

National Rock Garden

Celebrating the Geological Heritage of Australia



The Development of the National Rock Garden in the Nation's Capital

By Mike Smith

Director, National Rock Garden

Chair, NSW Rock Selection Committee



PURPOSE

The National Rock Garden will celebrate Australia's rich geological heritage:

- In a parkland setting within the national capital
- By means of a permanent display, showcasing the diversity of rocks and minerals, that contribute so significantly to the nation's landscapes, heritage and prosperity.



BOARD:

Professor Brad Pillans, Michelle Cooper, John Bain and Mike Smith,
supported by a broadly based Steering Committee

ADVISORY COUNCIL:

Dr Neil Williams, Honorary Professor, RSES, ANU

Shenal Basnayake, CEO, Australian Science Teachers Association

Prof. Tom Calma AO FAA, Chancellor, University of Canberra

Jo White, Director, Questacon

Dr James Johnson, CEO, Geoscience Australia

Tom Kapitany, Director, National Dinosaur Museum

Dr Mathew Trinca, Director, National Museum of Australia

Scott Saddler AM, Executive Branch Manager, National Arboretum

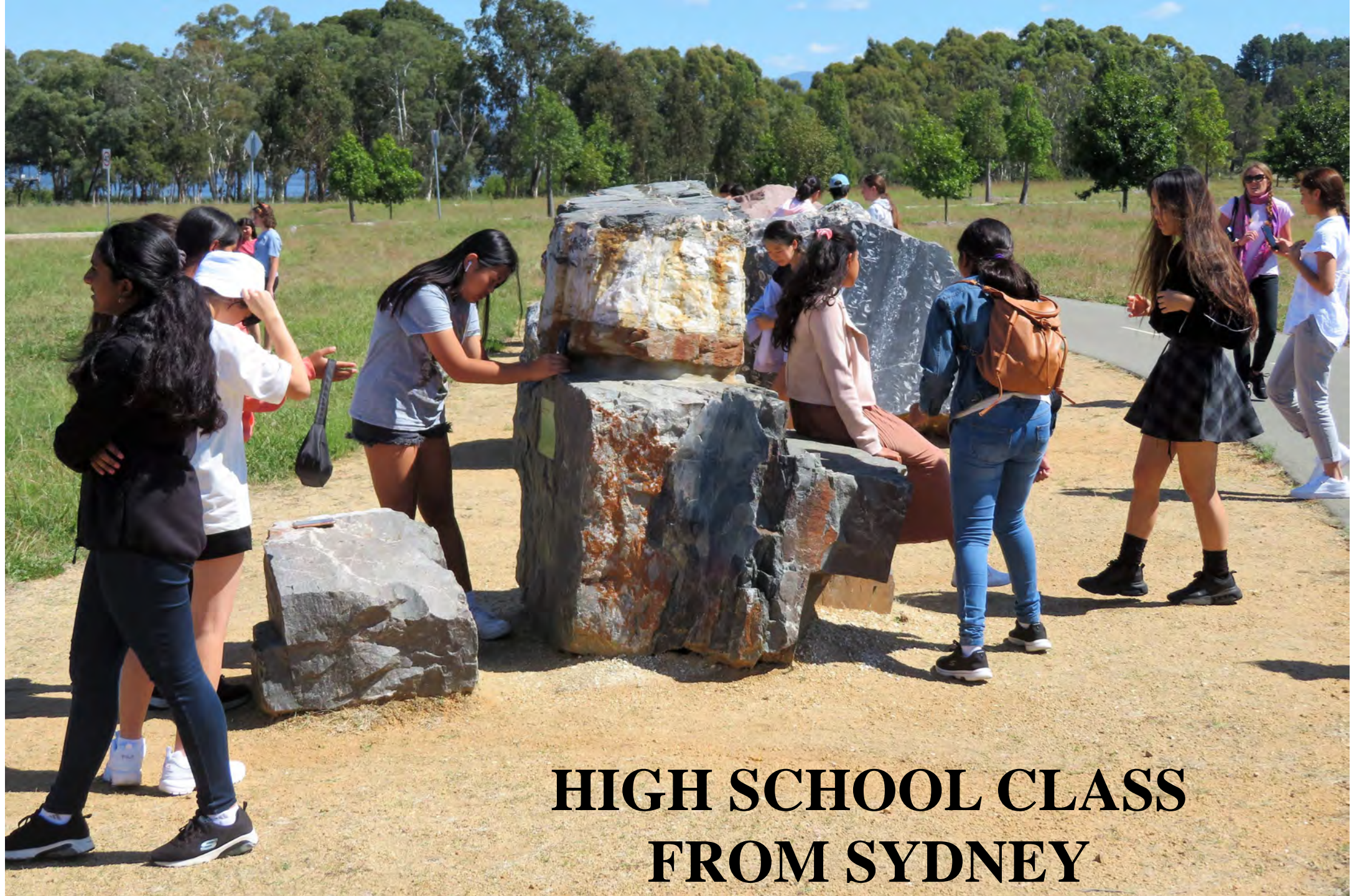
Kate Schulze, General Manager, Minerals Council of Australia

Simon Troeth, Newcrest Mining Limited

WHAT'S IT ALL ABOUT?



National Rock Garden, Nov 2016



**HIGH SCHOOL CLASS
FROM SYDNEY**



GRANDCHILDREN FROM LONDON

Polished
Banded
Iron
Formation





Chinaman Ck Limestone & Megalodont bivalves

Orbicular Granite Mt Magnet







NORTHERN TERRITORY
Mount Goyder Syenite
AGE: Proterozoic, 1.5-1.6 billion years
LOCATION: Mt Goyder Quarry, 118 km NE of Darwin
FORMATION: A low relief series of granites that extends from
Mount Goyder to the south coast (about 100 km). It is thought that
these granites were once part of a larger mass of granitic rock that
was in contact with the sea. The granites are composed of quartz, feldspar,
mica and hornblende. The rock is a fine-grained, light-colored granite.
(Source: NT Government)
SIGNIFICANCE: The granitic rocks in this area are highly visible in
the landscape, providing a link to the Northern Territory's geological
heritage. The rocks are also a source of aggregate for construction.
(Source: NT Government)

**LOOKING
TOUCHING
LEARNING**

OLDER FOLK LIKE ROCKS





YOUNG FOLK GET QUITE EXCITED

BULAHDELAH ALUNITE

supported by Worimi People of the Karual LALC
and funded by Federal Heritage Grant



