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EXECUTIVE SUMMARY

This heritage management plan for the State Circle Cutting, Canberra, provides a sound basis for the good management and conservation of this site and its heritage significance. The plan:

- describes the cutting;
- provides an overview of the history of the site;
- offers evidence related to aesthetic and scientific values;
- analyses all of this evidence and provides a statement of significance for the site;
- considers opportunities and constraints affecting the management of the cutting;
- provides a conservation policy and implementation strategies to guide management and conservation; and
- provides a schedule of priority conservation works and a maintenance schedule for ongoing works.

The State Circle Cutting is entered on the Commonwealth Heritage List maintained under the *Environment Protection and Biodiversity Conservation Act 1999*. It is also part of the Parliament House Vista conservation area which is also on this list. These listings protect the heritage values of the site, and impose a number of obligations including the need to prepare a management plan.

The State Circle Cutting is an exposed rock face which is a significant geological site because:

- it has enabled a more detailed and accurate interpretation of the geological history of both Canberra and the whole region;
- it is a rare angular unconformity in the Canberra area;
- it has the potential to provide more information about the geology of the region;
- because of its role in teaching geology and geological processes; and
- because it demonstrates the principal characteristics of an angular unconformity.

The cutting has been recognised by the Geological Society of Australia as a site of international geological significance.

The conservation policy and implementation strategies cover a wide range of matters including:

- liaison;
- geological feature;

- setting for the cutting;
- use of the area;
- new development; and
- interpretation.

Key policies and strategies are provided related to:

- the statement of **significance** set out in Chapter 4 being a principal basis for management, future planning and work affecting the cutting (Policy 1);
- conservation and management of the site being carried out in accordance with the principles of the **Australian Natural Heritage Charter** (Policy 2);
- **planning documents** developed for the cutting or parts of the site referring to this management plan as a primary guide for the conservation of the heritage values of the cutting, with the direction given in those documents and in this plan being mutually compatible (Policy 4);
- the NCA seeking to **liaise with relevant stakeholders**, including professional groups, on developments affecting the site (Policy 10);
- **conserving the cutting** (Policy 11);
- protecting the **setting of the cutting** (Policy 15);
- the primary and secondary uses of the cutting (Policy 16); and
- **interpreting the significance of the cutting** to the range of visitors who use the area, and to NCA staff, as well as highlighting the connection to the Parliament House unconformity, and also to encourage respect for the fragile nature of the site (Policy 18).

The State Circle Cutting is in fair to good condition, and displays high integrity. There is minor erosion/instability of the cutting face. A range of conservation and maintenance works are recommended, including minor stabilisation works to the cutting face, clearing drains, gutters and stormwater connections, clearing debris from behind the existing kerb, and increasing the kerb length and height (see Appendices E and F).

The interpretation of the cutting should be substantially improved, though this would only require some simple measures.

A review of the conservation policy in the heritage management plan for the Parliament House Vista (Marshall and others 2010) found that it complemented the policy for the cutting provided in this plan. There are no apparent inconsistencies or gaps in policy coverage between the two plans.

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1. INTRODUCTION

1.1 BACKGROUND AND PROJECT OBJECTIVES

The State Circle Cutting is long exposed rock face in central Canberra which has been entered in the Commonwealth Heritage List. It is also within the Parliament House Vista conservation area, which is also listed.

In accordance with section 341S of the *Environment Protection and Biodiversity Conservation Act 1999*, a management plan for the place must be prepared. The National Capital Authority manages the cutting on behalf of the Commonwealth, and this heritage management plan has been prepared to assist the NCA comply with this legislative obligation.

However, this management plan is more than just a legislative obligation. It is intended to help guide the conservation management of the site as a living and working document, especially with regard to changes that may arise.

As noted, the cutting is also a part of the Parliament House Vista which is on the Commonwealth Heritage List. A heritage management plan for the Vista has been prepared (Marshall and others 2010), and it has been used as a key reference in the development of this plan for the cutting.

A copy of the Commonwealth Heritage List place record for the cutting is reproduced at Appendix B.

A copy of relevant extracts from the project brief are provided at Appendix A.

This heritage management plan is the same as a conservation management plan – the term more widely used in the heritage industry.

