

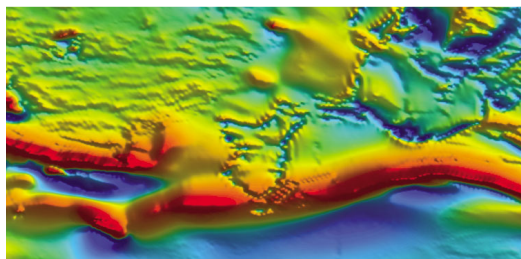
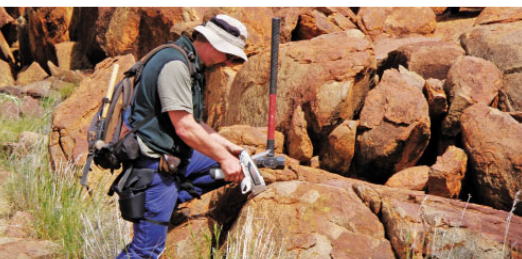


Government of **Western Australia**
Department of **Mines and Petroleum**

RECORD 2010/13

MANAGEMENT PLAN FOR STATE GEOHERITAGE RESERVES

by
**K Grey, FI Roberts, MJ Freeman, AH Hickman,
MJ Van Kranendonk, and AWR Bevan**



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**K Grey, FI Roberts, MJ Freeman, AH Hickman, MJ Van Kranendonk, and
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¹ **Head, Department Earth and Planetary Science, Western Australian Museum**



**Geological Survey of
Western Australia**

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Management plan for State Geoheritage Reserves

by
K Grey, FI Roberts, MJ Freeman, AH Hickman,
MJ Van Kranendonk and AWR Bevan¹

Abstract

This record describes and explains a management plan governing eight recently established State Geoheritage Reserves in Western Australia. In Western Australia, a 'State Geoheritage Reserve' is a Crown Reserve that requires greater management control than would be provided by a listing as a 'Geoheritage Site' (Section 41 of the *Western Australian Land Administration Act 1997*) on the Western Australia Register of Geoheritage Sites. Each of the reserves contains features (e.g. rare or unique fossils, or rare geological structures) that have exceptional geoscientific and geoheritage value, and which therefore require special management. The international importance of particular rock outcrops within these reserves has led to extensive publicity, resulting in increasing numbers of visitors from Australia and overseas. In recent years, informal monitoring of a number of the key outcrops has revealed examples of serious damage, and there is evidence of commercial sampling. Such damage, if it continues, would seriously compromise or even destroy the exceptional geoheritage value of the rocks within the reserves.

Procedures have been introduced to restrict the level and scope of potentially damaging activities within the State Geoheritage Reserves. Anyone intending to visit a reserve, for viewing, research work, or any other purpose, must first seek Government authority by submitting a 'Proposed Activity at a State Geoheritage Reserve' form to the Executive Director of the Geological Survey of Western Australia. Proposals will be assessed by a panel of experts convened by the Executive Director. Any proposals that involve ground disturbing activities, such as sampling of rocks or fossils, must be accompanied by a detailed research proposal, including background information, project aims, methods, and an undertaking to provide reports on results to the Executive Director. These reports will be treated as confidential for an agreed period up to three years. To allow adequate time for processing the proposals, recognizing the possible need for additional information from the applicant, the forms must be submitted at least two months prior to the date of the planned visit.

KEYWORDS: Geological monuments, national heritage, management, policy, sampling, research

Introduction

This management plan outlines procedures and guidelines for the sustainable management of recently designated State Geoheritage Reserves in Western Australia by the Executive Director of the Geological Survey of Western Australia (Executive Director GSWA) on behalf of the State Government.

State Geoheritage Sites and State Geoheritage Reserves

State Geoheritage Reserves are created under Section 41 of the Western Australian *Land Administration Act 1997** through a Management Order that vests them with the Minister for Mines and Petroleum, for management by

the Executive Director GSWA (the most senior State Government geologist). The following definition is used to determine whether or not a locality should be on the Western Australian Register of Geoheritage Sites:

'Geological features of the Earth that are considered to be unique and of outstanding value within Western Australia and to have significant scientific and educational values'

The essential feature of a Geoheritage Site is that it displays special scientific or educational values that form a basis for geological research or reference. As such, these are features considered by the geological community to be worthy of management and preservation. The first eight Geoheritage Sites to be elevated to the category of State Geoheritage Reserve (Figs 1–10) are recognized nationally and internationally for their geoscientific importance. Each of these sites is in danger of losing part of its geoscientific significance and value through inappropriate activities such as large-scale sampling or the cumulative effects of repeated small-scale sampling. Other Geoheritage Sites may be included in the list of State Geoheritage

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* For reference to WA State legislation, the reader should search on the WA Government website <www.wa.gov.au> using the word 'legislation'.

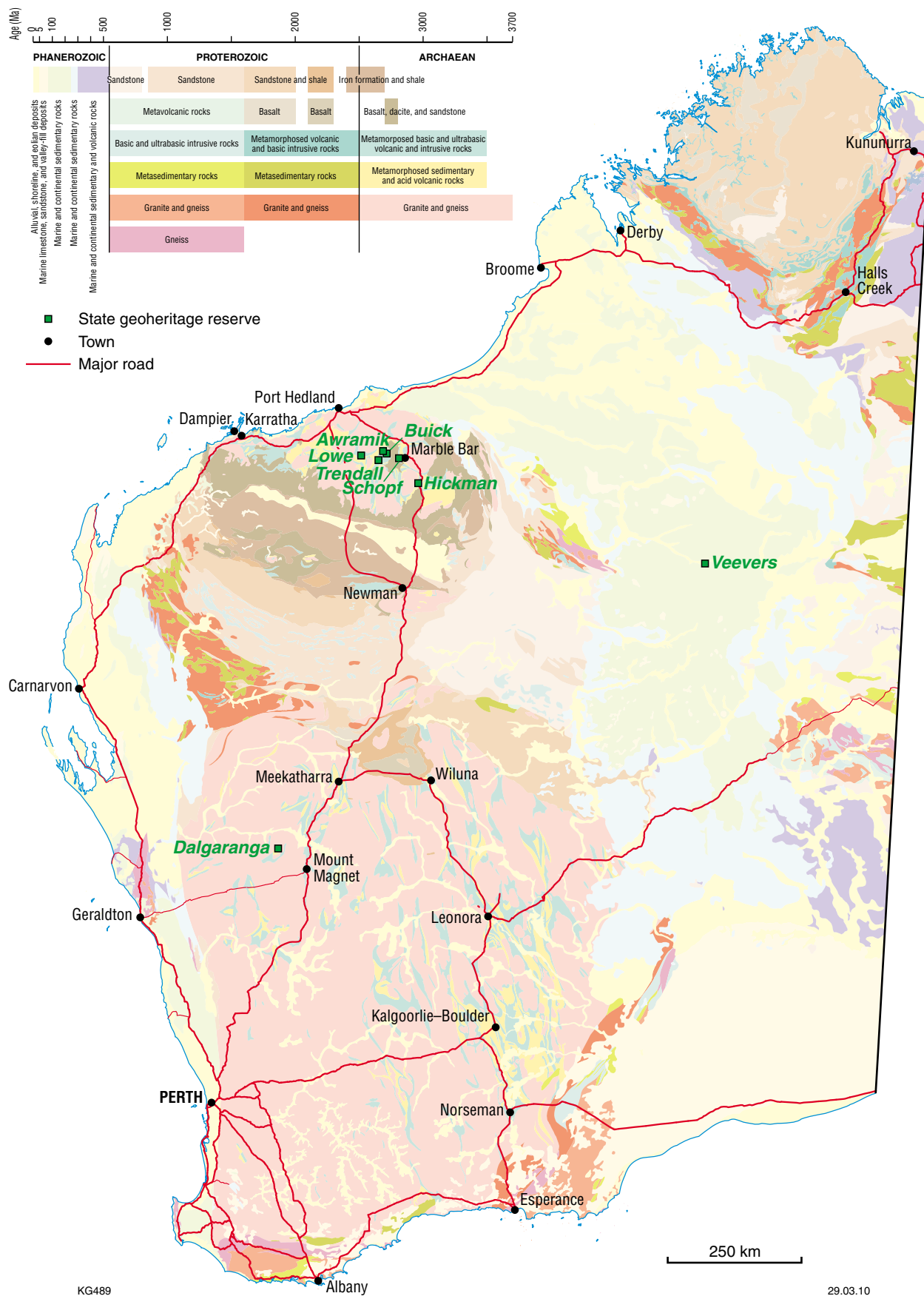
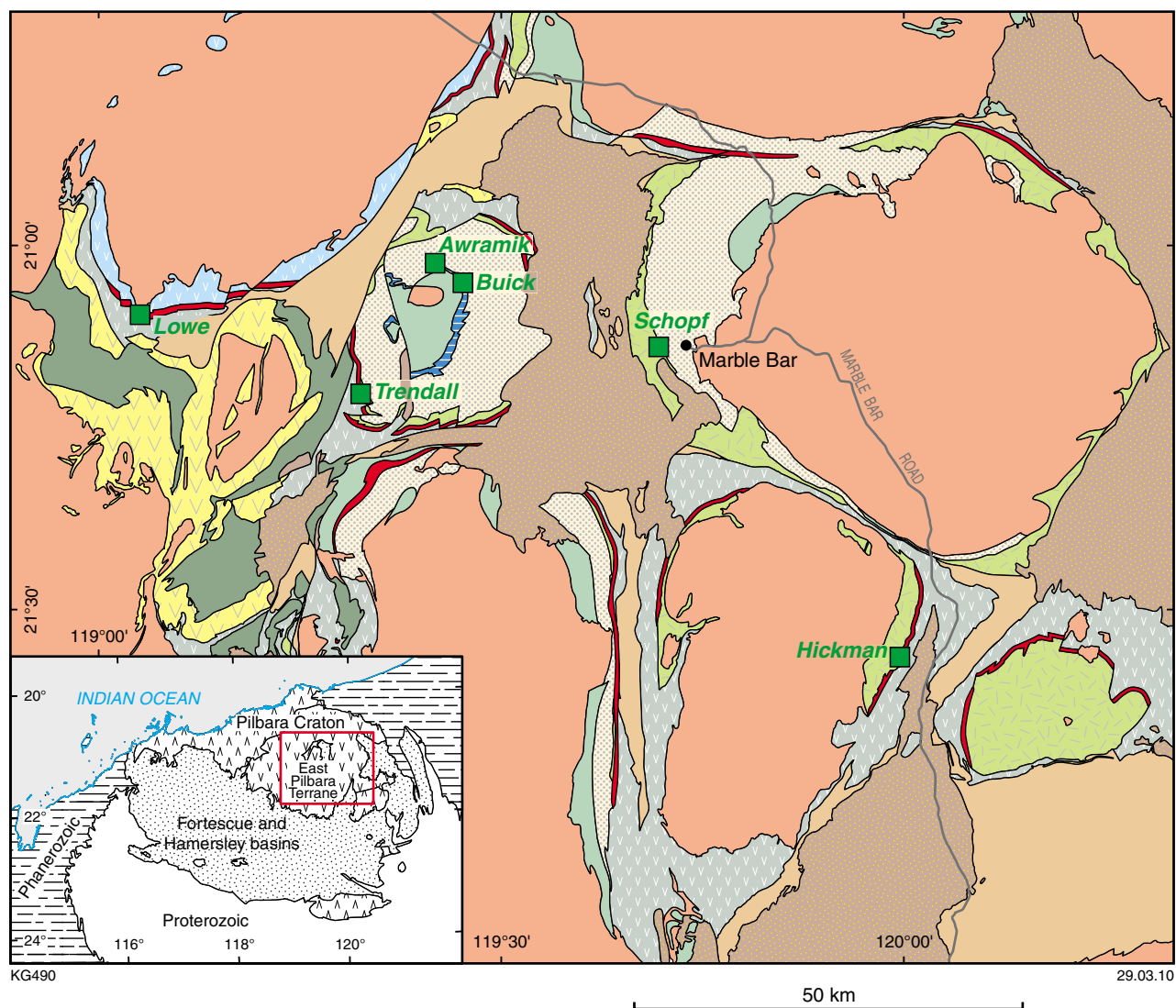


Figure 1. Map of Western Australia showing location of currently declared State Geoheritage Reserves: 1. Buick, 2. Awramik, 3. Trendall, 4. Lowe, 5. Hickman, 6. Schopf, 7. Dalgarranga, 8. Veevers (modified from GSWA, 1999).