TARANA GRANITE – THE ORANGE- COLOURED OPERA HOUSE ROCK



***Sadly, the white roof
tiles are from Sweden***

TARANA GRANITE UPLIFT

Funded by private donation



NOW STORED ON
MARULAN FARM



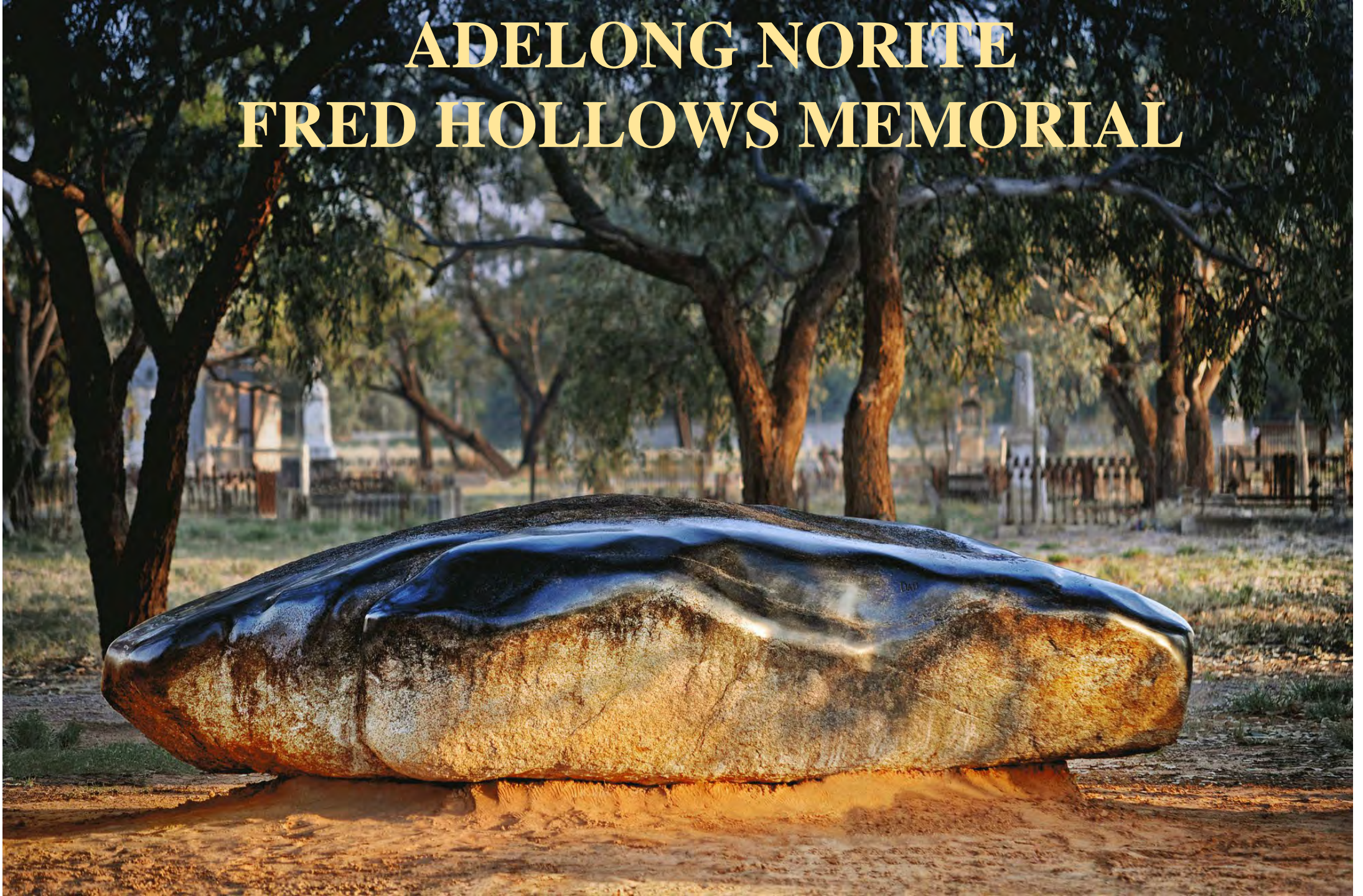
INDIGENOUS CONSULTATION

Face-to-face and on-line conversations with the executives of the Bathurst Local Aboriginal Land Council has concerned:

- Incorporating the name **WIRADJURI COUNTRY** on the NRG's descriptions of the rock,
- Including the local landform **BUUMAL** to distinguish the eastern part of Wiradjuri land,
- Developing support for young Indigenous people to encourage travel from town out to their Country & learn about **walang**.