Key general definitions

Conservation	In this report, the term conservation is generally used to mean, 'all the processes and actions of looking after a place so as to retain its natural significance and always including protection, maintenance and monitoring' (Cairnes 2002, Article 1.20). These processes include regeneration, restoration, enhancement, reinstatement, preservation and modification, or a combination of more than one of these. Conservation includes conserving natural processes of change.	
Site	In this report, the term site is generally used rather than place because this is the term normally used by geologists. Place is a term used in other heritage contexts. However, place is used in	

1.2 CONDUCT OF PROJECT

Overview

The methodology adopted for this plan is in accordance with the *Australian Natural Heritage Charter* (Cairnes 2002). This can be summarised as a series of steps as shown in

some cases (eg. in the statutory heritage criteria).

Figure 1 below.

Figure 1. Basic Steps of Conservation Management Planning

Source: Summarised from Cairnes 2002



In order to follow these steps and prepare this management plan a range of consultations, research, inspections and analyses were undertaken. Importantly, the assessment of significance relied upon:

- a range of information gathering tasks related to the common descriptors of significance (for example scientific value); and
- an analysis of this evidence for heritage values using the Commonwealth Heritage Criteria, including comparisons with other places where relevant, in order to test the understanding of such values.

The scientific/geological heritage aspects of the project relied on personal knowledge of the site and its heritage significance, a literature review going back to the initial recognition of the geological significance of the unconformity through to present day understandings of the site, and site visits.

This work provided a sound understanding of the site, and led to the preparation of a statement of significance. This work also provided an understanding of the constraints and opportunities related to the current and future management of the site. The statement of significance and the information about constraints and opportunities were used as the basis for developing conservation policies and implementation strategies.

Report structure

This heritage management plan:

- describes the State Circle Cutting in Sections 2.1-2.2;
- provides an overview of the history of the site in Section 2.4;
- offers evidence related to scientific and aesthetic values in Sections 2.5-2.6;
- analyses all of this evidence in Chapter 3 and provides a statement of significance for the site in Chapter 4;
- considers opportunities and constraints affecting the management of the cutting in Chapter 5; and
- provides a conservation policy and implementation strategies to guide management

and conservation in Chapter 6.

Public consultation

In accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) and the NCA's commitment to community engagement, a draft of the heritage management plan, was made available for public comment from 24 August 2013 to 4 October.

Notices were placed in the *Canberra Times* and *The Australian* on 24 August 2013 notifying the general public of the project, and the opportunity to comment. The report was publicly available on the NCA's 'Have Your Say' website, and stakeholders were notified in writing. A public information session was offered on 20 September to any interested parties.

As a result of this process, two sets of written comments were provided, and no one attended the public information session. One set of comments were from the ACT Heritage Council, and only note that the Council had decided not to register the cutting under the *Heritage Act 2004* (ACT) because the cutting is located on National Land and the Act has no direct effect. The Council also had no objections to the draft. No substantive changes to the HMP arose from these comments.

The second set of comments were from the Geological Society of Australia – ACT Division. The GSA was broadly supportive of the HMP. In addition, its comments led to a few minor improvements to the plan.

1.3 PURPOSE OF REPORT

The purpose of this report is to provide a management plan for the State Circle Cutting, in accordance with the obligations under the EPBC Act, including an understanding of its heritage values (Chapter 4), and conservation policies and implementation strategies for its future management (Chapter 6).

1.4 LIMITATIONS

There were no factors limiting the preparation of this report.

1.5 CONSULTANTS

The consultants for the project are Duncan Marshall, Phil Creaser and Douglas Partners (David Murray).

1.6 ACKNOWLEDGMENTS

The consultants wish to acknowledge the kind assistance of the following people and organisations.

Anna Wong	National Capital Authority
Dr Doug Finlayson	Geological Society of Australia (ACT Division)

National Archives of Australia

Ilse Wurst

at the time with the Department of Sustainability, Environment, Water, Population and Communities

2. DESCRIPTION, HISTORY AND OTHER EVIDENCE

2.1 LOCATION AND BOUNDARIES

The State Circle Cutting is located on the northeast arc of State Circle between Commonwealth Avenue and Kings Avenue, towards the outside edge of the road reservation (see Figure 2 and Figure 3).

The formal Commonwealth Heritage List boundaries for the site are,

'The exposed rock face on the northern side of State Circle between Commonwealth Avenue and Kings Avenue, Parkes.'

This boundary suggests no depth of the geological feature is included, just the rock face itself.