FORTESCUE BASIN

- Fortescue Group
- De Grey Supergroup
- Soanesville Group
- Archean granitic rocks (various ages)

Pilbara Supergroup

- East Pilbara Terrane
 - Sulphur Springs Group
 - Kelly Group
 - Strelley Pool Formation
- Warrawoona Group
 - Salgash Subgroup
 - Coongan Subgroup
 - Dresser Formation
 - Talga Talga Subgroup
 - Coonterunah Subgroup

- State Geoheritage Reserve

Figure 2. Map of the eastern Pilbara showing details of the six 'early life' State Geoheritage Reserves: 1. Buick, 2. Awramik, 3. Trendall, 4. Lowe, 5. Hickman, 6. Schopf (modified from Hickman, 2008, fig. 1).

Reserves in the future, but Reserve status will only apply to locations considered to be (1) under current or potential threat, and (2) of outstanding significance.

State Geoheritage Reserves are managed by the Executive Director GSWA in consultation with a panel of eminent geoscientists, including, where relevant, selected international experts on issues pertinent to a specific reserve (drawn both from GSWA and other organizations). Management procedures are designed to preserve reserves for future research and education and to restrict unnecessary sampling and disturbance. They include a requirement to submit applications to visit or to undertake research on any of the reserves. Each application will be formally assessed, particularly if removal of samples, or any other form of ground disturbance, is proposed. Any proposed access or research should be commensurate with the preservation of key in situ scientific evidence, and any results obtained should be of sufficient significance to justify the activities. Management of State Geoheritage Reserves will include the recording of methods and results of all scientific investigations on each reserve following its establishment. An approvals process is described below.

A primary goal of State Geoheritage Reserves is to restrict sampling to scientific purposes and minimize the impact of such sampling. Management is also intended to avoid unnecessary duplication of sampling and scientific investigations by different research workers, and to approve only those projects likely to produce significant new results. Research proposals will be evaluated by a panel of eminent geologists to determine whether the deleterious effects of sampling is outweighed by the value of the anticipated results. Access will probably be granted to parties wishing only to view and photograph features within the reserves, but camping on the reserves, and driving across them except on established roads, tracks, or any other form of well established thoroughfare, will not be permitted. There must be no collecting from a Reserve (even of scree material) without prior approval (via the issue of a collecting permit) from the Executive Director GSWA. Additionally, if it is proposed to export any material collected from a Reserve, an export permit will be required. Visitors will be requested to assist in monitoring the reserves by reporting any signs of damage, and may be asked to provide photographic evidence to assist in maintaining reserve integrity through documentation. Note that only small areas have been quarantined as Reserves. Many research projects could be carried out just as effectively on outcrops of similar rocks adjacent to the reserves.

The need for managed State Geoheritage Reserves

Western Australia's outstanding geoscientific sites and their locations have been well-publicized in scientific journals, as well as in the more popular media and on the internet, and there has been a steady increase in the number of enquiries received by GSWA about visiting key localities. Several Geoheritage Sites, including Pilbara fossil sites and Dalgaranga meteorite crater have been identified as

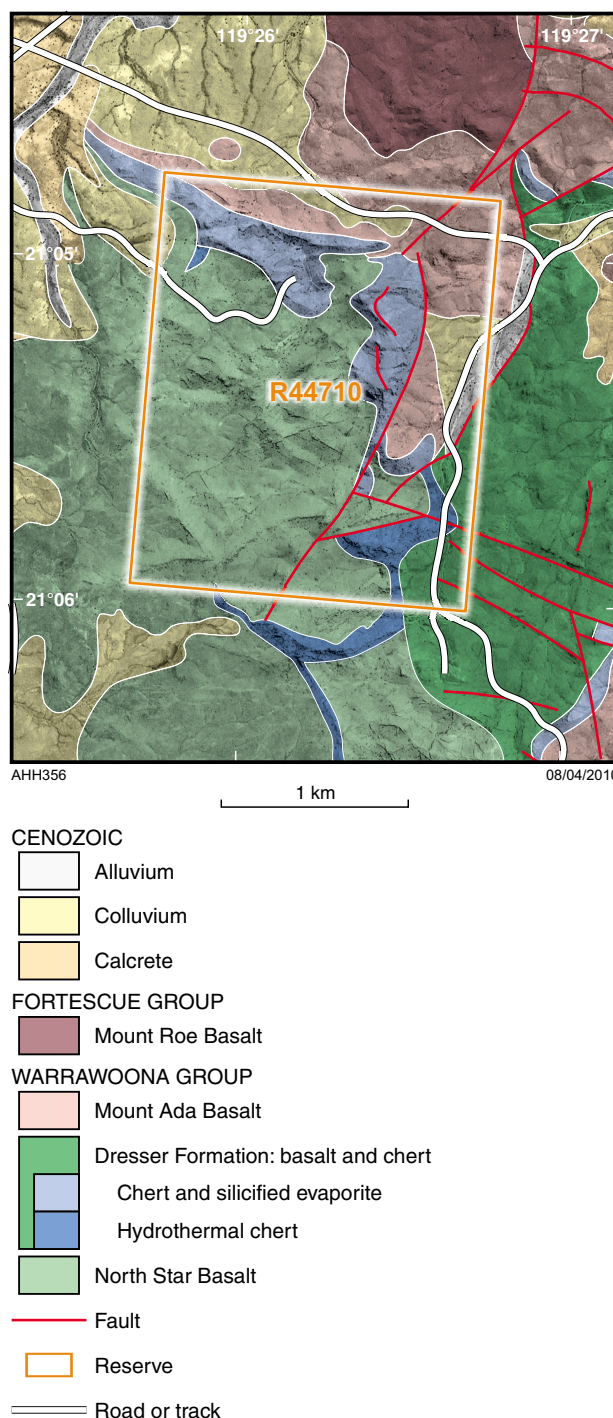


Figure 3. Detailed plan of the Buick State Geoheritage Reserve (R44710; geology modified from Van Kranendonk, 1999).

Mars analogue sites (West et al., 2010), which will focus additional attention on these localities. Increasing numbers of people are now visiting the sites, and unrestricted access and sampling would lead to progressive deterioration of rock faces and other features. This would result in a loss of critical scientific information to the global scientific community, and to the general public.

Until recently, the public has enjoyed unimpeded access to geoscientific sites, except where access is via private roads.

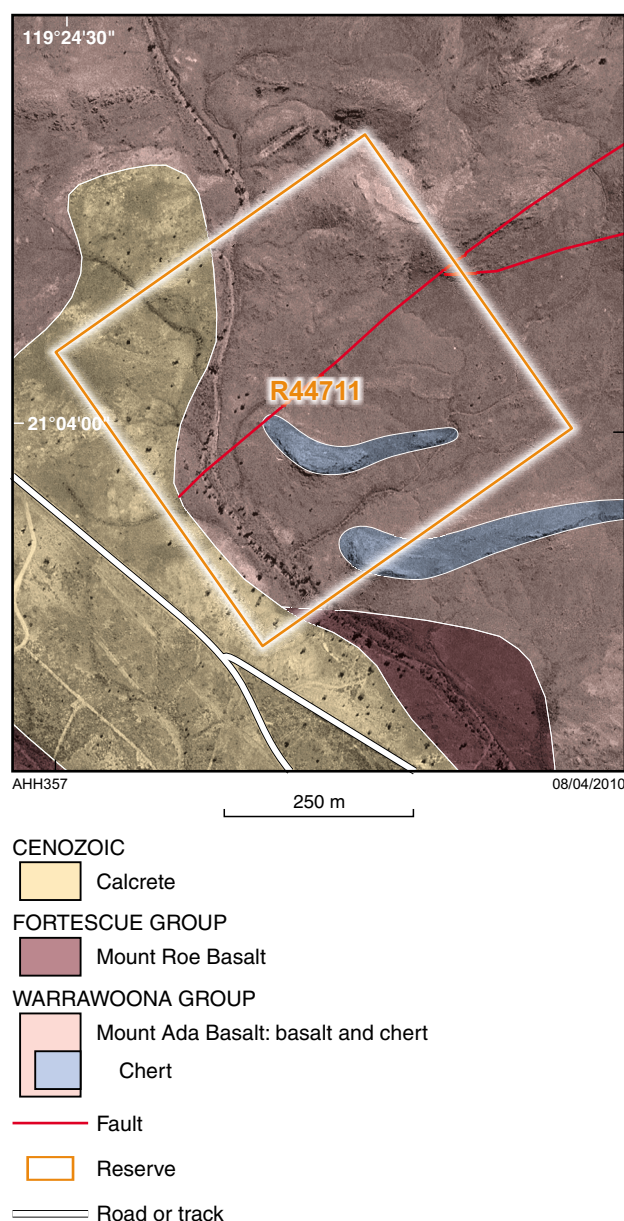


Figure 4. Detailed plan of the Awramik State Geoheritage Reserve (R44711; geology modified from Van Kranendonk, 1999).

Remoteness makes access difficult, but as tourists become more adventurous, poor access routes become less of an impediment. Additionally, there is anecdotal evidence of some tour operators intending to include key sites in their schedules. Public pressure on irreplaceable features will increase as tourism grows, and a more strategic and sustainable approach to management is now necessary.

Careful husbanding of geological sites, especially those of state, national or global significance is thus warranted. More than 140 geological features of significant scientific and educational value are recorded in the Western Australian Register of Geoheritage Sites. Listing in the register provides the means for site management, but only under the Acts and Regulations administered by the Department of Mines and Petroleum. By creating State

Geoheritage Reserves for selected Geoheritage Sites, additional powers of management can be brought into place over other activities, including those of the scientific community and the general public.

Upgrading a small number of the Geoheritage Sites to State Geoheritage Reserves gives care, control and management to the Minister for Mines and Petroleum, and in turn, to the Executive Director GSWA, for the preservation of geological features. State Geoheritage Reserves allow the State to better manage access to selected Geoheritage Sites, to prohibit sampling unless approved by the Executive Director GSWA, and to provide both the Australian Customs and Border Protection Service and the (Commonwealth) Department of the Environment, Water, Heritage and the Arts with powers to better control export of any fossil material or other natural science objects collected from the reserves.

Principles underlying the Management Plan

The generic management plan determines how decisions will be made in relation to State Geoheritage Reserves. It clarifies decision making processes and presents the structure through which decisions consistent with the management plan will be made. The plan was prepared under the direction of the Executive Director GSWA, who has where necessary consulted with an advisory committee, State and local government, other relevant authorities, the Western Australian Museum, the scientific community, and interested members of the public with regard to setting up State Geoheritage Reserves.