ADELONG NORITE FRED HOLLOWS MEMORIAL





BRAD, GABI & ANDREAS AT NRG'S NORITE

MORUYA TONALITE ARRIVES IN ACT





SYD HBR BRIDGE PYLON



MIDDLEDALE GABBROIC DIORITE



ROCK WASHING ESSENTIAL

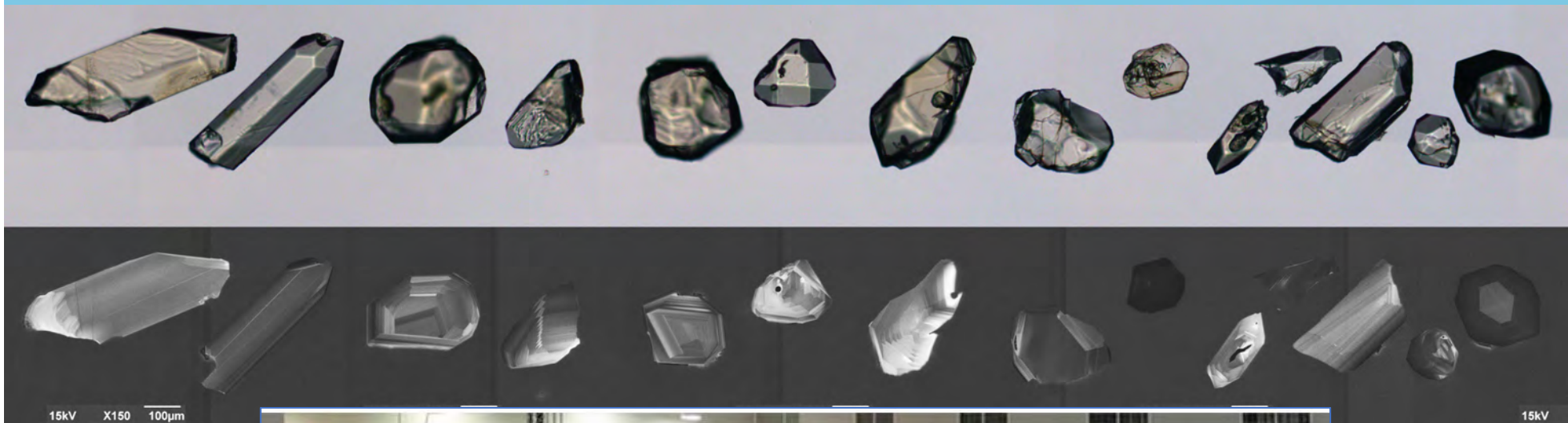
DIORITE BOULDER DELIVERED TO ACT



Lance Black – geochronologist

John Henderson \$10K donor

MGD ZIRCON CRYSTALS





EUGOWRA TOWN OF MURALS – WASHED AWAY



**CARMINA GREY WALLS IN NEW
PARLIAMENT HOUSE (EUG. GR.)**



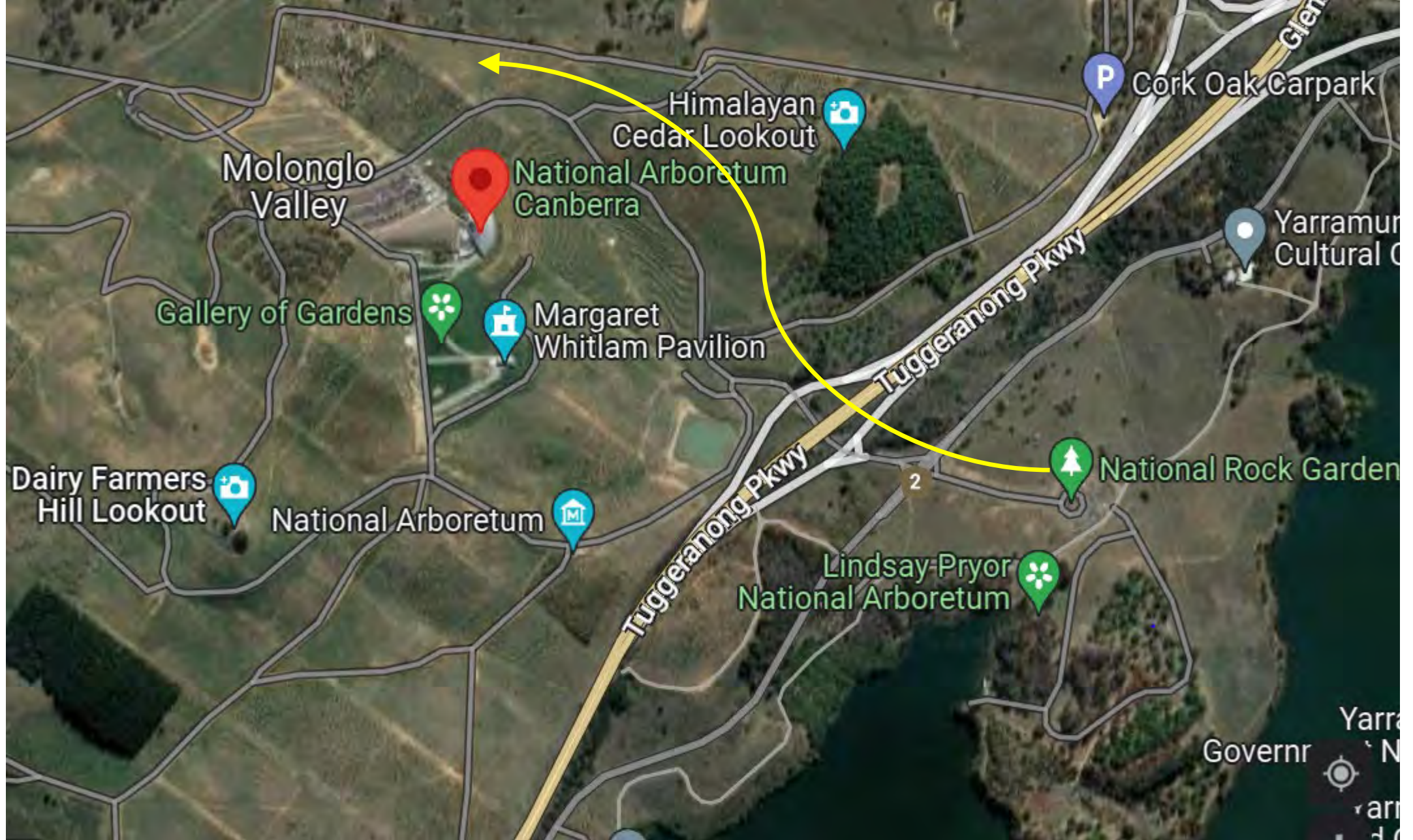
EUGOWRA
GRANITE BLOCK

**EUG. GRAN.
ARRIVES IN NAC
STORAGE SITE
13/12/2022**

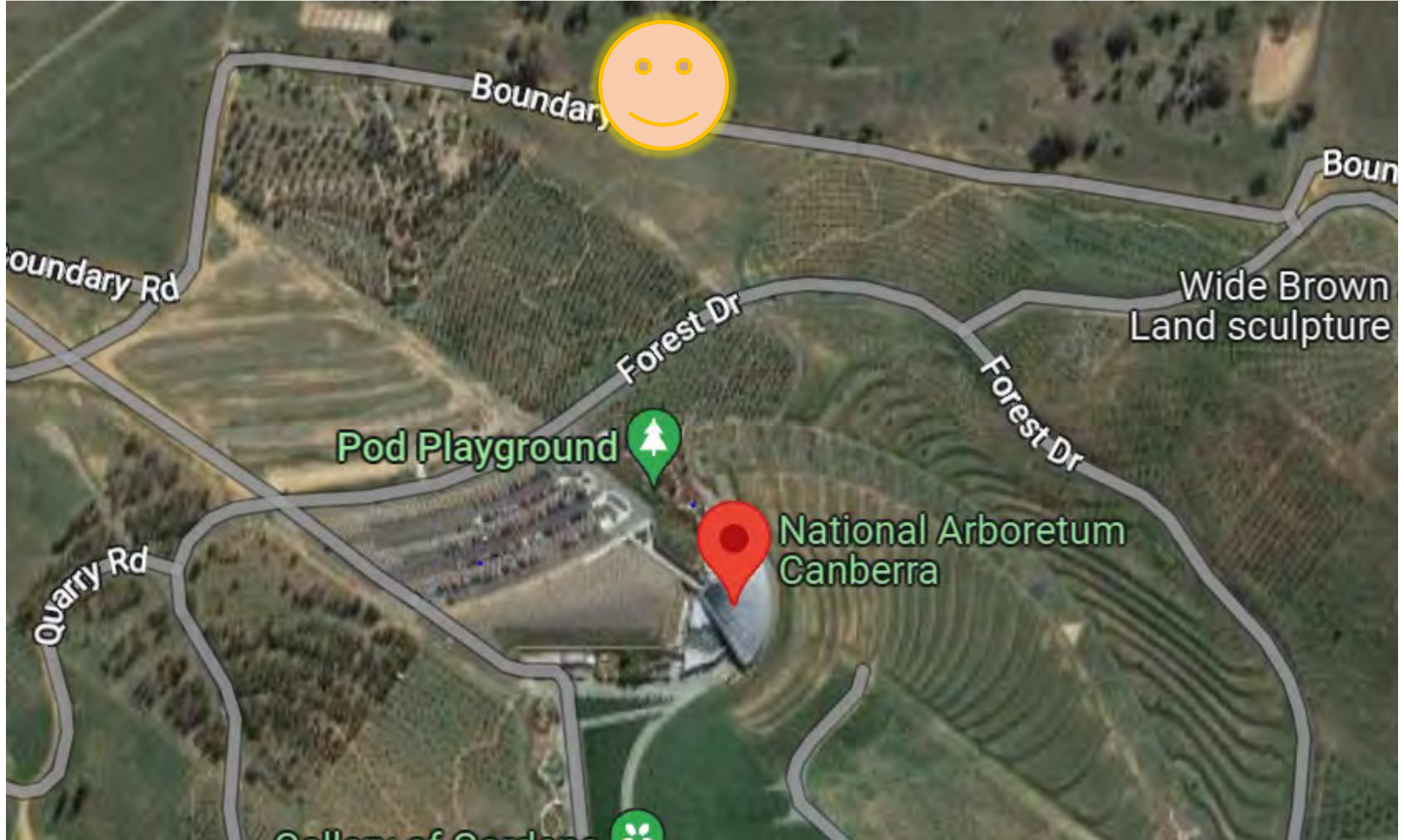




**4TH JUNE 2021 SIGNING OF
NRG-ACT AGREEMENT**



NATIONAL ARBORETUM CANBERRA



NEW ROCK GARDEN LOCATION