The site is within the road reservation of State Circle.

Figure 2. Block and Section Plan for the State Circle Cutting (highlighted with a red dashed line) – the cutting being located under the Federation Mall bridges

Source: Base image from ACTmapi



Figure 3. Location Plan for the State Circle Cutting in the context of the Parliament House Vista area Source: Department of the Environment, 2008



2.2 DESCRIPTION

Overview

The vertical rock cutting is situated on the northern side of State Circle on Capital Hill between Commonwealth Avenue and Kings Avenue, and is just over 300 metres in length. The cutting tapers at both ends from nothing up to a height of several metres. Originally the cutting had two levels but following the construction of two bridges leading up to Parliament House in the 1980s, part of the upper level was removed, battered, and landscaped with ground cover plants so that no outcrop remains. However, the lower level, which is probably more significant, remains intact.

The top of the cutting has a bench area with a random (unworked) stone capping set in mortar close to the cutting face, and a concrete drain behind (see Figure 11). The landscaped battered slope extends above the bench. Many of the ground cover plants have failed, leaving the ground and irrigation pipes exposed (see Figure 6).

The concrete drain is also overgrown by some ground cover plants, there is debris partly blocking the drain, and the connection to the stormwater system at the western end is blocked. The gutter at the toe of the cutting is also partly blocked by debris. Mounds of erosion debris has also accumulated at the toe of the cutting in places (see Figure 7). There is one loose stone in the stone capping.

The cutting is one of the few sites that exposes the major angular unconformity between the Early Silurian State Circle Shale unit (deposited about 435 million years ago) and the overlying Early Silurian Camp Hill Sandstone Member of the Canberra Formation (deposited about 428-425 million years ago). It should be noted that in the cutting, the State Circle Shale unit is represented by siltstones and sandstones while the Camp Hill Sandstone Member is in fact represented by thinly bedded sandstones, siltstones and mudstones. More details about specific features in the cutting are provided below, and an image portraying the major features is at Figure 15.

In addition to the cutting itself, a viewing platform is located on the south side of State Circle, at the higher level of Federation Mall. This is a concrete structure set into the ground, with concrete access steps, brick paving, and a bronze interpretation plaque mounted on the wall (see Figure 12 and Figure 13). This platform is not included in the Commonwealth Heritage place.

A range of images portraying aspects of the cutting are provided in Figures 4 to 15 below.

Specific features in the Cutting

The State Circle Shale here is formed of mainly siltstone and very fine sandstone which has been strongly contorted by slumping. Marine fossil graptolites were found during excavation of the cutting, the most common species being *Monograptus exiguus*, which confirms the deposits were laid down in a deep oceanic environment, and they also help to indicate the age of the sediments. The age of these rocks has been estimated at approximately 435 million years old, which places them in the Early Silurian Period. (This text is based on the Commonwealth Heritage List place record, reproduced in full at Appendix B)

The Camp Hill Sandstone, which is approximately 428-425 million years old, is comprised of fine to coarse quartz sandstone, interbedded with siltstone and silty mudstone. The unit

is fossiliferous, with poorly preserved brachiopods, corals and trilobites found during the excavation work.

Sandstone rafts: The presence of large slabs or rafts of sandstone, which are now completely enclosed within the finer grained shale, probably originated when a large packet of sandstone and siltstone layers, resting on a sloping oceanic surface, started to slide towards the deeper parts of the ocean basin. As the sequence of sediment layers tumbled downslope, the sandstone beds broke up into slabs of various sized and mixed with the finer grained sediments.

Pallid zone: The uppermost 20 to 50 cm thick horizon of the State Circle Shale has a pale, almost white colour, which supports the argument that the plane of the unconformity represented an ancient land surface exposed to weathering.

Ripple marks: The unconformity in the State Circle Cutting marks a geologically short time of just a few million years. This is the time that elapsed between the elevation of the State Circle Shale from the floor of the ocean, its transformation into a hilly land of severely deformed rocks, and its subsequent wearing down by erosion to a low-lying area that could then be reclaimed by the sea.

It was in this younger sea that the Camp Hill Sandstone was deposited. Ripple marks have been preserved on the top surfaces of some of the sandstone layers, and fossils, particularly brachiopod shells of the genus *Rhipidium*, as well as specimens of corals and trilobites, have been found in the Camp Hill Sandstone. The presence of ripple marks and these fossils indicates that the sea was a shallow one.