The 'Management Consultative List' is a list of eminent Australian and international experts on the early evolution of life on Earth, impact craters, and other expertise appropriate to specific reserves to provide objective advice to the Executive Director GSWA regarding applications for access and sampling. It will be revised and added to periodically.

A 'Management Consultative Panel' will be selected from the Management Consultative List when an application for activity on a reserve is received. This panel of experts will review the application and provide recommendations to the Executive Director GSWA.

The procedures established to manage State Geoheritage Reserves by the Executive Director GSWA require:

- a prohibition on unauthorized mining, commercial sampling, or sampling for purely acquisitive purposes, from any part of the reserve;
- a prohibition against mining or commercial sampling of key outcrops and against activities directly impacting on the key outcrops;
- a prohibition on any sampling, coring (including paleomagnetic drilling), marking of rock faces with permanent or water-soluble marking pens or paint, or any other activity that will result in the removal, partial removal or masking of the features for which the reserve was created;

- restrictions on sampling of rocks in other parts of the reserves;
- a requirement for all researchers to seek approval to take samples using a standard project proposal form (the 'Proposed Activity at a State Geoheritage Reserve') form (see Appendix 1);
- protocols for any approved sampling within the reserves and the establishment of a database of all known visitors to the reserves.
- a requirement for full scientific reports to the Executive Director GSWA on all investigations undertaken within a reserve. The first preliminary report is required within 90 days of completion of the field investigation, and the first report on the research undertaken, with results, is required within 12 months of the completion of the field investigation. Thereafter, ongoing reports will be provided to the Executive Director GSWA, including copies of any publications, until written advice that the research has been completed. Reports will be treated as confidential for an agreed period not exceeding three years.
- detailed photographic evidence of the condition of the important outcrops may be required from all approved visitors.

Current State Geoheritage Reserves

At present, the established State Geoheritage Reserves fall into two main categories: those related to evidence of early life (fossil sites), and those related to meteorite or asteroid impact structures. Currently, six reserves containing Earth's earliest visible traces of life at c.3500 million years ago (3.5 billion years, or 3.5 Ga) in the Pilbara region, and two reserves recording much younger asteroid or meteorite impacts, are recognized as requiring special State management because of their exceptional geoheritage value (Figs 1–10).

Where possible, information panels will be erected on access tracks into the reserves, so that any person entering will be informed about their location, importance, and entry restrictions. GSWA will circulate information about the reserves in order to bring their establishment to the attention of Australian and international geoscientists with relevant research interests.

Evidence of early life

Planet Earth coalesced from the solar nebula approximately 4.57 billion years ago (4.57 Ga). The oldest preserved rocks on the planet are 4.03 Ga, and the oldest fossils are 3.5 Ga. Most of the oldest fossils are known only from outcrops within the newly appointed State Geoheritage Reserves of Western Australia. The global fossil record in rocks older than 2.5 Ga is sparse, and consists of rare stromatolites and microfossils. Such fossils provide the most tangible evidence of early biological activity on Earth, even though the biogenicity of some of these

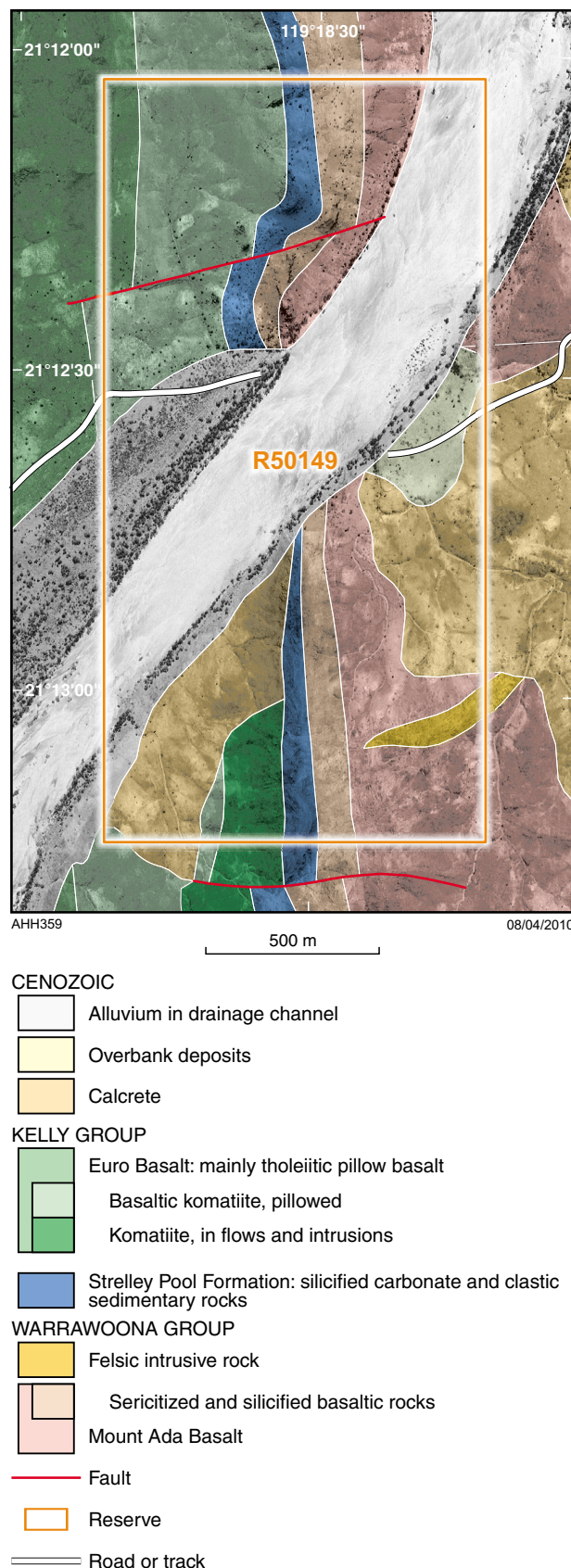


Figure 5. Detailed plan of the Trendall State Geoheritage Reserve (50149; geology modified from Van Kranendonk, 1999).

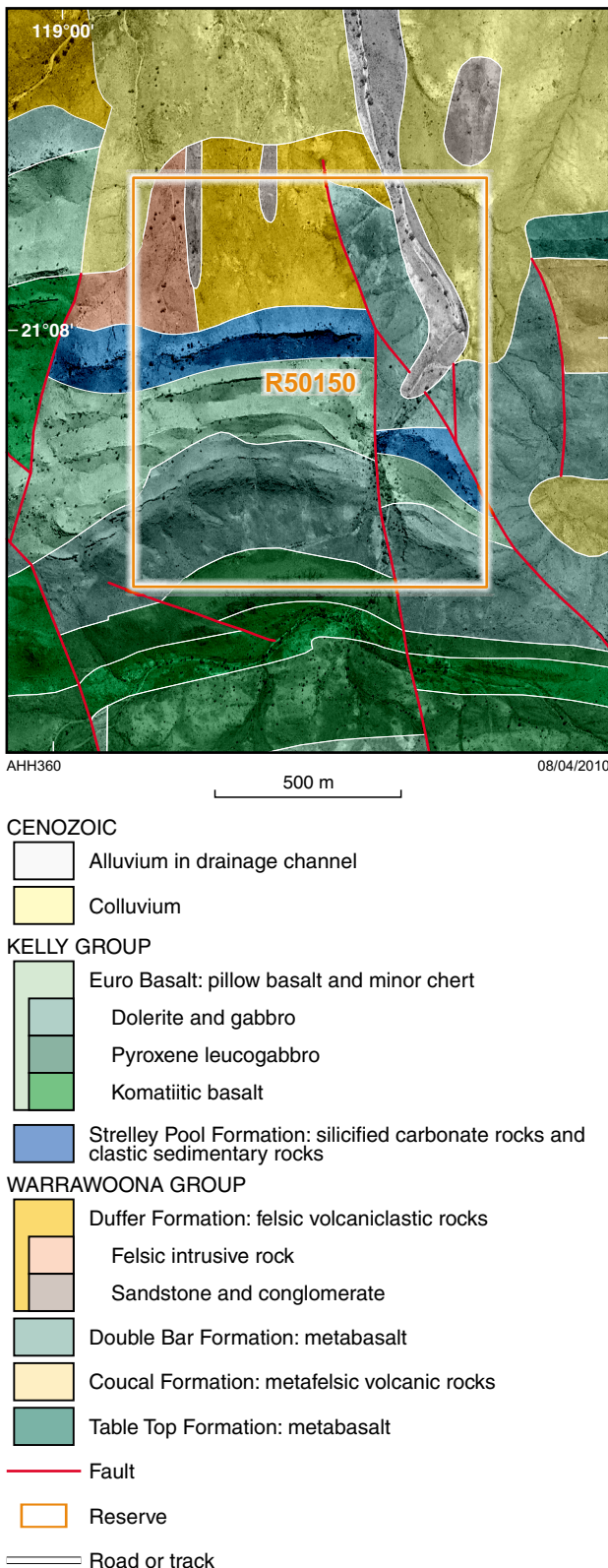


Figure 6. Detailed plan of the Lowe State Geoheritage Reserve (R50150; geology modified from Van Kranendonk, 1999).

structures is contentious. In recent years, the ‘world’s oldest fossils’ have attracted considerable attention, much of this as a result of GSWA research published in collaboration with Australian and international colleagues, and through the activities of several international research agencies. This has resulted in significant numbers of research scientists, media crews, commercial collectors, fossickers and geologically-oriented tourists wanting to visit and, in many cases, to sample the rare outcrops with the best preserved fossils (Fig. 11). Geotourism is a growth industry, and the numbers of tourists, educational groups from both secondary and tertiary levels, as well as geologists and other scientists researching the evolution of life on Earth has been steadily increasing. Consequently, the number of people wishing to visit the few key outcrops where these unique features can be seen will continue to rise.

The six State Geoheritage Reserves in the Pilbara region (Figs 1–8) play a critical role in these ongoing studies because they are the best preserved and oldest indicators of early life on Earth (Schopf and Packer, 1987; Lowe, 1980; Walter et al., 1980; Awramik et al., 1983; Hofmann et al., 1999; Allwood et al., 2006, 2007; Van Kranendonk, 2007; Schopf et al., 2007; Van Kranendonk et al., 2008). As such, these localities are under constant pressure to be sampled in the search for definitive evidence about the evolution of the biosphere, atmosphere, and lithosphere. All six sites now designated as State Geoheritage Reserves are small in area and contain vital evidence in just a few rock faces that must be conserved. The State has a responsibility to ensure that the use of these few outcrops is sustainable so that scientists and the general public are able to use and benefit from them in the future.

All available evidence of early life has already been removed from the original discovery locality (Walter et al., 1980), referred to as ‘Dunlop’ after its finder, and the locality is no longer worth conserving (although material from Dunlop is available in museum collections). Other Pilbara fossil sites have suffered from the deliberate removal of significant rock faces (Figs 12a,b and 13a–d) and others show signs of incidental damage from ill-considered sampling (Grey et al., 2002). So far, damage has not been extensive, but the observed destruction has highlighted the vulnerability of these sites and increased the need for protection. For many years, most of the sites were safeguarded by their remoteness and difficulty of access, and were kept relatively ‘secret’ through non-disclosure of exact site coordinates. However, publication of scientific work on the sites in Australian and international journals, and online media coverage, has required the release of precise location information. With modern electronic global positioning systems and improved transportation, anyone interested can now easily locate and visit the sites. Known visits to the sites have steadily increased, as have requests to collect and export material. Material available at the most vulnerable sites is far too sparse to sustain unmonitored sampling and may be vulnerable to damage by persons walking over delicate rock faces. The Western Australian Museum holds only a handful of specimens and one large slab of material from these critical localities in its collection; and GSWA has only a few small specimens from them in its collection.

