



National Rock Garden

Celebrating the Geological
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Newsletter No. 12
March 2016

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How can YOU get involved?



The National Rock Garden is proudly
supported by the Geological Society of
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www.nationalrockgarden.org.au

Grant Received for Design of Education Pavilion at the National Rock Garden

Brad Pillans and Mike Smith, NRG Directors

In December 2015, the National Rock Garden Steering Committee was delighted to receive a grant of \$30,000 from the Australian Geoscience Council to fund the generation of a design concept for an Education Pavilion at the NRG site, as described in greater detail later in this article.

About the Australian Geoscience Council

The Australian Geoscience Council (AGC) is the peak body representing all geoscientists in Australia. It has representation from its eight member societies, which are the six learned societies in various specific fields of geoscience, together with two professional institutes. Details of the member organisations can be found at the AGC web site www.agc.org.au which also describes the Vision and the Mission Statement for the Council.

The AGC recently announced details of its long term strategic plan, which has three strategic pillars, namely Geoscience Education, Geoscience Advocacy and Geoscience Sustainability. The willingness of the AGC to provide financial support for the NRG is derived from the Council's enthusiasm for Geoscience Education.

An Education Pavilion at the NRG Site

Earth science education is a primary focus of the National Rock Garden, particularly for school groups. In order to understand how to work effectively with large school groups, NRG steering committee members met with science educators from the Australian Science Teachers Association, the CSIRO Discovery Centre and Geoscience Australia. These experienced educators agreed that the NRG will be highly regarded and frequently visited, particularly by organised tours of school children and their support staff. However, this use requires a broad range of specific facilities to ensure the capacity to deal with multiple coach-loads (each bringing around 50 passengers) including bus parking, assembly & address areas, sheltered areas for eating lunches and toilets.

The requirement for a purpose-built Education Pavilion at the garden encouraged the NRG Steering Committee to develop a plan for a facility with the following features:

1. A spacious undercover area where visitors, including school groups, could gather.
2. An effective teaching and learning space for educators, geoscientists and guides to communicate with visitors and school groups.
3. Space to display NRG information, including secure storage for NRG brochures and rare rocks.

The Steering Committee envisages a single-story building, 30-40 m long and some 12-15 m wide, oriented to capture a north view across the NRG site, towards Black Mountain (see image on following page).

Purpose of the \$30,000 Grant

The AGC has endorsed the NRG Steering Committee's request for the amount of \$30,000 to fund the design of an Education Pavilion at the NRG site, which will consist of the following tasks:

1. A visit to the NRG site, including consultation with the National Capital Authority, and preparation of an updated NRG site plan
2. Building Concept Design, including a building plan, a site plan, elevations and cross sections, and presentation of 3D views of the building
3. Indicative Cost Estimate for the proposed NRG Education Pavilion

We are pleased to announce that in January 2016 the NRG engaged well-known architects Tonkin Zulaikha Greer (TZG) to design the pavilion. TZG have worked closely with Taylor Cullity Lethlean (the landscape architects who designed the NRG draft masterplan), on other major projects in Canberra, including the National Arboretum and the National Botanic Gardens. The three NRG Directors recently met with TZG Director, Peter Tonkin, as well as representatives of the National Capital Authority (who are responsible for managing Commonwealth land in Canberra), at the actual site of the proposed Education Pavilion, to review design options. We hope to have sketch plans completed by March. Construction and operation of the NRG Education Pavilion will enhance Canberra's reputation as a world-class education hub.



Image from left to right: Peter Tonkin (TZG), Gweneth Leigh (NCA), Brad Pillans (NRG), Mike Smith (NRG), John Bain (NRG) and Duncan Maclellan (NCA) at the NRG site to discuss the proposed Education Pavilion. (Courtesy Brad Pillans)

Geotechnical Study Commences at National Rock Garden Site

Mike Smith¹ and Sarah Buckerfield²

¹Director, National Rock Garden, ²Geophysicist, Geoscience Australia

The National Rock Garden (NRG) will be a permanent facility in a landscaped environment on a five hectare site. The current NRG Masterplan (available at www.nationalrockgarden.org.au) indicates that rocks will be exhibited in a variety of layouts including the excavation of a flat area in the southern portion where a gallery of very large rock specimens will be placed, adjacent to an elevated amphitheatre. In addition, a series of gorges are planned to be excavated in the central portion of the area and lined with rocks laid out to demonstrate a wide range of geological structures. A series of rock clusters will be dispersed along pathways of the geological walk. This article describes a geotechnical study aimed at locating any near-surface occurrences of hard rock which could impact on future plans to excavate into the gently sloping face of the NRG site.