NEW ROCK GARDEN LOCATION Image by Brad Pillans



HARRIS HOBBS LANDSCAPES

16 Robe Street DEAKIN ACT 2600

Tel. (02) 6273 4661 Fax. (02) 6273 4233

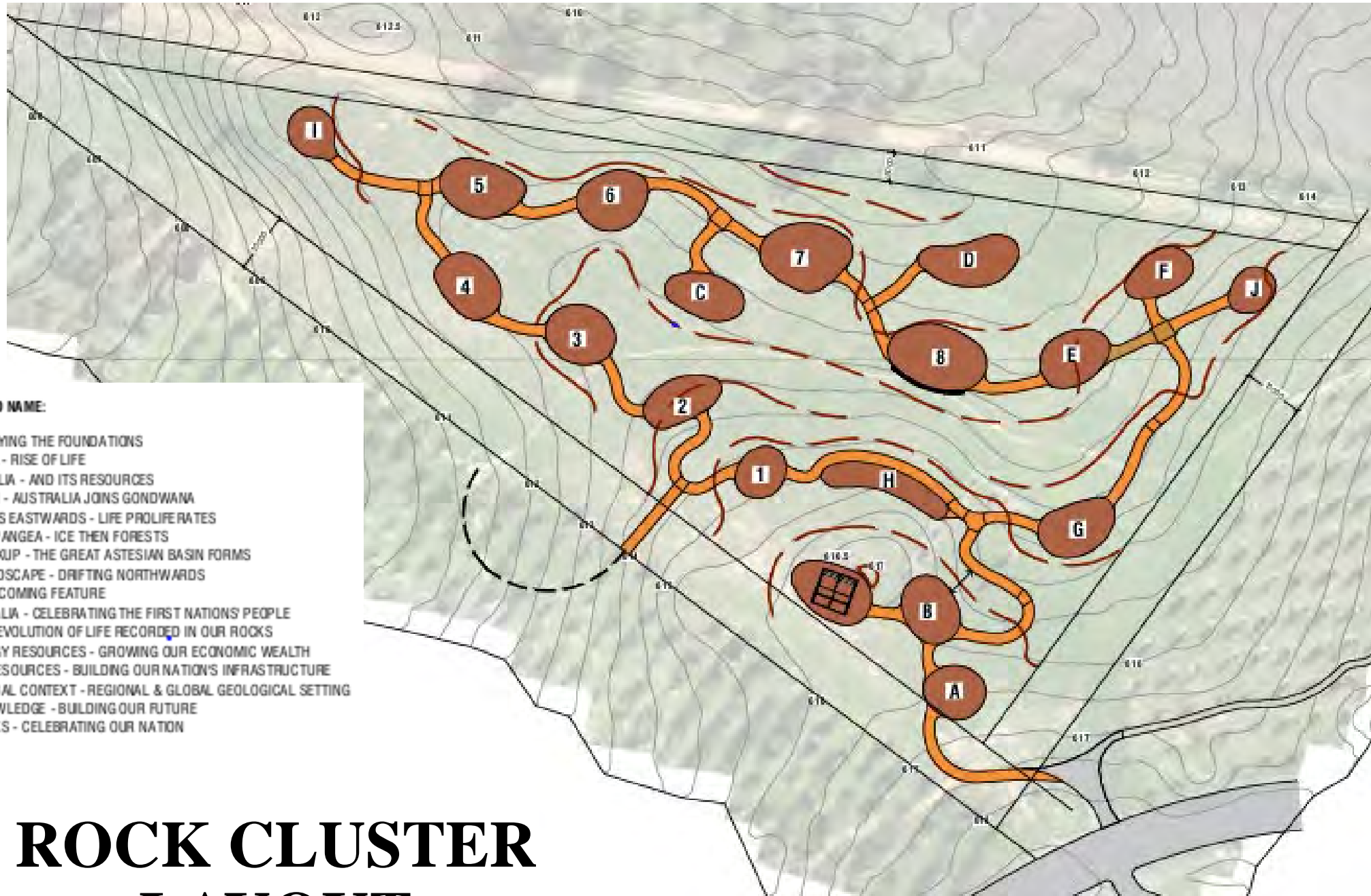
Email. hhl@hhl.com.au

LANDSCAPE ARCHITECTURE

The NRG has employed landscape architects, Harris Hobbs Landscapes, to finalise the concept design of our new site in the National Arboretum Canberra. This design has been lodged as a Works Application for approval.

It features a series of themed rock clusters, connected by wheelchair-accessible paths and will be integrated with a complementary planting of Weeping Wilga trees, *Geijera parviflora*.

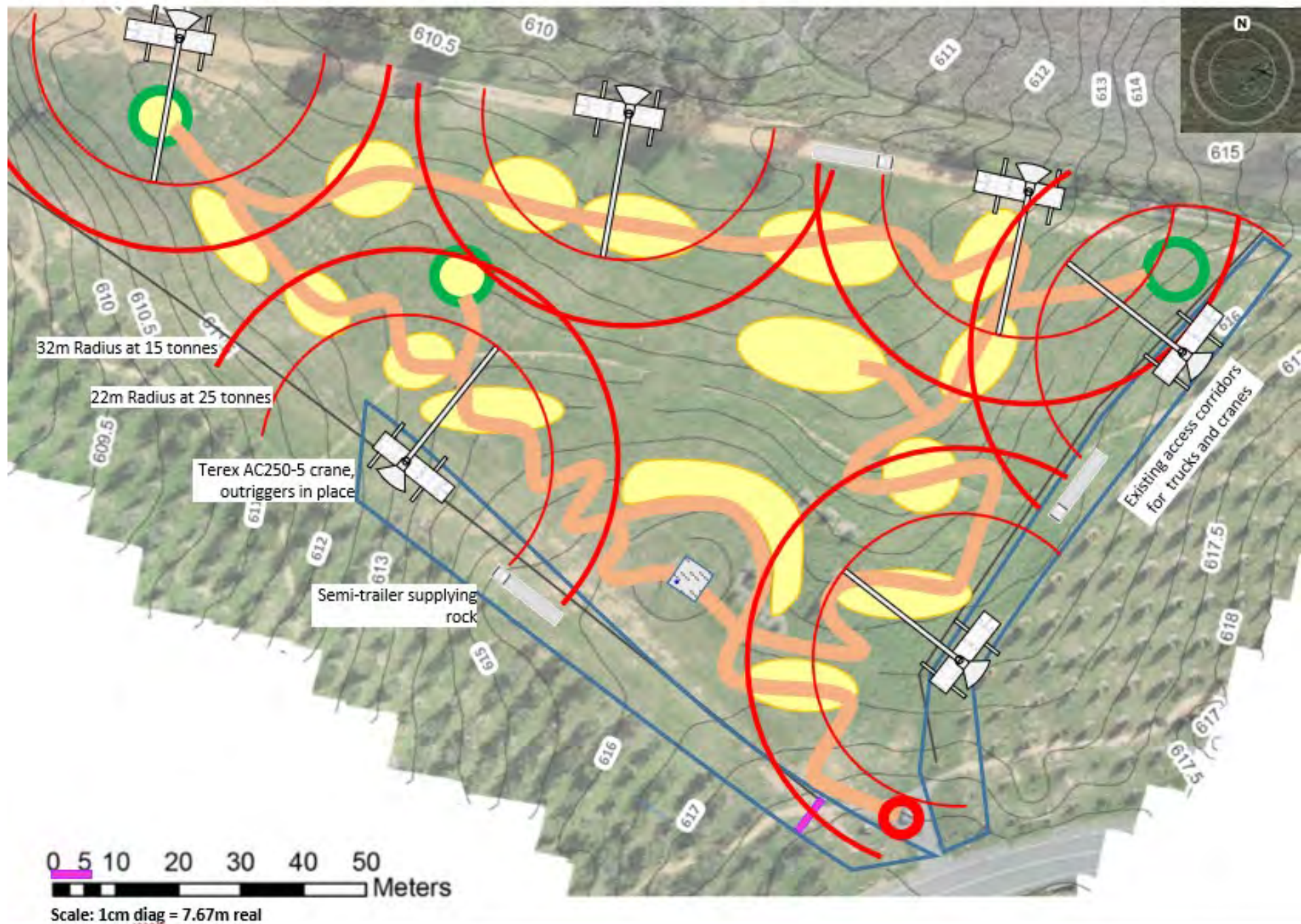
A shelter near cluster B will be subject to a future Works Application.