There are no extensive collections elsewhere, either within Australia, or overseas, because the scarcity of material has limited the amounts that can be collected without damaging the integrity of field evidence. In most cases, the scientific value of a locality is best preserved by leaving its key features, such as rock faces containing fossils, intact and in their original geological setting.

Previously, two reserves, the 'North Pole Stromatolite' reserve (Reserve 44710, referred to as 'Buick') and the 'North Pole Microfossil' reserve (44711, referred to as 'Awramik'; Figs 1–4) were placed on the Register of the National Estate by the Australian Heritage Commission, in recognition of their value by the Commonwealth Government. However, the Register of the National Estate was frozen in 2007 and the sites in question have not been included in the current revision of national heritage sites, the National Heritage List. The placement of sites on national heritage registers does not provide any significant protection, except perhaps from Federal activities, although it does give recognition that the sites are of national importance. Both sites were originally created Crown Reserves because of their international geological significance and heritage listing, with management vested in the Department of Lands. Management of the State Geoheritage Reserves has now been vested in the Minister for Mines and Petroleum.

Four additional sites of similar or greater scientific significance to the Buick and Awramik sites were given State Geoheritage Reserve status in March 2009, in order to manage their geoheritage values. These sites are:

- Trendall (Reserve 50149 — Fig. 5)
- Strelley West (Reserve 50150, also known as 'Lowe' — Fig. 6)
- Spinaway Creek (Reserve 50151, also known as 'Hickman' — Fig. 7)
- Chinaman Creek (Reserve 48969, also known as 'Schopf' — Fig. 8)

Two of these reserves are surrounded by unallocated Crown land, three by the Hillside Pastoral Lease, and one by Reserve 2906 (land for common use vested in the Shire of East Pilbara).

Discussions were held between GSWA geologists and the owners of pastoral leases and the Shire of East Pilbara to explain the proposal and to seek their support. Pastoralists were assured that the State Geoheritage Reserves do not need to be fenced because it is considered unlikely that cattle will harm critical rock faces. GSWA gained endorsement for the creation of the reserves from the parties concerned. Discussions were also held with Marble Bar residents to enlist their support in safeguarding the reserves and in reporting any suspected unauthorized activity.

Impact structures

Two impact craters are currently listed as State Geoheritage Reserves; Dalgara (with a collapse crater diameter of 24 m; Fig. 9; Bevan 1996) and Veevers (with a collapse

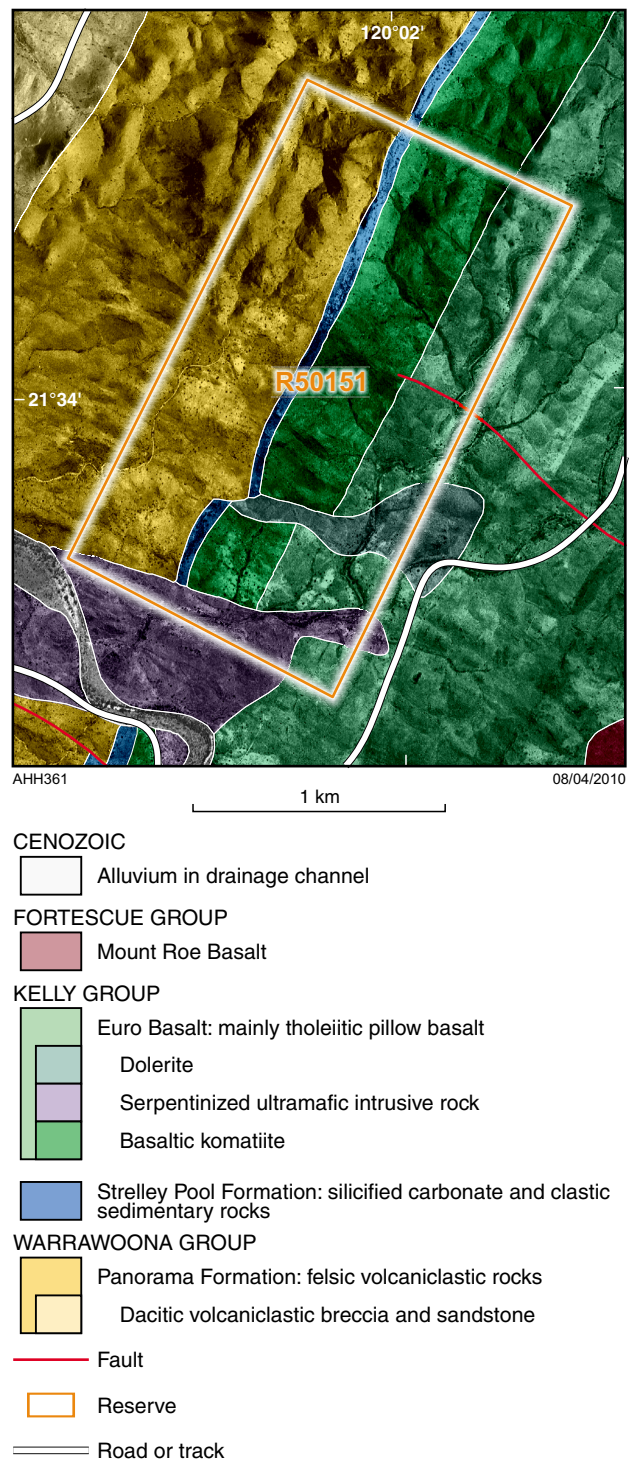


Figure 7. Detailed plan of the Hickman State Geoheritage Reserve (R50151; geology modified from Bagas et al., 2004).

crater diameter of 70–80 m; Fig. 10). The Dalgara (Reserve 28497) and Veevers (Reserve 41372) craters (Fig. 14a,b), were previously vested in the Minister for State Development in 1992 but have since been transferred to the Minister for Mines and Petroleum. Another meteorite impact crater, Wolfe Creek Crater, was gazetted in August 1976 as the Wolfe Creek Meteorite Crater National Park as a Class A Reserve (No. 29 457)

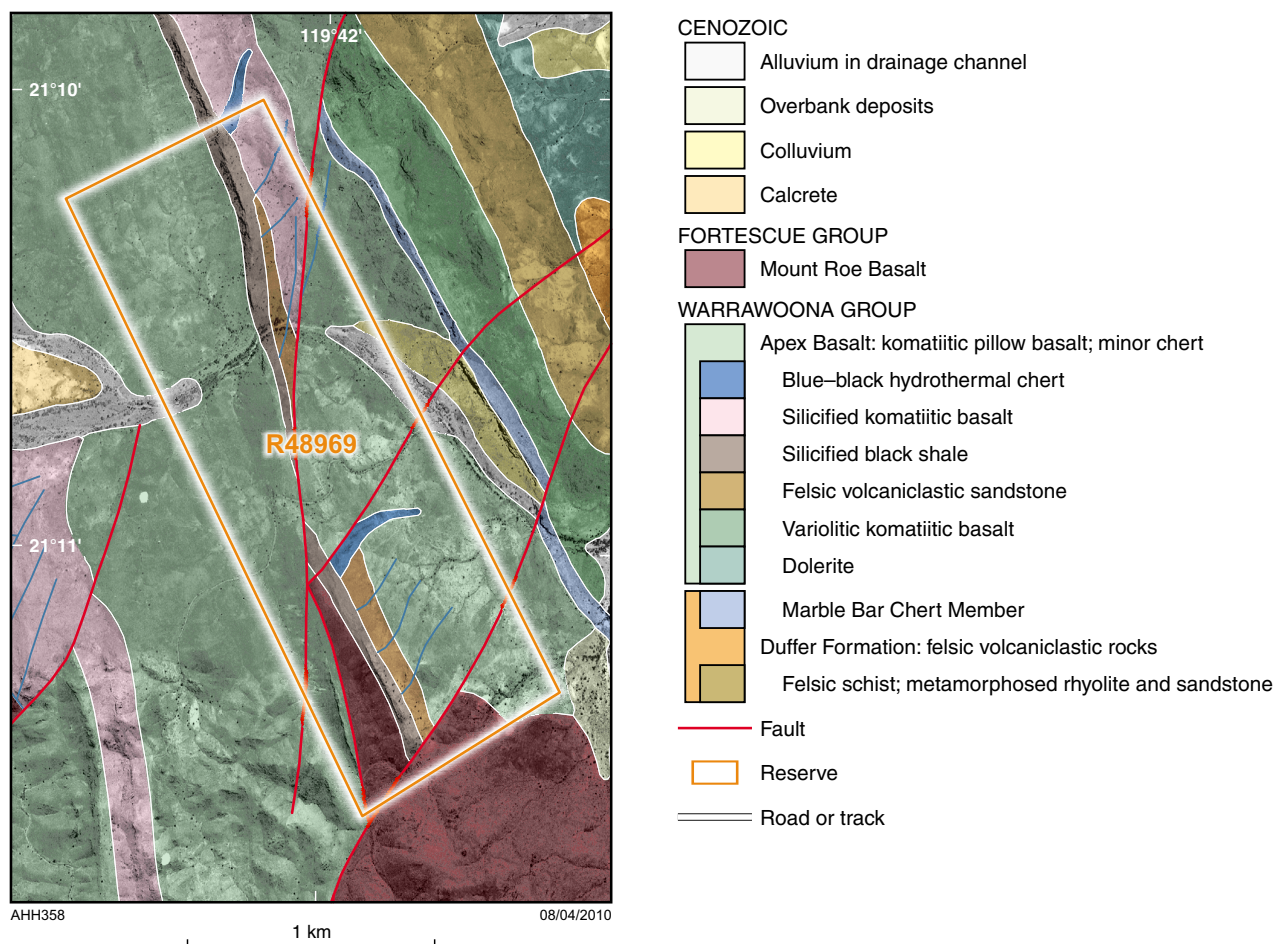


Figure 8. Detailed plan of the Schopf State Geoheritage Reserve (R48969; geology modified from Hickman and Van Kranendonk, 2008).

and is managed by the Department of Environment and Conservation.

Dalgaranga is increasingly well-known because it is publicized on the internet as a tourist destination. Construction of the Square Kilometre Array (SKA) radio telescope facility 120 km to the northwest is likely to increase visitor numbers to this crater. Veevers (Yeates et al., 1976) is in the remote Great Sandy Desert and is only accessible from the Canning Stock Route track (about 90 km to the northwest) so visitor numbers are currently small. Nevertheless, internet sites record several recent visits. It is critical for distinctive landforms associated with both impact craters to be conserved, so the prevention of vehicle damage is a particular issue.

The Dalgaranga, Veevers, and Wolfe Creek craters are associated with surviving fragments of the impacting meteorites. In Western Australia, meteorites (recovered or not) belong to the State and ownership is vested in the Trustees of the Western Australian Museum under the *Museum Act* (1969).

Any meteorite fragments of the original impact that remain at the craters are reserved as the property of the State and ownership is vested in the Trustees of the

Western Australian Museum. Meteorites may only be removed to be delivered to the Trustees of the Western Australian Museum under the terms of the *Museum Act* (1969) and with the prior permission of the Minister of Mines and Petroleum through the Executive Director GSWA. Collection and retention of any meteorite material other than by the authorization of the Trustees of the WA Museum is illegal.