The NRG site occurs on the Coppins Crossing 1:10,000 geological map sheet. There is no rock exposure on the site, but the basement rocks are believed to be mid-Silurian Mount Painter Volcanics, which reportedly includes dacite, rhyodacite, shale, siltstone, ashstone and limestone. The lack of rock outcrop means that the exact lithology and the depth to fresh rock are not known. It is likely that small south-flowing drainage lines existed on the site flowing down from the elevated terrain now occupied by the National Arboretum. Thus, it is speculated that there could be buried ridges and gullies that lie concealed beneath the current land surface. Accurate knowledge of the location of basement ridges, as well as the depths to fresh rock, is important to assist the design of the proposed excavation work.

In order to map the basement topography, below the area where excavation is expected to be undertaken, a geotechnical study has been planned for the NRG site. The NRG Steering Committee is extremely grateful to the geophysical staff from Geoscience Australia who have agreed to undertake these measurements. The geotechnical work has so far involved ground penetrating radar (GPR) and passive seismic studies.



Image: Panorama of Area of Proposed Geotechnical Study. (Courtesy Peter Smith)

A comprehensive risk analysis for the geotechnical survey has been completed. The proposed work site presents no obvious hazards to the geotechnical survey team, as the area is lightly vegetated with grasses and small trees, and has a very mild slope. There are no pits, potholes, fences or power cables. In addition, the proposed survey methods present a very low risk of injury to the operators. The site is adjacent to a public area which includes a cycling path, and members of the Steering Committee have been present to explain the purpose of the work to any inquisitive onlookers.

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Ground penetrating radar and passive seismic work have been carried out and the results are being processed and interpreted. Further measurements may be taken if there are important areas lacking information.

Ground penetrating radar is a non-destructive, very low impact technique used in many applications studying depths near the ground surface. Applications include rock and soil mapping, groundwater mapping, and detecting pipes, fractures, or buried objects. The method is probably best known for its use in the archaeological investigations undertaken in the BBC television series, 'Time Team'. High frequency radio waves are emitted into the ground and are reflected off boundaries between rocks, soil and concrete, and absorbed to different degrees by different soil types (e.g. clay/sand). The returning reflected waves are detected and recorded and can be used to map the subsurface.

In late May 2015, the NRG site was covered by a 50m grid oriented NE-SW and NW- SE and these GPR measurements are currently being processed and evaluated. The presence of clays limits the technique but we believe that we have obtained useful information about the overburden down to about three metres depth, and hopeful that we have picked up the weathered basement in some places. The following profile is an example of where we believe we have detected weathered basement. Strongly reflecting layers are evident in the top of the section (surface to 1.5 metres) which would derive from layered sediments in the overburden. Over the depth range 2.5 to 4 metres, there is a weak reflector that could represent the weathered bedrock. In this example (see image below) the reflector is located at 2.5 to 3m depth, with the interpreted pick shown in red.