ROCK CLUSTER LAYOUT

CLARIFYING CLUSTER THEME NAME AND NUMBER

1. EARLY EARTH - LAYING THE FOUNDATIONS
2. EARLY AUSTRALIA - RISE OF LIFE
3. BUILDING AUSTRALIA - AND ITS RESOURCES
4. SNOWBALL EARTH - AUSTRALIA JOINS GONDWANA
5. AUSTRALIA GROWS EASTWARDS - LIFE PROLIFERATES
6. GONDWANA AND PANGAEA - ICE THEN FORESTS
7. GONDWANA BREAKUP - THE GREAT AUSTRALIAN BASIN FORMS
8. SHAPING THE LANDSCAPE - DRIFTING NORTHWARDS
- A. NGUNNAWAL WELCOMING FEATURE
- B. PEOPLING AUSTRALIA - CELEBRATING THE FIRST NATIONS' PEOPLE
- C. LIFEFORMS - THE EVOLUTION OF LIFE RECORDED IN OUR ROCKS
- D. MINERAL & ENERGY RESOURCES - GROWING OUR ECONOMIC WEALTH
- E. CONSTRUCTION RESOURCES - BUILDING OUR NATION'S INFRASTRUCTURE
- F. AUSTRALIA'S GLOBAL CONTEXT - REGIONAL & GLOBAL GEOLOGICAL SETTING
- G. GEOSCIENCE KNOWLEDGE - BUILDING OUR FUTURE
- H. FEDERATION ROCKS - CELEBRATING OUR NATION
- I. VOLCANOES
- J. PEACE ROCKS





Australian Government

National Capital Authority

Application Number: WA102999

The application entailed 23 documents (descriptions, drawings and plans)

APPROVAL TO PROCEED GIVEN 21 FEB 2023

Works Approval is granted pursuant to Section 12(1)(b) of the *Australian Capital Territory (Planning and Land Management) Act 1988* for the relocation of the National Rock Garden located as shown on Drawing Nos. 1, 100 – 102, 301 – 304, 601, 701 – 702, 801 – 803, 901, 902 and as outlined in the supporting documentation submitted.

NATIONAL ARBORETUM CANBERRA (NAC)

General Work Health and Safety Requirements

The contractor will comply with all directions of the NAC regarding work, health and safety (WH&S) matters. This includes the right to carry out site inspections by NAC officers.

Prior to commencing works, the contractor shall submit to the NAC a Safety Plan specific to the works. The Safety Plan itemises 10 specific areas for detailed response.

TENDER PROPOSALS FOR THIS WORK DUE END OF APRIL

National Rock Garden

What is next ?

- Bingie igneous complex
- Host gneiss from Broken Hill
- Fowlers Gap fossiliferous silcrete
- Peats Ridge columnar basalt
- Deep sea radiolarian chert from Chaffey Dam
- Maybe Mineral Hill (thanks Jess), Magnetite Skarn (thanks Doug), and Bauxite (thanks Ian)
- And in WA: Mt Weld REE, Spodumene +
- And more: WA, Qld, Vic, Tas, SA, NT, ACT



BINGIE POINT IGNEOUS COMPLEX (Stewart Needham)