In order to minimize damage and removal of material, anyone intending to visit these reserves will need to obtain prior authorization from the Executive Director GSWA. In particular, tour guides will need approval to take parties into the reserves. It is suggested that tour leaders submit a proposal for each calendar year, indicating approximately how many tours and how many visitors are likely to visit the sites. Approval will be subject to conditions, such as 'viewing and photography only; no collecting; no camping within the crater, and no driving into the crater or close to its margin except on well-designated roads or tracks'. The latter is because it is critical to protect the shape and relationship of different rock units to one another at the sites. Tour leaders may also be requested to assist in monitoring the sites by reporting any signs of damage and may be asked to submit photographs to help maintain site integrity through ongoing documentation.

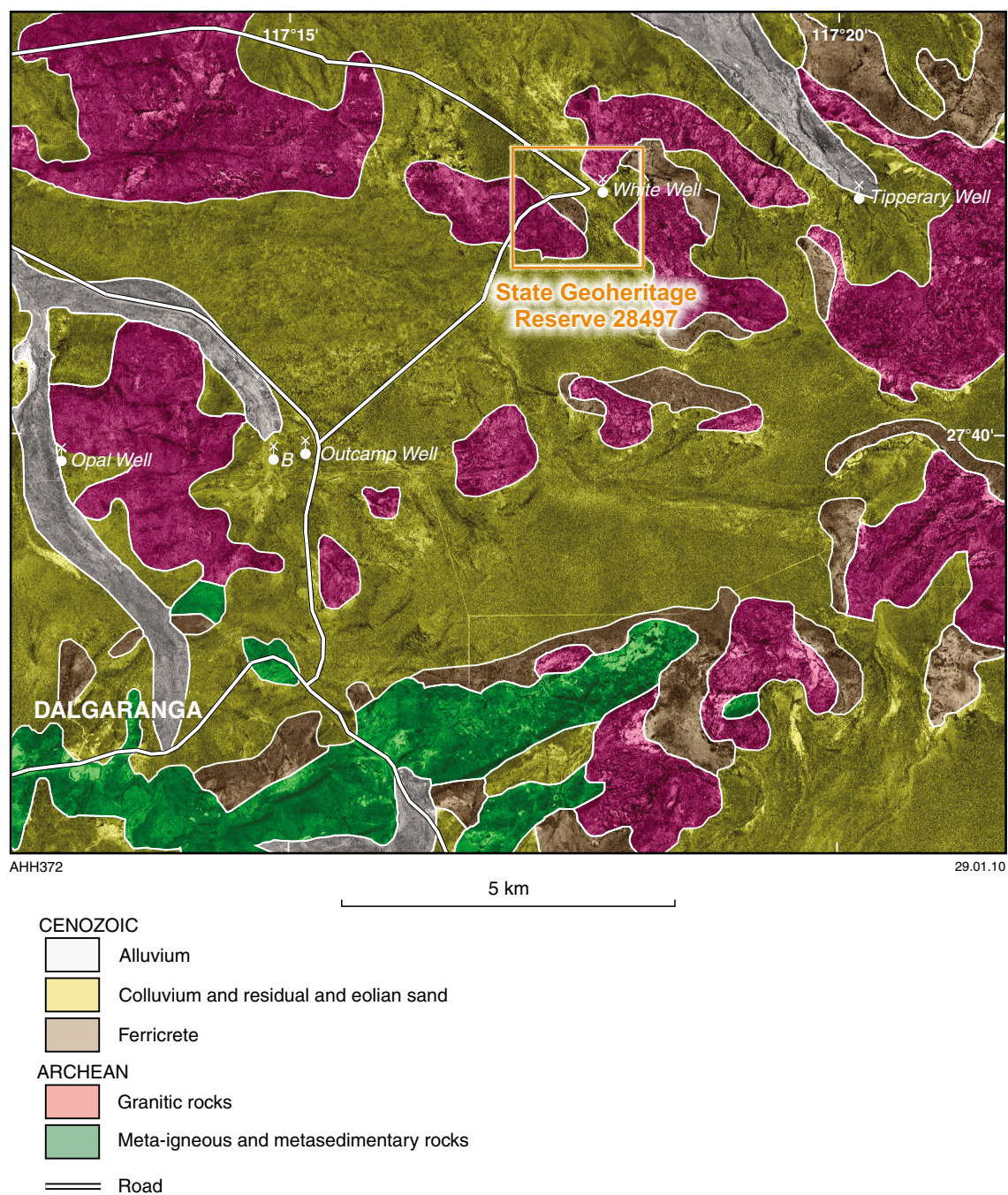


Figure 9. Location of the Dalgaranga State Geoheritage Reserve (R28497; geology modified from Watkins et al., 1987).

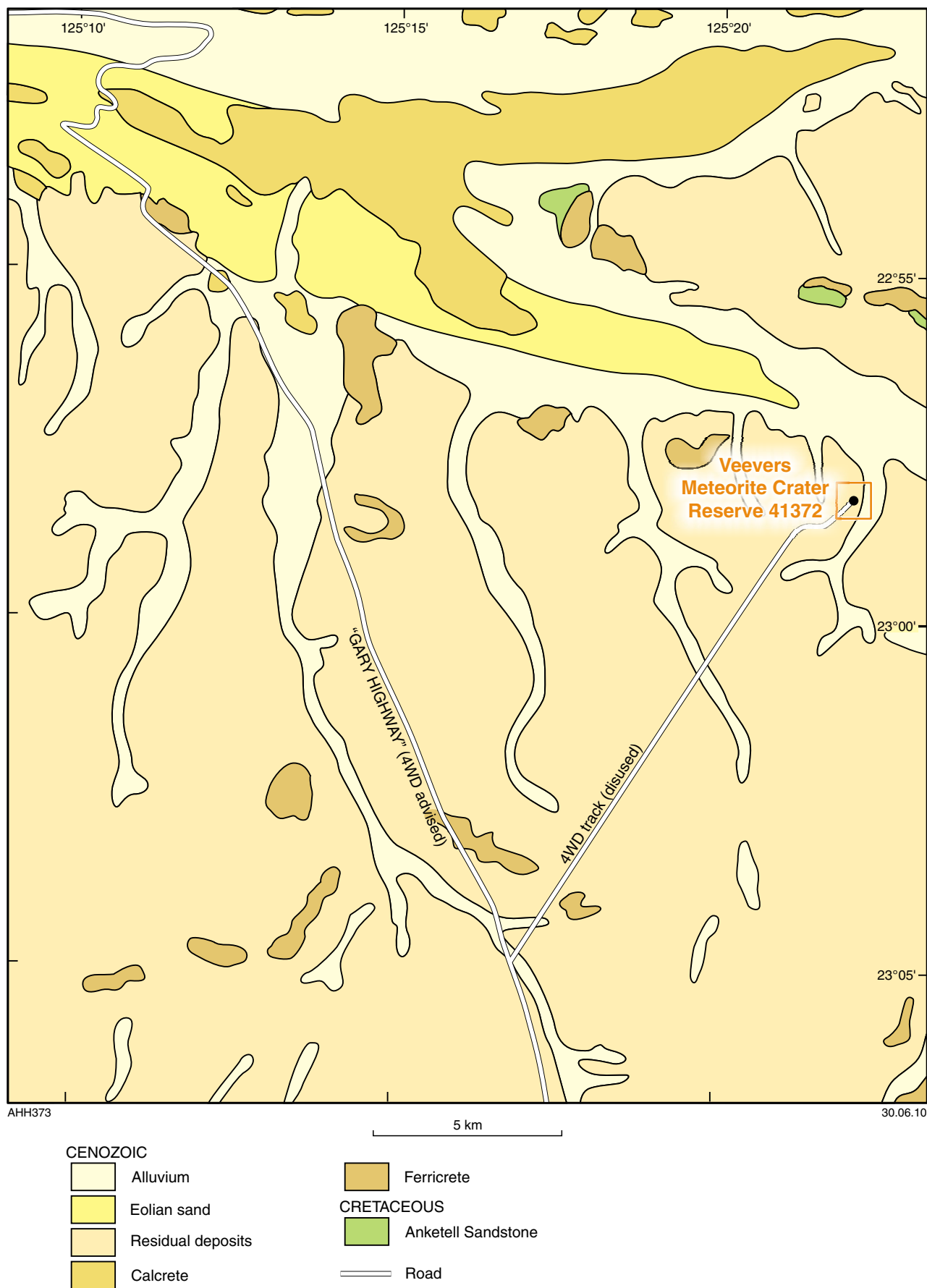


Figure 10. Location of the Veevers State Geoheritage Reserve (R41372; geology modified from Towner and Walton, 1975, and Crowe, 1976).



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01.04.10

Figure 11. Visitors to State Geoheritage Reserves: a) students examining the Buick State Geoheritage Reserve on a university field trip; b) filming for a television documentary on early life at the Trendall State Geoheritage Reserve.



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31.03.10

Figure 12. Damage at the Buick State Geoheritage Reserve in the Dresser Formation, probably the oldest fossil evidence of life on Earth: a) the removal of blocks of sandstone beneath a stromatolite mat and b) removal of a large piece of stratiform stromatolite mat.