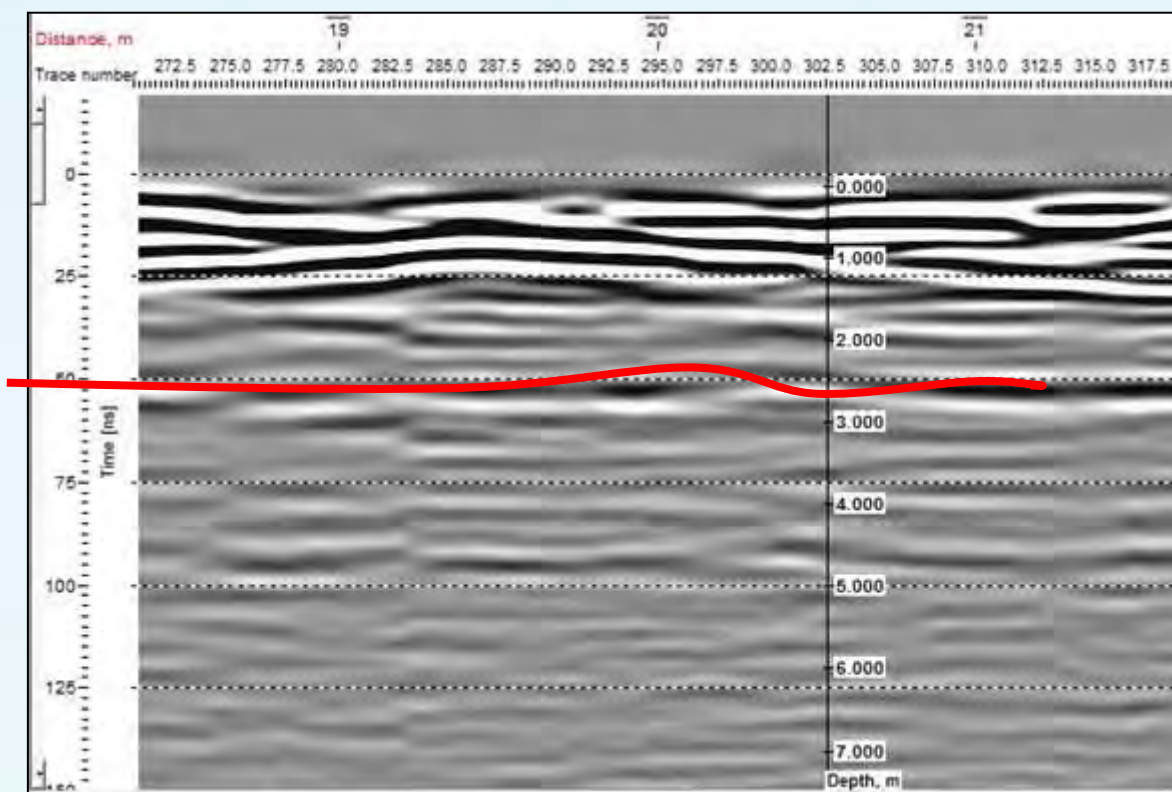


Image: Ground penetrating radar profile illustrating reflecting layers. The red line marks the reflector believed to be the weathered bedrock boundary. (Courtesy Sarah Buckerfield)

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Passive seismic is a non-destructive, very low impact technique used to study the composition of rocks and soil at a range of depths beneath the ground surface. Passive seismic techniques utilise the sound waves from ambient sources such as traffic and machinery, distinguishing it from the refraction seismic method which uses sound waves created specifically for the survey operation.

The instrument (see image below) is placed on the ground surface to measure seismic waves as they arrive from a wide range of natural and artificial sources. This information is used to estimate the speed of seismic waves through soil and rocks beneath the surface, which can be used to infer what types of soils or rocks are found in that location. This cheap and relatively simple technique has proven highly successful not only in shallow engineering applications but also in imaging rocks up to hundreds of metres below the surface.



Image: Passive seismic instrument used to measure seismic waves as they arrive from a wide range of natural and artificial sources. (Courtesy Sarah Buckerfield)

The results from the National Rock Garden site are of high quality and are currently undergoing analysis and interpretation. A three component sensor records horizontal and vertical motion, in the northerly, easterly, and vertical directions. The ratio of the horizontal to vertical components is calculated and graphed as a function of frequency. The frequency at which the horizontal to vertical ratio is at a maximum changes depending on the depth at which a distinct velocity contrast occurs.



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The first interpretation results confirm the presence of a strong change from low velocity material at the surface to moderate velocity material at between 1 to 3 metres depth at various locations, probably the same feature as shown in the ground penetrating radar data. Interpretation is continuing.

Additional results of the various geotechnical measurements will be reported in a subsequent issue of the NRG Newsletter.

National Rock Garden Information Manager – Opportunity for an Enthusiastic Volunteer

Situation:

The Steering Committee of the National Rock Garden (NRG) is in the early stages of progressing implementation of the Masterplan for the National Rock Garden. Information is starting to accumulate regarding planning, finance, stakeholder engagements, rock selection and delivery, site layout and relevant approvals, but the breadth of information is starting to exceed the limits of casual management.

It is apparent that progress of the NRG could be impaired if the information being accumulated cannot be effectively exploited. There is therefore an exciting opportunity for a volunteer with an interest in information management to contribute to the progress of the NRG.

Opportunity:

The NRG Committee is seeking expressions of interest from people who might like to take on the role of information manager for the NRG, as a volunteer member of the NRG Steering Committee. Currently, there is a simple Dropbox structure in place, which is intended to be an improvement over personal information stores that individuals have developed to date. As such there are minimal legacy structures to deal with, even though the information content in some of those structures could be extensive.

The purpose of the role would be to:

- Devise and implement an information repository that would allow resilient storage and retrieval of NRG data, with varying access arrangements for different stakeholder groups, including:
 - Steering Committee members
 - GSA members
 - Sponsors
 - Friends of the NRG
 - Authorities such as the NCA and the ACT government
- Liaise with existing and former NRG participants to extract information of relevance or importance from their personal archives.
- Utilise inexpensive Information management tools such as the existing Dropbox, though use of alternate tools that did not impose significant life cycle costs would be entertained.
- Progress the extraction of valuable repository from individuals' scattered storages.
- Depending on the desired level of engagement, either actively control the repository or simply instruct Steering Committee members in its operation.



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Related activities that an enthusiastic participant could branch out into include:

- Contribution to the structure and management of the NRG website – some of the significant information on the website would be sourced from the repository.
- Contribution to the design of the information delivery system intended to provide the eventual NRG visitors with ready access to detailed exhibit information via smartphone apps, exhibit barcoding, web references etc.

Timing:

The role could be taken up as soon as possible – the sooner the better in terms of limiting rework of ongoing information accumulation.