BINGIE IGNEOUS COMPLEX



HOST GNEISS BROKEN HILL



TYPICALLY FOLIATED BH GNEISS



THE GARNETS TELL A STORY OR TWO





WOLF LEYH'S FISH-EYE GNEISS



**BROKEN
HILL
GOSSAN**

ABUNDANT SINTER BOULDERS AT FG



UPLIFT OF FOWLERS GAP SILCRETE



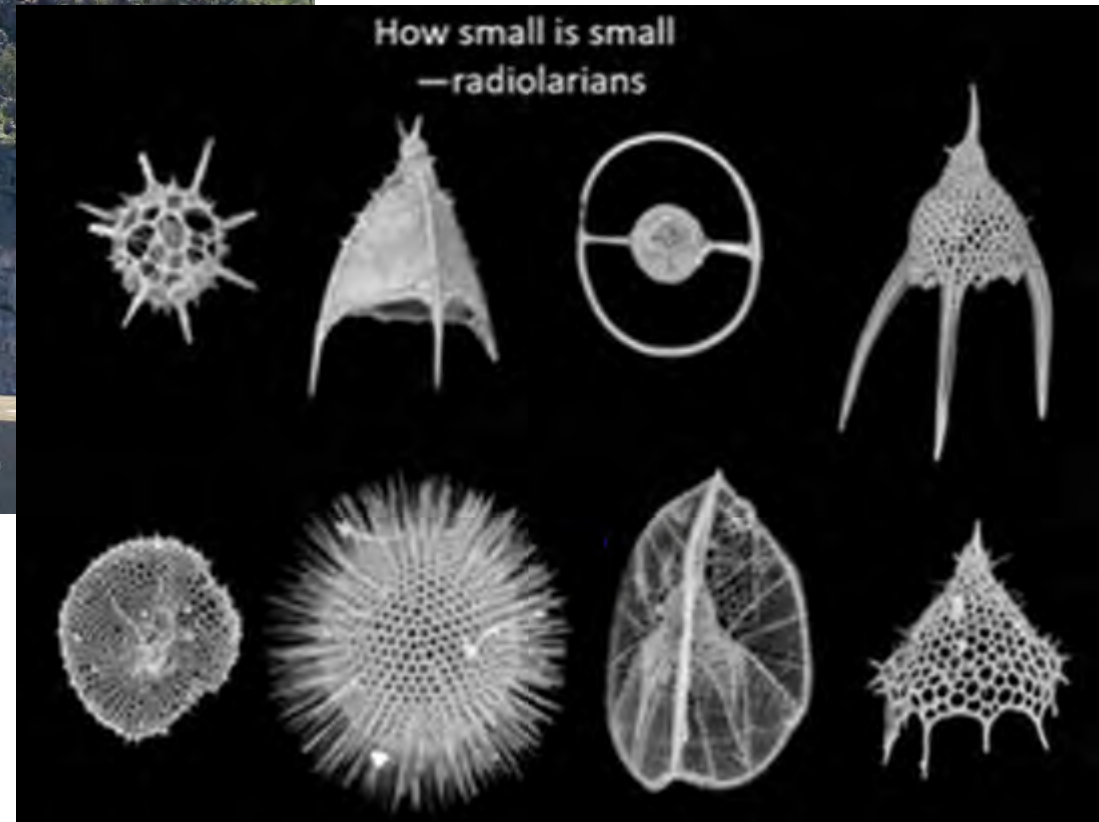
JET WASHING OF SPECIMEN



FOSSIL LEAF AND BRANCH – NOW SEEKING BHLALC ENGAGEMENT



RED RADIOLARIAN CHERT – DEEP SEA DEPOSIT



RED RADIO- LARIAN CHERT

**ROCK MARKING
CHAFFEY DAM
COMPLETION Oct
1979**

**PMA-MJS visit
approved August
2023**



NORFOLK ISLAND – BRITISH PENAL COLONY – TWICE ABANDONED





BASALT BOULDER IN FARM PADDOCK



MASSIVE AND
BEDDED
CALCARENITE

MAIN LOADING WHARF AT KINGSTON, NORFOLK ISLAND



MT WELD REE

Date 19 December 2022

Ms Jennifer Parker
VP CORPORATE AFFAIRS
Lynas Rare Earths Ltd.
Email jparker@lynasre.com

Dear Ms

My collea
Lacaze, C

I am plea
Project. C
National

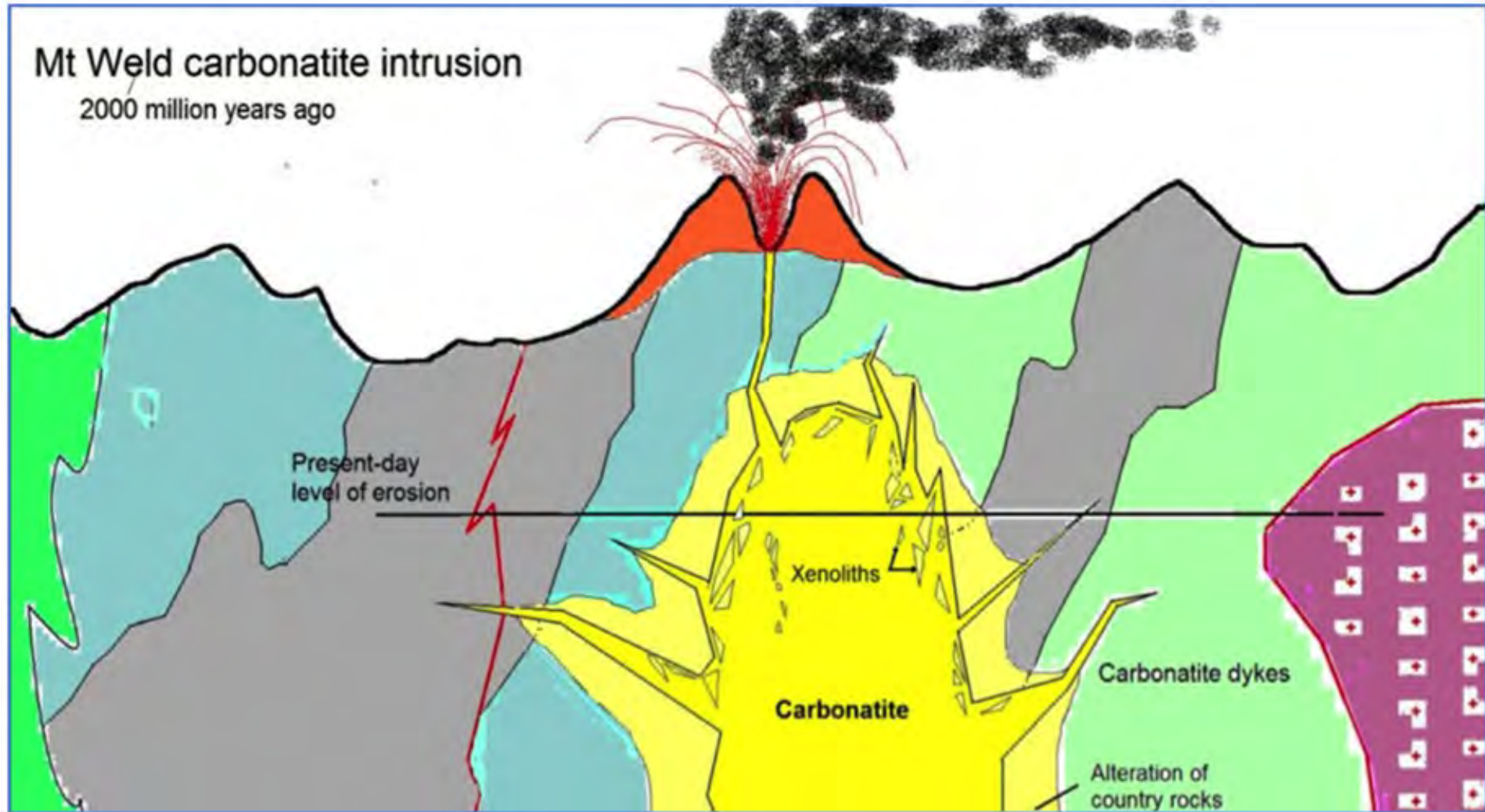
From: Jennifer Parker <JParker@lynasre.com> **Sent:** Thursday, 22 December 2022 11:01 AM **To:** Mike Smith <mike_rpgeo@optusnet.com.au> **Cc:** 'Russell Meares' <rmeares@pacificnickel.com>; 'Bert De Waele' <bdewaele@fmgl.com.au>; Chris Torrissi <Chris.Torrissi@lynasre.com>
Subject: RE: Mt Weld rock for National Rock Garden - Letter from Director Mike Smith

Dear Mike,

Many thanks for your letter and follow up to the conversation with Russell. I have discussed this opportunity with Chris Torrissi, our General Manager of Mt Weld (ccd). Chris has advised that as noted in your letter, the ores we are currently mining at Mt Weld are prone to crumble. However, in the coming years, once we are mining carbonatite ores, we would be happy to consider providing a 2-10 tonne sample to the National Rock Garden. This will be unique and unusual rock type for most people - carbonatite white crystalline dolomite with 1-5 mm red grains of REE minerals. We look forward to staying in touch.