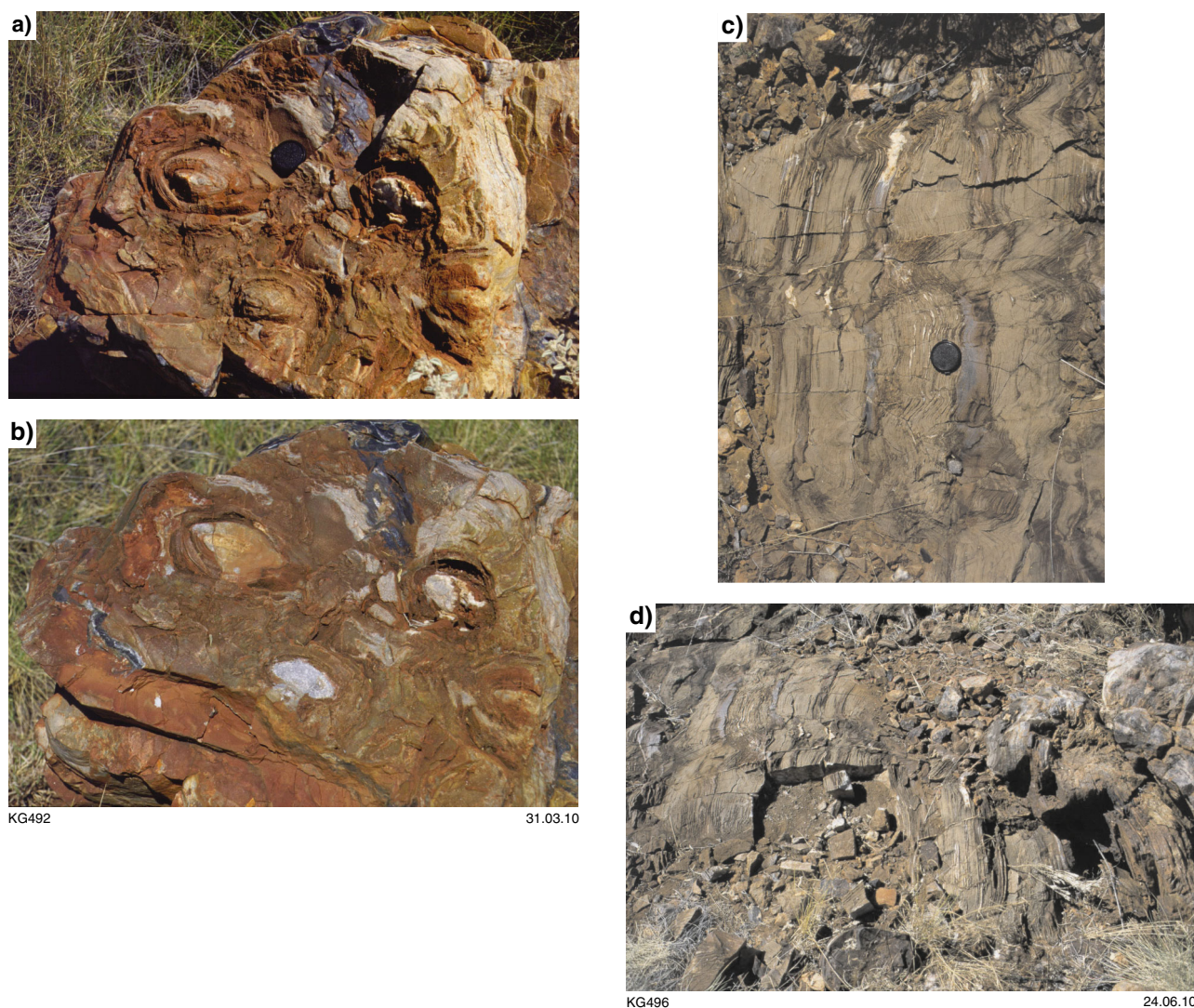


Figure 13. Damage at the Trendall State Geoheritage Reserve in the Strelley Pool Formation, probably the best example of diverse Archean stromatolite morphologies associated with sedimentary features; a) and b) the decapitation of large conical stromatolites on a boulder, c) and d) the removal of a carbonate block with a conical stromatolite in cross-section. Such damage is not sustainable given that the outcrop is only a few square metres in area.

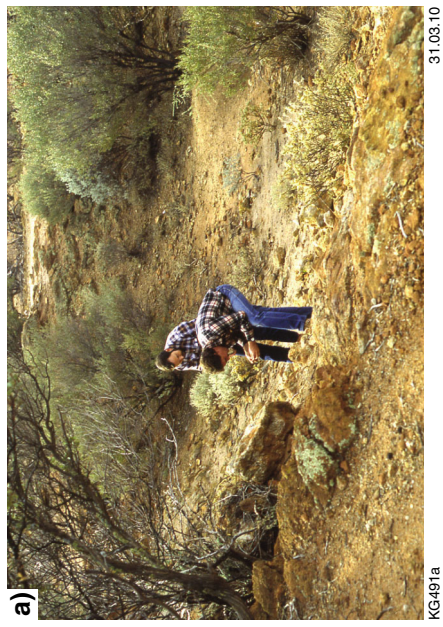


Figure 14. Meteorite crater geoheritage reserves: a) the crater at Dalgaranga State Geoheritage Reserve (photograph by V. Humphrey, W.A. Museum); b) soil sampling at Dalgaranga Crater to identify meteoric material (photograph by A. Bevan); c) the crater at Veevers State Geoheritage Reserve (modified from Wikipedia image, http://en.wikipedia.org/wiki/Veevers_crater).

Potential impact on stakeholders

Mineral resource activities

Several of the State Geoheritage Reserves are in regions with high mineral potential, and although there will be some access restrictions, mineral exploration will generally not be impeded, except for activities at key outcrops, although, as noted earlier, the Reserves cover only small areas in which the geology and mineral potential is already well known. Any ground disturbing activities carried out under the *Mining Act 1978* and the *Petroleum and Geothermal Energy Resources Act 1967* require approval by the Director of the Environment Division of the Department of Mines and Petroleum who is required to consult with the Executive Director GSWA prior to activities being approved. There will be a prohibition on any ground disturbing exploration activities or sampling on key outcrops. Exploration activities elsewhere in the reserve may be considered and possibly approved by the Executive Director, GSWA, providing there are no adverse effects on the key outcrops.

Any activity within reserves should be managed to minimize risk to the geologically important outcrops or features within the reserves. If a mineral deposit is located on a reserve, mining will be permitted only if it can be demonstrated that it will not adversely impact the geoheritage values of the reserve, with the final decision being made by the Minister for Mines and Petroleum.

The following condition, alerting tenement holders to restrictions and limitations on activities, is being placed on all future tenements granted over State Geoheritage Reserves:

'Prior to collection of any samples from within Reserve (Add Reserve number), the (Add name of tenement Lessee/Licensee) to ascertain the nature of the valuable material from the Executive Director, Geological Survey and shall not collect such material without the approval in writing of the Executive Director. Prior to commencing any activity which includes the use of scrapers, graders, bulldozers, backhoes or other mechanized equipment for surface disturbance or the excavation of costeans with the reserve, the (Add name of tenement Lessee/Licensee) must submit a detailed description of all such proposed activities for the written approval of the Executive Director, Environment, DMP in consultation with the Director of the Geological Survey.'

In addition, future tenements should be endorsed with the following statement:

'Reserve (Add Reserve number) within this tenement contains significant geological features that are listed on the State Geoheritage Register; and any collection of samples may damage or destroy the values of the sites.'

Other activities

Access to reserves may be considered for educational, scientific, media, or other viewing purposes (for example,

as part of a field excursion), but the purpose and scope of the proposed visit will need prior approval from an expert scientific panel. The procedure to be followed for submitting a proposal and a copy of the 'Proposed Activity at a State Geoheritage Reserve' form are given in Fig. 15 and Appendices 1, 2, and 4. Access may be approved subject to conditions, but sampling will be allowed only in cases where the proposed research is assessed as justified by the Executive Director GSWA. Visitors and researchers granted approval to carry out activities within a reserve are likely to be required to assist in monitoring the reserves by reporting any signs of damage, with photographic evidence. Geologists from GSWA and other officers of the Department of Mines and Petroleum will monitor the State Geoheritage Reserves at intermittent intervals and compare new photographs with previous photographic records. The Australian Customs and Border Protection Service and the Commonwealth Department of the Environment, Water, Heritage and the Arts may also have monitoring systems in place to check compliance with export regulations (see below). For some State Geoheritage Reserves, local volunteers are monitoring visitor activity.

Prohibition of commercial collecting

Commercial collecting is incompatible with the purposes for which State Geoheritage Reserves were created. These activities threaten vulnerable rock faces within some of the reserves, and commercial exploitation of the reserves is untenable. Considering how poorly represented the material is in Australian museums and other public institutions because of the conservative approach taken to collecting by responsible researchers, it is not accepted that such specimens should be treated as marketable commodities. Removal of fossils or other features of scientific value from State Geoheritage Reserves by fossickers, miners, or commercial collectors is strictly prohibited.

The creation of State Geoheritage Reserves has facilitated prosecution of anyone illegally removing and exporting of fossil material from Australia. Export of early Archean fossils from Pilbara State Geoheritage Reserves (except under permit as described in this management plan) is not allowed under Commonwealth legislation administered by the Australian Customs and Border Protection Service and the Commonwealth Department of the Environment, Water, Heritage and the Arts. Commonwealth departments, the Geological Survey of Western Australia, and the Western Australian Museum consider that fossils from these reserves qualify as Class B objects under the Protection of Movable Cultural Heritage Act, 1986, and therefore can only be exported under permit and under stringent conditions that usually allow only temporary export for scientific study. Creation of State Geoheritage Reserves will assist the Australian Customs and Border Protection Service and the Commonwealth Department of the Environment, Water, Heritage and the Arts in protecting the nation's fossil heritage from illegal export by improving the chance of prosecution because of State management of on-reserve sampling.

Public access and tourism

In most cases, commercial tourism is incompatible with the purposes for which the reserves were created. Access for these purposes is unlikely to be approved. Except in exceptional circumstances, access to Pilbara fossil reserves is unlikely to be approved for commercial geotourism (particularly for large commercial groups), or for small sightseeing parties that do not have a legitimate scientific purpose. Experience has indicated that the activities of such parties are difficult to monitor and most participants in such tours cannot resist collecting loose material. Even indirect and seemingly inconsequential damage of this nature will have an attrition effect on the reserves, and it is essential to preserve even loose material in situ because it can contribute to reconstruction of paleoenvironments. For Pilbara stromatolites, an alternative site, the Dawn of Life Trail, 60 km south of Marble Bar, is readily available for visits by the general public and tourism groups interested in evidence of early life and is easier to access than any of the State Geoheritage Reserves (Van Kranendonk and Johnston, 2009). An exception applies in the case of Dalgarranga State Geoheritage Reserve, where a special activity license may be approved for tour operators.

Media groups

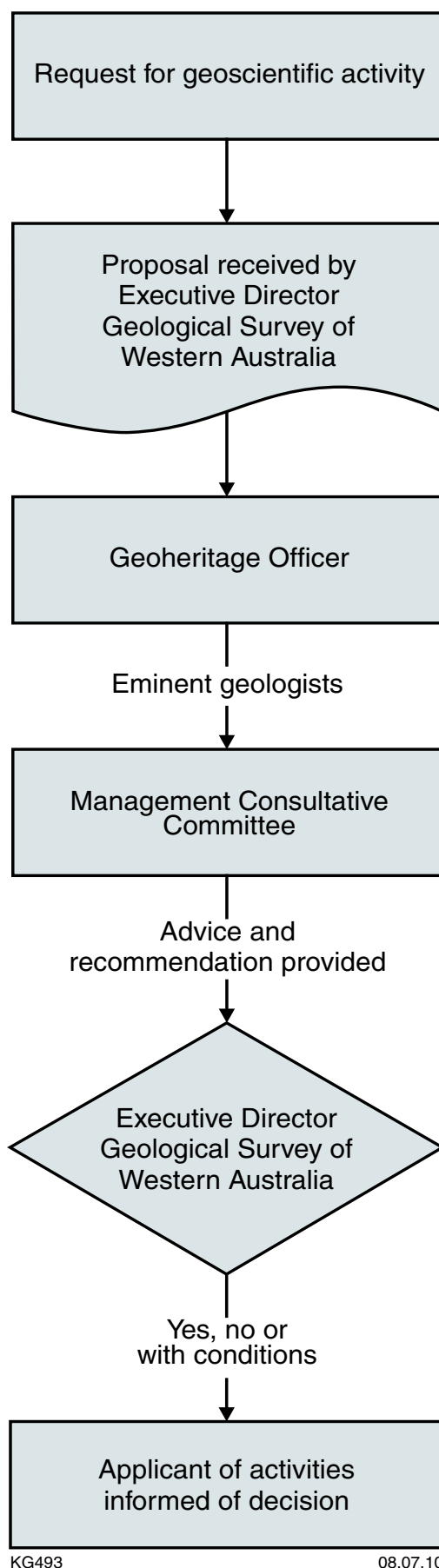
Access to reserves will be considered for selected media groups, such as those making scientific documentaries, but the purpose and scope of the proposed visit must be submitted for approval using the form describing the proposed activity (Appendix 2). Media access will normally be approved, but no sampling will be allowed and approval for access will be subject to conditions. Visiting media groups should obtain copies of any reserve guidebooks available and, where possible, include a scientific expert so that an accurate scientific picture is obtained and presented.

Scientific access

The management of State Geoheritage Reserves aims to achieve a balance between conservation of geological values and scientific study. These activities are not mutually exclusive, but scientific work cannot be carried out at the expense of losing key outcrops, rock faces or individual features such as fossil stromatolites. Research is welcomed within State Geoheritage Reserves provided it is carried out responsibly and with prior permission from the Executive Director GSWA. Access to State Geoheritage Reserves for scientific investigations, including sampling, will be granted only for those proposals judged to have significant scientific merit.