Duration of the role could be for as long as a contribution could be provided.

Level of Engagement:

The level of engagement could range across:

- a one-time setup activity,
- part time participation in the Steering Committee to provide maintenance for the repository and its contents, to
- full time participation in the Steering Committee.

Response:

If interested, please contact the Chairman of the NRG Steering Group, Prof Brad Pillans at brad.pillans@anu.edu.au.

National Rock Garden at Australian Earth Sciences Convention in Adelaide

Steering Committee Chairman Professor Brad Pillans will present a detailed update on the National Rock Garden in a speech to be delivered at the Geological Society of Australia's Australian Earth Sciences Convention 2016.

This major conference will be held in the city of Adelaide during June this year and will be accompanied by many field trips and workshops (please refer to <http://aesc2016.gsa.org.au/> for further information). The National Rock Garden Steering Committee will also have a small display booth at AESC2016.

The AESC2016 will showcase the latest geoscience research, provide opportunities for professional development and the space for geoscientists to connect and collaborate with their peers. Adelaide is, of course, a vibrant coastal city surrounded by interesting geology right on its door-step. The geology of the Adelaide region is a major factor in determining the distribution of well-known wineries in the Barossa Valley, McLaren Vale and Adelaide Hills, as well as the character of the wines that they produce.

Science meets Parliament

The 16th annual Science meets Parliament (SmP) took place on the 1st and 2nd of March 2016, in Canberra. The event brought some 200 scientists together for a two-day program of professional development and networking aimed at helping them to better communicate their science to the media, policymakers and parliamentarians. A large number of MPs participate in SmP, which is strongly supported by both the Federal Government and Opposition parties.

SmP is organised by Science & Technology Australia (STA), Australia's peak science body representing more than 68,000 scientists across all science and technology disciplines. Membership of STA is not an individual membership, but via a wide range of science societies and groups of which individual scientists are members. For example, Brad Pillans is a member of the Geological Society of Australia, which is a member of the Australian Geoscience Council (AGC), which in turn is a member of STA. It sounds a bit complicated, but it does allow a very large number of scientists to have a united voice in promoting science to the wider community, including parliamentarians.

Each member organisation of STA can send up to two delegates to SmP, and Brad was fortunate to attend as a representative of the AGC. Since a major aim of AGC is to promote geoscience education, this gave him an opportunity to highlight the National Rock Garden. Brad met with two politicians – The Hon John Cobb MP (National Party member for Calare, NSW) and Senator Larissa Waters (Greens Senator for Queensland), both of whom showed a depth of knowledge and an interest in a wide range of science topics, including the NRG.



From left to right: Senator Larissa Waters, Dr Lee Rollins (Genetics Society of Australasia), Dr Line Bay (Australian Coral Reef Society), Prof Brad Pillans and Dr Kuntala Lahiri-Dutt (Institute of Australian Geographers). Image supplied by the office of Senator Waters.

How can YOU get involved?

National Rock Garden Masterplan

Please download the Masterplan from the NRG website (note this is a large file).

<http://www.nationalrockgarden.org.au/assets/News-letters/M1310140904Rock-Garden-MP-WEB-4-small.pdf>

Social Media

Do you have a link to a YouTube clip or online resources you think the National Rock Garden community would like to see? If you do, please post it on our Facebook page. www.facebook.com/National-Rock-Garden-509206615828657/

Feedback and further information

We welcome feedback and suggestions on the development of the National Rock Garden. See the feedback boxes on the National Rock Garden website: www.nationalrockgarden.org.au

Tax deductible

The National Rock Garden is a registered Charity and all donations are tax deductible. Making a donation to the National Rock Garden is a great way to reduce your tax and feel good too! To make a donation, please visit the NRG website or phone (02) 9290 2194.

Sponsoring the National Rock Garden Building the National Rock Garden will take the participation of many volunteers, involve different tiers of government, provide work for contractors, designers and builders and ultimately involve many organisations and people. As highlighted above, we need major donors and sponsors to work with us as we build this national monument in the nation's capital. If you or your organisation would like to be financially involved, please contact: Mike Smith mike_rpgeo@optusnet.com.au, Prof. Brad Pillans, brad.pillans@anu.edu.au or Sue Fletcher, sue@gsa.org.au

This Newsletter Compiled by Michelle Cooper and Mike Smith. Edited by Brad Pillans National Rock Garden The newsletter is circulated twice a year, ordinarily December/January and June/July. New "friends" are welcome and can be added to the email circulation list by contacting the editor. You don't have to be an Earth scientist. Members of the public, students and educators with an interest in the evolution of the Australian continent are all welcome. Newsletters are also posted on the National Rock Garden website. www.nationalrockgarden.org.au

Keep up with the latest NRG news, rock movements, rocks of the month and a whole lot more.

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