Kind regards

Jennifer



BE AT PHIL'S REE TALK FOR SMEDG

National Rock Garden

Celebrating the Geological Heritage of Australia



Conclusions

We have approval to proceed

We have sought 4 quotes to achieve the Landscape Design

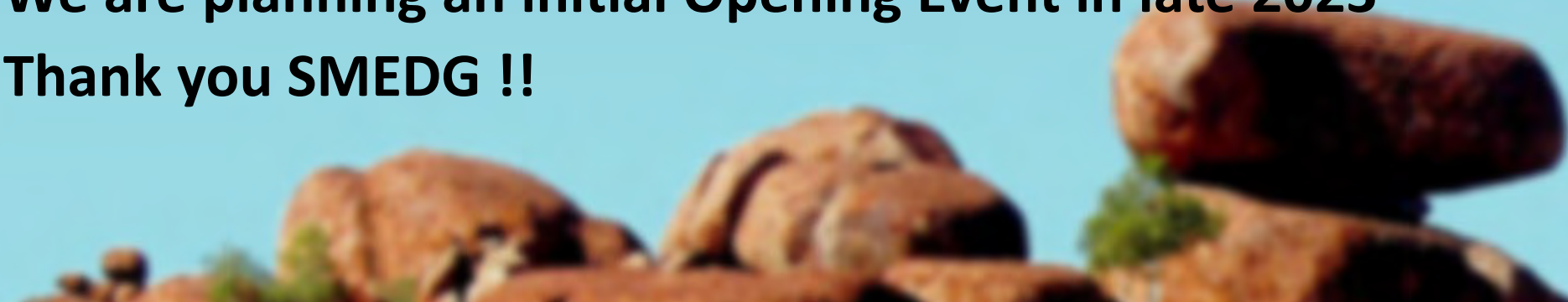
We have rocks in WA, Qld, NSW, Vic & ACT ready to move

We have funding for many of the rock re-locations

We will need additional funds for the construction work

We are planning an initial Opening Event in late 2023

Thank you SMEDG !!



IN NSW

Russell Meares, Michael Leggo, Jane & Larry Barron,
Barney Stevens, Wolf Leyh, Shelley Mills, Paul Ashley,
John Greenfield, Simone Meakin, Stewart Needham,
Alex Ritchie, Kelsie Dadd, John Martyn, Joanna Parr,
John Holliday, Ian Percival, Col Bembrick, David Cohen,
Kim Stanton-Cook, Peter Lewis, Lance Black, Adrian
Fisher, Doug Finlayson, Ian Williams, Ian Graham,
Martin Van Kranendonk, Max Rangott, Morris Duggan,
Ian Levy, Jessica Askew, Doug Menzies, Brenda
Franklin, David Branagan, Jane Lemman, Phil Gilmore,
Joel Fitzherbert, Ian Pringle & more