Management Plan

The Management Plan for State Geoheritage Reserves operates within the framework of any national and international heritage agreements which bind the State, treaties which bind the State, all relevant State and Commonwealth laws and Government policies. The



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Figure 15. Approval Process for Geoscientific Activities.

Executive Director of the GSWA, as the State's highest-ranking geologist, is the nominated manager of the reserves.

Visitor and activity management

All visitors to State Geoheritage Reserves are required to submit a 'Proposed Activity at a State Geoheritage Reserve' form (Appendix 1) to the Executive Director GSWA. A party leader may submit a form on behalf of the party. The form must be submitted at least two months in advance of the proposed visit, and must include information about the size of the party and the dates of the proposed visit. If scientific activities are proposed to be carried out within the reserve, full details must be supplied (see Research management).

1. The Executive Director GSWA, or his/her appointee, will acknowledge receipt of the proposal and indicate a date by which a response will be sent.
2. Visitors who only wish to make observations or take photographs do not need to provide a detailed research proposal, but should outline the scientific reasons for their visit (e.g. educational) and any potential outcomes ('possible inclusion of photographs in text book'). Straightforward applications to view and photograph the classic features may be approved without convening a 'Management Consultative Panel', at the discretion of the Executive Director GSWA. Any other proposed form of activity will require the provision of a detailed research proposal.
3. The proponent will be sent a notification that their proposal has been approved, not approved, or approved under certain conditions. In the latter case, the conditions and restrictions will be outlined. Where an application is not approved, the notification will give reasons for the determination made by the Executive Director GSWA.
4. In cases where an applicant objects to a decision, they should initially discuss it with the Executive Director of GSWA in an attempt to correct misunderstandings, present new information, or evidence, and get a decision changed quickly. If the applicant is not satisfied with the outcome of these discussions, and wishes to appeal the decision, they may do so by referring the matter to the Minister for Mines and Petroleum, but they should do so within one week of receiving the original decision.

Research management

Researchers wishing to inspect or collect material from one or more State Geoheritage Reserves are required to submit a proposal to the Executive Director GSWA for evaluation by a panel of experts, using the following guidelines:

1. The researcher or researchers will submit a 'Proposed Activity at a State Geoheritage Reserve' form (Appendix 1) to the Executive Director GSWA. The

form must be submitted at least 2 months in advance of the proposed visit.

2. The Executive Director GSWA, or his/her appointee, will acknowledge receipt of the proposal and indicate a date by which a response will be sent.
3. The Executive Director GSWA, or his/her appointee, will convene a panel of experts — the Management Consultative Panel — to examine the proposal, to provide advice on the scientific merit of the project, and to assess potential damage to the outcrops likely to be caused as a result of the proposed activities. The panel convenor will act as the Panel Chairman. Where possible, the panel will be drawn from experts with knowledge of both the outcrops in question and the field of proposed research, as well as those with an interest in reserve conservation. The panel will consist of researchers from both GSWA and other institutions, as discussed in the section on the Management Consultative Panel.
4. Once the Management Consultative Panel has been consulted and the final report prepared, the Executive Director GSWA will consider the panel's recommendations and the applicant will be sent a notification that their proposal has been approved, not approved, or approved under certain conditions. In the latter case, the conditions and restrictions will be detailed. The proponent should also receive a copy of the final report giving reasons for the panel's conclusions and the determination made by the Executive Director GSWA.
5. In cases where an applicant objects to a decision, they should initially discuss it with the Executive Director of GSWA in an attempt to correct misunderstandings, present new information, or evidence, and get a decision changed quickly. If the applicant is not satisfied with the outcome of these discussions, and wishes to appeal the decision, they may do so by referring the matter to the Minister for Mines and Petroleum, but they should do so within one week of receiving the original decision.

Management Consultative Panel

The Management Consultative Panel for State Geoheritage Reserves will advise the Executive Director GSWA on matters concerning all aspects of the reserves and, in particular, will evaluate and make recommendations about whether any proposed activities should be approved or forbidden from being carried out. The Management Consultative Panel may also recommend conditions or make recommendations under which activities on reserves can be carried out. No payment is to be made to any panel member.

On receipt of a request to carry out activity on a reserve, a consultative panel will be assembled by the Executive Director GSWA or his nominated appointee. The chairman will send a copy of the project proposal form to each panel member.

- The panel will be drawn from a list of eminent geoscientists with expertise in the relevant field or with a particular interest in conservation of geoheritage sites, or both.
- Each panel will consist of a minimum of four geoscientists, comprising at least one GSWA geoscientist with knowledge of the reserve in question, at least one GSWA geoscientist involved in managing geoheritage issues, at least one person with a relevant background from another Western Australian institution (such as the Western Australian Museum, or one of the Universities), and at least one other person with a relevant background and established international reputation, such as a scientist from another Australian or overseas research or academic institute. The panel's composition will be dependent on availability.
- Panel members will report to the Executive Director GSWA or his/her nominated appointee, who will act as panel convenor and chairman and will be responsible for contacting the other selected panel members. The panel does not need to meet, but can be consulted by means of phone calls or electronic media.

Panel members will undertake the following tasks:

1. Evaluate the request received, taking into consideration the scientific merit of the proposal and the likelihood of damage to the reserve in order to obtain those results.
2. Make a recommendation as to whether the scientific outcome of the proposal will be of sufficient significance to outweigh the anticipated damage. Panel members need to consider whether similar results could be obtained by sampling outside the boundaries of the reserves, or from another locality, and whether the proposed activity is likely to unnecessarily duplicate earlier studies.
3. Suggest any restrictions or requirements to be imposed before activities can be carried out. For example, the panel members may recommend how large a sample may be taken, whether it may be taken from bedrock or scree, that it must not be taken from critical faces, or they may suggest modifications or improvements to the sampling strategy. In all deliberations, the need to conserve critical evidence in outcrop should be given priority.
4. Make recommendations about required outcomes from the proposal, such as reporting requirements to GSWA, and a timeframe for reporting, to ensure that results are available in the public domain and in timely fashion. In all deliberations, the need to conserve critical evidence in outcrop will be given priority.
5. Supply the Executive Director GSWA with brief written recommendations indicating clearly whether or not approval should be given for the proposed activities.

Based on the collective recommendations of the panel, the Executive Director GSWA will make a decision that will be forwarded to the original applicant.

On receipt of the initial proposal, a deadline for response will be set and the applicant will be notified by the Panel Chairman of the receipt of the request and the date by which a decision can be expected. The final recommendation must reach the applicant by that date, thus the Chairman will set dates by which panel members will respond with their recommendations. If a panel member has not responded by that date, then another panel member may be appointed at the Chairman's discretion. Panel members are expected to treat any information included in the proposal and subsequent deliberations as confidential. The panel's report and recommendations are available to the applicant and will be included in the response by the Executive Director GSWA.

Conclusions

The Geological Survey of Western Australia works to elucidate the geological framework of Western Australia and reveal the potential for mineral and petroleum resources. Its role includes developing regional geoscientific resources and related policy information systems by acquiring, enhancing, archiving and disseminating data to promote the mineral and petroleum prospectivity of Western Australia and to assist in land-use planning and State development. GSWA, on behalf of the State, is concerned with ensuring that geological heritage in Western Australia is recognized and that any activities that affect the value and integrity of sites of geological significance are appropriately managed. In Western Australia, sites of geological significance may include different aspects of geology and geomorphology, such as a fossil locality, a type section, a landform or other geological features. Significant geoscientific sites are listed in a Register of State Geoheritage Sites. Sites of particular significance that are deemed to be under threat of damage may be given the status of State Geoheritage Reserves, which means they will be managed by GSWA in the interests of conserving their geoscientific values. Implementation of the State Geoheritage Reserve Management Plan will rely on the maintenance of good relations with other government and private sector organisations in regions containing reserves, and with the broader community. It is anticipated that better management of the State's geoheritage will foster a sense of ownership and shared responsibility across the community for the protection of the unique geological values of the State Geoheritage Reserves.

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References

- Allwood, AC, Walter, MR, Kamber, BS, Marshall, CP and Burch, IW 2006, Stromatolite reef from the Early Archaean era of Australia: *Nature*, v. 441, p. 714–718.
- Allwood, AC, Walter, MR, Burch, IW and Kamber, BS 2007, 3.43 billion-year-old stromatolite reef from the Pilbara Craton of Western Australia: Ecosystem-scale insights to early life on Earth: *Precambrian Research*, v. 158, p. 198–227.
- Awramik, SM, Schopf, JW and Walter, MR 1983, Filamentous fossil bacteria from the Archaean of Western Australia: *Precambrian Research*, v. 20, p. 357–374.
- Bagas, L, Beukenhorst, O and Hos, K 2004, Nullagine, WA Sheet 2954: Geological Survey of Western Australia, 1:100 000 Geological Series.
- Bevan, AWR 1996, Australian crater-forming meteorites. Australian Geological Survey Organization, AGSO Journal of Geology and Geophysics, v. 16, p. 421–429.
- Crowe, RWA 1976, Morris, WA Sheet SF 51-16: Geological Survey of Western Australia, 1:250 000 Geological Series.
- Geological Survey of Western Australia 1999, Western Australia atlas of mineral deposits and petroleum fields 1999: Geological Survey of Western Australia, 33p.
- Grey, K, Hickman, AH, Van Kranendonk, MJ and Freeman, MJ 2002, 3.45 billion year-old stromatolites in the Pilbara region of Western Australia: proposals for site protection and public access: Geological Survey of Western Australia, Record 2002/17, 11p.
- Hickman, AH 2008, Regional review of the 3426–3350 Ma Strelley Pool Formation, Pilbara Craton, Western Australia: Geological Survey of Western Australia, Record 2008/15, 27p.
- Hickman, AH and Van Kranendonk, MJ 2008, Marble Bar, WA Sheet 2855: Geological Survey of Western Australia, 1:100 000 Geological Series.
- Hofmann, HJ, Grey, K, Hickman, AH and Thorpe, RI 1999, Origin of 3.45 Ga-old stromatolites in Warrawoona Group, Western Australia: *Geological Society of America Bulletin*, v. 111, p. 1256–1262.
- Lowe, DR 1980, Stromatolites 3,400–Myr old from the Archaean of Western Australia: *Nature*, v. 284, no. 5755, p. 441–443.
- Schopf, JW and Packer, BM 1987, Early Archaean (3.3 to 3.5 Ga–old) fossil microorganisms from the Warrawoona Group, Western Australia: *Science*, no. 237, p. 70–73.
- Schopf, JW, Kudryavstev, AB, Czaja, AD and Tripathi, AB 2007, Evidence of Archean life: Stromatolites and microfossils: *Precambrian Research*, v. 158, p. 141–155.
- Towner, RR and Walton, DG 1975, Ural, WA Sheet SF 51-12: Bureau of Mineral Resources, Australia and Geological Survey of Western Australia, 1:250 000 Geological Series.
- Van Kranendonk, MJ 1999, North Shaw, WA Sheet 2755: Geological Survey of Western Australia: 1:100 000 Geological Series.
- Van Kranendonk, MJ 2007, A review of the evidence for putative Paleoproterozoic life in the Pilbara Craton, in *Earth's Oldest Rocks edited by MJ Van Kranendonk, RH Smithies, and V Bennet: Developments in Precambrian Geology*, v. 15, p. 855–896.
- Van Kranendonk, MJ and Johnston, JF 2009, Discovery trails to early Earth — a traveller's guide to the east Pilbara of Western Australia: Geological Survey of Western Australia, 168p.
- Van Kranendonk, MJ, Philippot, P, Lepot, K, Bodorkos, S and Pirajno, F 2008, Geological setting of Earth's oldest fossils in the c. 3.5 Ga Dresser Formation, Pilbara Craton, Western Australia: *Precambrian Research*, v. 167, p. 93–124.
- Walter, MR, Buick, R and Dunlop, JSR 1980, Stromatolites 3,400–3,500 Myr old from the North Pole area, Western Australia: *Nature*, v. 248, p. 443–445.
- Watkins, KP, Tyler, IM and Hickman, AH 1986, Cue, WA Sheet SG 50-15: Geological Survey of Western Australia, 1:250 000 Geological Series.
- West, MD, Clarke, JDA, Thomas, M, Pain, CF and Walter, MR 2010, The geology of Australian Mars analogue sites: *Planetary and Space Science*, v. 58, p. 447–458.
- Yeates, AN, Crowe, RWA and Towner RR 1976, The Veevers crater; a possible meteoritic feature: Australian Bureau of Mineral Resources, *BMR Journal of Australian Geology & Geophysics*, v. 1, p. 77–78.

