda in geosciences – Handley et al, 2020

4. Governance, accountability and community

Geoscience Australia supports the review's objectives to:

- Enhance regulatory and workplace relations settings to support universities to meet their obligations to both staff and students.
- Explore the contribution that higher education makes to the Australian community, national security, and sovereign capability

5. The connection between the vocational education and training and higher education systems

Specific to the Earth Science sector sustainability, there have been numerous reviews and inquiries into education and training needs. These include but are not limited to the Minerals Council of Australia's *Back from the Brink: Reshaping Minerals Tertiary Education* report², the *Australian Academy of Science Decadal Plan for Australia Geoscience 2018-2027*³ and the *Surveyor's Trust Australian Surveying & Spatial Workforce: A National Roadmap*⁴.

These all highlight the need for strategic planning across the sectors that includes government, industry and academia. There is a need to ensure the Earth science skills pipeline is maintained by government, universities and industry and a need to better understand the skills that graduates are expected to have upon completion of their qualifications. Without these conversations there is a risk of a disconnect between what graduates are being taught in tertiary education and the skills that employers are expecting graduates to have. ***Geoscience Australia supports the recommended strategic alignment of all sectors to ensure the skills and training provided are aligned to the needs of the sector.***

The *Australian Surveying & Spatial Workforce: A National Roadmap*⁵ makes five recommendations for workforce reform in the surveying and spatial workforce. This references the diversity of stakeholder 'ecosystems' for surveyors/spatial experts. It would be vital that the Earth science sector remains closely connected with this dialogue, rather than viewing this as something that should be solved by the surveying industry itself. ***Geoscience Australia sees that there is an opportunity to leverage the recommendations from industry, notably around cross-skilling by developing training pathways for professionals coming from, or in, e.g. resources, spatial sector, engineering or other fields.***

² Back from the Brink: Reshaping Minerals Tertiary Education, Mineral Council of Australia, 1998

³ Decadal Plan for Australia Geoscience 2018-2027, Australian Academy of Science, 2018

⁴ Australian Surveying & Spatial Workforce: A National Roadmap, Surveyor's Trust, 2022

⁵ Australian Surveying & Spatial Workforce: A National Roadmap, Surveyor's Trust, 2022

6. Quality and sustainability

Geoscience supports the review's objective to assess and develop opportunities in this area, particularly for long-term sustainability of university courses that meets the future needs of the Earth Sciences sectors. This will also be important to ensure Australia's "knowledge relevance" and international competitiveness and sovereign employment needs.

7. Delivering new knowledge, innovation, and capability

Geoscience Australia supports the review panel's consideration of a system of university research that delivers for Australia, securing the future of the Australian research pipeline, from basic and translational research to commercialisation. In doing so, the Accord will explore relevant initiatives and other opportunities and to further boost collaboration between universities and industry to drive greater commercial returns. ***We also urge that the university and government collaboration is also considered as part of an important system of collaboration and ideally the three-way links between university – industry – government.*** These links are a strong component of our core commitment to having supportive stakeholders. We would also like to reiterate the value in systematic capability and capacity mapping outlined for reference #1, and we feel that this approach would also make important contributions here as well.

Summary of Geoscience Australia's key recommendations

In summary, our key recommendations for consideration as part of this higher education review include:

1. Meeting Australia's knowledge and skills needs now and, in the future

- *The further recognition of critical and high-priority fields followed by the prioritisation of developing strategic plans and goals with measurable targets for courses and departments in these fields would be valuable to helping to sustain the production of graduates and post-graduates in these fields.*
- *A systematic mapping of university capability and capacity across Australia at least in areas of national priority would help fuel evidence-based decision within the university sector as well as assist in linking government and industry needs with the university sector.*

2. Access and Opportunity

- *Finding effective ways to engage and have impact for regional and First Nations Australians*
- *Encourage Australian Universities to engage with SAGE and other diversity and inclusion organisations to increase the diversity of the Earth science sector and its graduates.*

3. Investment and Affordability

- *The review builds a portfolio of successful examples to help focus future programs of collaborative investment (between universities, industry, and government) in priority higher education programs.*

4. Governance, Accountability and Community

- *Geoscience Australia supports the review's objectives to:*
 - *Enhance regulatory and workplace relations settings to support universities to meet their obligations to both staff and students.*
 - *Explore the contribution that higher education makes to the Australian community, national security, and sovereign capability*

5. Connection between vocational education and training and higher education systems

- *Strategic alignment of all sectors to ensure the skills and training provided are aligned to the needs of the sector.*
- *Geoscience Australia sees that there is an opportunity to leverage the recommendations from industry, notably around cross-skilling by developing training pathways for professionals coming from, or in, e.g. resources, spatial sector, engineering or other fields.*

6. Quality and sustainability

- *Geoscience supports the review's objective to assess and develop opportunities in this area, particularly for long-term sustainability of university courses that meets the future needs of the Earth Sciences sectors.*

7. Delivering new knowledge, innovation, and capability

- *We also urge that the university and government collaboration is also considered as part of an important system of collaboration and ideally the three-way links between university – industry – government.*

With regards,



Dr James Johnson,
Chief Executive Officer
Geoscience Australia