Plus all of SMEDG Committee



VICTORIA Oskar Lindenmayer



Hanging Rock Trachyte



**Heathcote
Greenstone**



**Grampians
Sandstone**

QUEENSLAND – Ian Withnall & team



**Precipice
Sandstone**



**Eastern Creek
Volcanics**



**Toomba
Basalt**

TASMANIA – Ralph Bottrill

**Owen
Conglomerate**



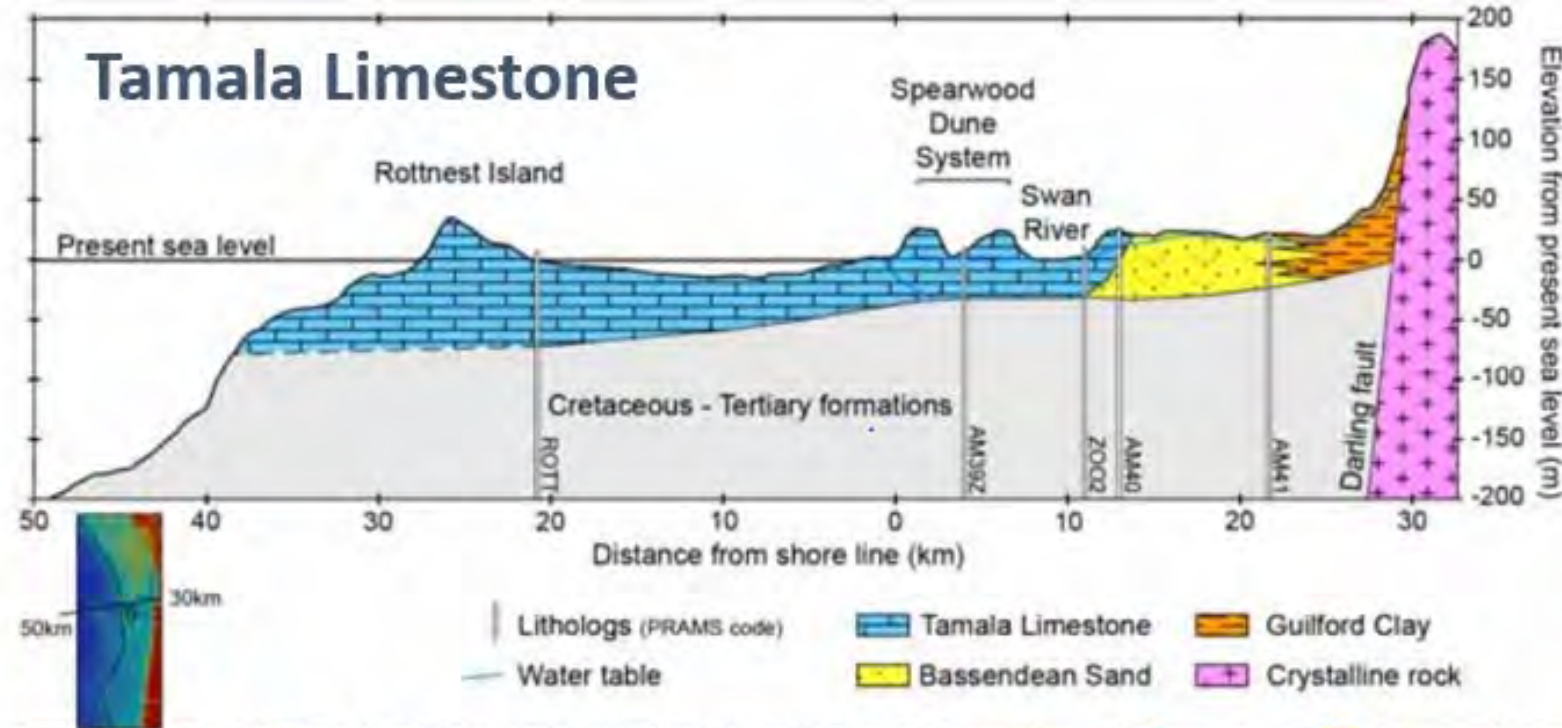
**Rocky Cape
Group**



SOUTH AUSTRALIA – Wolfgang Preiss

Ediacaran
Fauna





**WEST
AUST.
Bert De
Waele**



Last thought for NSW – Ardlethan Tin

Thank you for listening



NSW Rocks already in, or on their way into the NRG Display

| Specimen Name | Stratigraphic Unit | Age | Rock Type | Interesting Aspects of Rock in Brief |
|--|---|---------------------------|-------------|--|
| Hawkesbury Sandstone | Hawkesbury Sandstone | Mesozoic (Triassic) | Sedimentary | Used in many buildings of significance, eg Town Hall, St Mary's Cathedral, old Lands Dept Bldg, University of Sydney and many more |
| Alunite-Veined Rhyolite | Massive Alunite | Early Permian | Volcanic | Bulahdelah NSW, specimen exposed by bullbozer working on Pacific Highway Bypass |
| Canowindra Fish Fossil Bed (on loan to Questacon) | Mandagery Sandstone | Palaeozoic (Devonian) | Sedimentary | Internationally famous Late Devonian mass fish kill assemblage in lacustrine environment |
| Mt Gibraltar Microsyenite | Gibraltar Monzogranite (Bowral Trachyte) | Palaeozoic | Igneous | Used in many buildings of significance (QVBldg, ANZAC Memorial, Challis Hse) and curb-stones |
| Moruya Granite | Moruya Tonalite | Palaeozoic | Igneous | Sydney Harbour Bridge pylons, Customs House columns, GPO, James Cook plinth in Hyde Park |
| Adelong Norite | Adelong Norite | Silurian | Igneous | Black, medium to coarse-grained hornblende diorite used by artist Andreas Buisman |
| Middledale Gabbroic Diorite (in NAC storage site) | Middledale Gabbroic Diorite | 417 Ma | Intrusive | Famous as geochronological Reference Standard TEMORA 2 based on zircon stability |
| Federal Parliament wall rock from Eugowra NSW (in NAC storage site) | Eugowra Granite | Early Devonian (tbc) | Igneous | Over 24,000 individual granite stones are incorporated in walls at new Parliament House Canberra |
| Tarana Granite (Specimen on farm at Marulan, funding received) | Tarana Granite member | Palaeozoic (Carbonifer's) | Igneous | Classic dimension stone used at Sydney Opera House, ANZAC Memorial and more |
| Peats Ridge Columnar Basalt (Fifteen pieces at Moss Vale) | Mafic igneous body, emplaced into Triassic Hawkesbury Sandstone | Eocene | Igneous | Strong development of columnar structures in basalt quarried for road metal |

Future NSW Rocks

| | | | | |
|---|---|-----------------------------|--------------------|--|
| Broken Hill Host Unit (Speaking with BLALC & BHCCouncil) | Hores (Potosi) Gneiss | Proterozoic 1685 Ma | Metamorphic/ Ore | Broken Hill - World's largest Pb-Zn-Ag mine |
| Cadia-Ridgeway Mineralised Porphyry | Cadia Hill Monzonite | Palaeozoic (Silurian) | Igneous/Ore | Iconic mine, iconic Cu-Au mineralisation chosen but vetoed by local Waradjuri Land council |
| Tallong Conglomerate | Conglomerates with possible glacial association | Early Permian | Sedimentary | Basal units infilling gullies in Palaeozoic basement at the start of Syd Basin deposition |
| Magnetite Skarn from Cowra | Cowra Skarn (name tbc) | TBC | Metamorphic | Iron resource which under development |
| Broken Hill Gossan | Broken Hill Gossan | Wide-ranging | Weathering product | Discovery source of the huge Broken Hill Pb-Zn-Ag orebody |
| Plagioclase Pyrite Gneiss (with cobalt) | Himalaya Formation of Thackaringa Group | 1699 +/- 10 Ma - Staherian | Metamorphic/ Ore | Potentially economic cobalt-pyrite deposit. Company supports acquisition |
| Blueschist with Eclogite Pods | Rocky Beach Metamorphic Melange | Palaeozoic (Cambrian) | Metamorphic | Classic high-pressure metamorphic rocks of the New England Orogen |
| Partly Serpentinised Harzburgite | Great Serpentine Belt | Possibly Cambrian | Metamorphic | Fresh, partly serpentinised harzburgite, representing a mantle-derived rock |
| Middle Ordovician Chert | Whinell Chert | Palaeozoic (Ordovician) | Sedimentary | Rare deepwater oceanic sedimentary rock, typical of widespread turbidite facies |
| Glacial Varves | Currabubula Formation | Palaeozoic (Carboniferous) | Sedimentary/ Ore | Late Carboniferous glacial story |
| Fossiliferous Limestone from Burrinjuck Reservoir area | Taemas Limestone (and Cavan Bluff Limestone) | Palaeozoic (Early Devonian) | Sedimentary | Iconic Early Devonian limestone, highly fossiliferous, representative of contemporaneous limestones in eastern Australia |
| Permian <i>Eurydesma</i> Beds | Snapper Point Formation | Palaeozoic (Permian) | Sedimentary | Typical Gondwana cold-water bivalve-dominated assemblage Eastern Aust |

More NSW Rocks for the Future

| | | | | |
|---|--|-------------------------------|-----------------------|--|
| Slab of Plant Fossils in Illawarra Coal Measures | Illawarra Coal Measures | Late Permian 253-260 Ma | Sedimentary | Large slab of shale with leaves, seeds, roots, twigs of <i>Glossopteris</i> (eg large annotated slab in the GA exhibition area). Evidence of Gondwana breakup. |
| Hunter Valley Coal | Newcastle Coal Measures equivalents | Palaeozoic (Permian) | Sedimentary/ Ore | First coal discovered (1791) and mined (1801) in Australia at Newcastle. Operating coal mines should be able to help |
| Hill End Gold-bearing Slate - <i>Commenced, but v slow</i> | Piambong Formation | Palaeozoic | Metamorphic/ Ore | Iconic mine, historic orogenic gold mineralisation |
| Kosciusko Granite/Meta-sediment | Kosciusko Batholith | Palaeozoic | Igneous | Snowy Mtns Hydro Scheme, National Park, summit of Australia (try to acquire large diameter drill core?) |
| Martins Creek Ignimbrite (<i>Report in progress</i>) | Martins Creek Ignimbrite (Isismurra Formation of Gilmore Volcanic Group) | Carboniferous at least 328 Ma | Volcanic | Has been used for centuries as ballast on the railway lines of northern NSW. See slab specimen at GA entry. |
| Wasp Head Formation | Wasp Head Formation | Early Permian 290-286 Ma | Sedimentary (breccia) | Wasp head represents the bottommost unit of the Sydney Basin. It unconformably overlies Ordovician rocks, the Wagonga Beds. |
| Bingie Point Tarandore Point various igneous rocks | Bingie Point intrusive complex | Devonian 389 Ma & 395 Ma | Igneous | Igneous granatoid magma mixing between tonalite & gabbro/diorite plus dykes of basalt, microdiorite, aplite |
| Frying Pan Creek Granite | Frying Pan Creek Granite (Bathurst Batholith) | 330-315 Ma (TBC) | Intrusive | Spectacular megacrysts of K Feldspar (how did these form?) |
| Mount Dromedary Igneous Complex | Mount Dromedary Igneous Complex | About 100 million yrs ago. | Igneous | An isolated volcanic core rising 797 metres above sea level near the historical villages of Tilba Tilba and |
| Lightning Ridge Opal-bearing Rock | Griman Creek Formation or Wallangulla Sandstone | Mesozoic (Cretaceous) | Sedimentary/ Opal ore | Wallangulla Sandstone, also known as the "shincracker" which is a very hard white rock with distinctive |
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