Appendix 1

Process for obtaining sampling permission at State Geoheritage Reserves

The process to be followed to apply for permission to visit, sample or carry out any other activity at a State Geoheritage Reserve is summarized in Fig. 15 and Appendix 4 and is as follows:

1. Identify the State Geoheritage Reserve you wish to visit (Figs 1–10, or for an interactive map of Western Australia showing Geoheritage Sites and Reserves go to: <www.dmp.wa.gov.au>, select 'Geological Survey of WA' from the left hand box, select 'GeoVIEW.WA' from the right hand box, select 'Access GeoVIEW.WA' from the right hand box, select 'Special Category Lands' in the right hand box, click the 'visible' and 'active' boxes and click on Refresh. Zoom in to the area of interest. Geoheritage sites and reserves are shown by red polygons. For more information on a particular site, click the polygon and then the 'i' button), establish its boundary co-ordinates (UTM), gather any available data on material already sampled from the reserve, and obtain information on access to the reserve.
2. For each State Geoheritage Reserve involved, consider the possibility of collecting similar material from alternative areas adjacent to the reserve area. For example, the Trendall Reserve has been designated to protect the large conical stromatolite faces and their relationship to features of the enclosing sedimentary rocks that provide critical field evidence for determining biogenicity. Other structures, such as small, conical stromatolites are also protected. However, the same stratigraphic unit extends southwards as a ridge for several kilometres, providing alternative research and sampling opportunities.
3. If sampling from the State Geoheritage Reserve is still deemed necessary, develop a Research Proposal that includes the following information, and submit a 'Proposed Activity at a State Geoheritage Reserve' form (Appendix 4) available from <http://www.dmp.wa.gov.au/gswa>.

Information required for an application includes:

- *Contact details:* Names, addresses, and contact details of researchers involved in the proposal.
- *Dates* of proposed visit.
- *Background* to the proposed research.
- *Co-ordinates* of sample-site polygon boundaries. To assist the panel's assessment, the location of the proposed sampling areas should also be indicated on a map or photographic image of the State Geoheritage Reserve. Copies of Figures 2–10 in this Record may be used for this purpose.
- *Sampling strategy:* How many samples are required; what size will they be; what lithologies or structures will be targeted; what sampling methods will be used?
- *Sample treatment:* Outline the procedures intended to be carried out on each sample or group of samples, and whether or not these procedures will result in the destruction of the sample.
- *Sample export:* The export of meteorites and fossils from Australia is under the control of the Department of Environment, Water, Heritage and the Arts of the Commonwealth Government. GSWA has no authority to issue export permits if they are required. Researchers wishing to export samples need to consult the Environment Department website:
<http://www.arts.gov.au/movable-heritage>
and be familiar with the provisions of the *Australian Protection of Movable Cultural Heritage Act 1986 (PMCHA 1986)*. An outline of procedures involved in exporting samples is appended (Appendix 3). Provide information on how the export of material that might be regarded as a Class B object under the PMCHA will be handled.
- *Sample repository:* Where will the samples reside during the research? What will happen to samples when the study is completed and where will significant samples be repositied? Note that under the *PMCHA 1986* all type and illustrated fossils ultimately must be returned to the State and placed in an institution where they will be available for examination by other researchers.
- *Outcomes of Research Project:* What are the anticipated outcomes of the proposed project and where will results be published?
- *Reports to Executive Director GSWA:* A condition accompanying the approval of any research undertaken on a State Geoheritage Reserve is that summary reports of all activities on the reserve and all results obtained must be provided to the Executive Director of the Geological Survey within a reasonable timeframe. Normally, researchers will be expected to provide a summary of field operations within three months of completion of the fieldwork, and thereafter annual reports of results during the duration of the research. The application should include the proposed reporting schedule.
- If applicable, approval from mining tenement holder, pastoral leaseholder or Department of Environment for use of private tracks to access the State Geoheritage Reserve.

Appendix 2

Information about exporting samples from Australia

The export of objects considered to be part of Australia's cultural heritage is managed by the Commonwealth Department of Environment, Water, Heritage and the Arts, which is based in Canberra, and is administered by Australian Customs and Border Protection Service under the provisions of the Protection of Movable Cultural Heritage Act 1986 (POMCHA). Details of the Act and contacts can be found on the Environment Department website.

<http://www.ea.gov.au/heritage/awh/movable/index.html>

Material to be exported falls into two main groupings: non-scheduled and scheduled items. Rock samples fall into the former category, while items such as meteorites, fossils, mineral specimens to a certain value, and items of scientific interest fall into the latter category and are listed on a control list.

Items not on the control list do not require an export permit, so only a normal customs declaration is required if samples consist of rock samples only. However, experience has shown that customs clearance can be expedited if you obtain a Letter of Clearance signed by a reputable Australian geologist from GSWA, the WA Museum, a University, an institution such as CSIRO, or one of the larger mining companies who has inspected the contents of packages to be exported. The letter should be on the letterhead of the examiner's employer and the geologist should provide contact details in case Australian Customs and Border Protection Service wish to verify the contents of the parcel. It also helps to include a phrase indicating that the parcel is not known to contain any meteorites or significant fossils found in Australia, but that should any significant fossils subsequently be recovered, the exporter understands that they must be reposit in an Australian collection. A copy of the letter of clearance should be forwarded to the Commonwealth Department of the Environment, Water, Heritage and the Arts in Canberra.

The [Control List](#) is located in the Regulations to the Act, and divides Australian protected objects into two classes:

Class A objects, which may not be exported. These include items such as Victoria Crosses, parts of Ned Kelley's armour, and some aboriginal artefacts.

Class B objects, which may be exported if given a Letter of Clearance signed by an expert examiner or if granted an Export Permit under the provisions of the Act. Objects such as meteorites, type and illustrated or otherwise rare fossil specimens, and other objects of scientific interest (this might include samples of Jack Hills zircons) may not be exported permanently without a Permit. Structures of early Archean age that resemble stromatolites but that might not be classed by as 'fossils' by individual researchers still qualify as Class B objects because they are Natural Science objects.

If material is considered to be already well represented in collecting institutions in Australia, then a Letter of

Clearance may be issued by a registered examining institution. Otherwise, Class B material requires a permit for either permanent or temporary export. Permission to export may be refused, but in most cases temporary export is allowed for the purposes of study. Usually, specimens can only be exported temporarily for study, and have to be returned to Australia within two years.

Export permits can only be issued by the Environment Department in Canberra and you should make contact with the department well in advance of your trip to determine the procedures and conditions under which your material can be exported. For example, you may be required to present your material to an expert at the Western Australian Museum or GSWA in Perth for inspection. These experts can only make a recommendation about whether the material can be exported; they cannot sign the permit. Again you will need to make these arrangements well in advance, as there are only one or two specialists able to make these determinations, and they may be absent when you want to arrange export. The experts do not arrange or pay for shipping, although they may be able to advise on appropriate companies. If possible, arrange consignment notes and account numbers to be charged in advance through your institution if possible.

A person wishing to export permanently or temporarily a Class B object is required to apply for a permit in writing. Applications are processed in accordance with the legislative process established under section 10 of the Act. A ruling from the Attorney General's office indicates that fossils that are not visible to the naked eye (e.g. microfossils in black chert) do not count for the purposes of the Act. Nevertheless, most Australian palaeontologists would feel that an exporter who subsequently discovered fossils in samples was under a moral obligation to return any type or illustrated specimens to an Australian collection. Any visible Achaean fossils are likely to be Class B objects and require a 'Permit to Export'. The Australian Customs and Border Protection Service now require an Export Clearance Number for any item to be exported under a permit. This has to be obtained either by taking the material to be exported to Customs for inspection 24 hours before export, or arranging for a Customs Broker (see Yellow Pages phone directory) to handle the export and obtain the number for a fee of about \$50.00. Make sure you allow enough time at the end of your trip to deal with these formalities. Visitors often allow themselves only one day in Perth before they depart, which is not long enough for them to obtain all the clearances needed. GSWA cannot and will not handle them on your behalf.

Attached is an example of a Letter of Clearance to accompany non-fossiliferous samples or samples well represented in Australian collections (the wording describing the material should be varied accordingly):

Appendix 3

Export of rocks

[Letterhead of employee of issuing signatory]

Your ref:
Our ref:
Enquiries: [name of signatory]
Email: [email of signatory]

Date:

To: Inspector for Customs

Export of rocks

This letter accompanies rock samples to be exported by:

Title: **Surname:** **First name:**

Name of Institution:

Address:

.....

Phone: (Australia) **Phone:** (Country of residence)

Email:

FAX:

Departure details:

Exit port: **Date:** **Flight:**

Other: Rocks to be exported through: [name of broker or export agent]

Comments

The package to be exported is of rock samples only. The samples should not require an export permit because they do not contain Class B items as defined under the Australian Protection of Movable Cultural Heritage Act 1986, such as fossils, meteorites, or mineral specimens above a certain value. The person exporting the material understands that should fossils subsequently be found in any sample they must be returned to Australia for permanent storage [use wording to suit specific items].

If there are any problems please contact:

[signature]

Examiner: [name and position]

Email: **Phone:** **Fax:**

Mail address:

Appendix 4

State Geoheritage Reserves — proposal to visit or carry out research

Reserve to be visited:

Date of proposal:

Dates of proposed visit:

Main purpose of visit:

Contact details:

Name of Principal Researcher

or Tour Leader:

Address:

Other contact details:

Email:

Fax:

Phone:

Names and contact details of other members of the party:

Attach a proposed visit or research proposal that provides the following information (see Appendix 3 of Grey et al., Record 2010/13 for details of information to include:

- Background to the proposed research
- Co-ordinates of sample-site polygons.
- Sampling strategy
- Related material in Australian or other collections.
- Sample treatment.
- Sample export arrangements
- Sample repository
- Outcomes of Research Project
- Reports to Executive Director, GSWA

This Record is published in digital format (PDF) and is available online at www.dmp.wa.gov.au/GSWApublications.
Laser-printed copies can be ordered from the Information Centre for the cost of printing and binding.

Further details of geological products produced by the Geological Survey of Western Australia can be obtained by contacting:

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Department of Mines and Petroleum
100 Plain Street
EAST PERTH WESTERN AUSTRALIA 6004
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