Figure 4. Panoramic view of the Cutting

Source: Phil Creaser 2013



Figure 5. View from the West/Commonwealth Avenue end of the Cutting





Figure 6. Western end of the Cutting with stone capping and concrete drain

Source: Duncan Marshall 2013



Figure 7. Section of Cutting at western end showing some erosion Source: Duncan Marshall 2013



Figure 8. State Circle Cutting Source: Duncan Marshall 2013



Figure 9. View towards Kings Avenue

Source: Duncan Marshall 2013



Figure 10. View of Cutting from Federation Mall

Source: Phil Creaser 2013



Figure 11. View of the Cutting and bench above



Figure 12. Viewing platform on south of State Circle

Source: Duncan Marshall 2013



Figure 13. Bronze interpretation plaque in viewing platform

Source: Duncan Marshall 2013



Figure 14. Panoramic view from the viewing platform

Source: Phil Creaser 2013



Figure 15. View of Central-West Section of Cutting annotated to show Major Features

Source: Base image Duncan Marshall 2013



Condition

As a general comment, the State Circle Cutting is in fair to good condition, and there is little or no erosion of the rock face in the cutting apart from a small area at the western end.

As part of the project to develop this plan, a geotechnical assessment was undertaken and the main general observations made during the site inspections for that assessment are as follows.

- The interbedded sandstones, siltstones and mudstones belonging to both geological units are of variable strength and each rock type has weathered and regressed behind the original line of cut at different rates during the approximate forty years since the lower face was first excavated.
- The more erodible and friable beds exposed on the batter face have regressed to between 100 mm to 300 mm behind the line of the more resistant (higher strength) beds (although this increases to 500 mm behind the original cut line in some areas of the batter face). This has led to the progressive undercutting of the more resistant beds and the failure to the batter toe of both fine grained material and some bedrock joint blocks ranging from 20 mm to 100 mm diameter.
- It appears that the majority of the joint blocks that have fallen from the batter have not reached the traffic lane, but rather have lodged behind the concrete kerb at the toe of the batter or rolled onto the footpath.
- There is a solitary 150 mm diameter fragment of rock lying on the central median of State Circle, near to the central pier of the western over-bridge, approximately 15 metres distant from the toe of the batter. The rock fragment appears to have originated from the opposite crest of the lower batter face beneath the bridge. It is possible that the rock fragment has fallen from the batter and rolled onto the roadway but it is unlikely to have rolled across the full width of the eastbound lanes to its present position.
- There is a 100 mm high concrete kerb extending along the northern side of the footpath at the toe of the lower batter face from CH 204 metres to a grated drain at CH 57 metres (CH = a chain measurement along the length of the cutting). Much of the 'channel' behind the concrete kerb is filled with fallen rock fragments. (see Figure 9)
- There does not appear to have been any significant reduction of the weathering of the lower batter face where it has been afforded some protection from the elements by the overhead Federation Mall bridges.
- There does not appear to be any visual evidence of adversely orientated jointing or defects within the bedrock exposed in the lower excavated batter that could lead to significant overall instability of the slope.
- The cemented stone capping layer along the crest of the slope generally remains intact and in good condition with only one loose stone noted.
- The concrete box drain along the mid-level bench appears to be in good condition

and is generally free of vegetation or soil build-up.

- There was no groundwater seepage noted from the batter face during either of the inspections.
- The cemented stone flagging on the mid-level bench below both of the over-bridges appears free of cracking or any areas of settlement.

Additional details about the condition of the cutting are provided in the full geotechnical assessment provided at Appendix I.

2.3 Associated sites

While the site demonstrates an unconformity between sediments of different ages, it is not readily recognisable as such as the cutting only exposes this geological feature in two dimensions. To fully appreciate the nature of an angular unconformity, it needs to be seen in three dimensions rather than as a cross section. The unconformity used to be able to be seen on Capital Hill and featured in geological excursions of Canberra (Öpik 1964) but since the construction of Parliament House, it can only be seen under the Senate Chamber as part of organised tours (see the following figure). These are the only two sites in Canberra that expose the unconformity. The Parliament House site is part of the same unconformity which is exposed at State Circle.

Figure 16. Parliament House unconformity

Source: Duncan Marshall 2013



A discussion of comparable sites is presented under Chapter 3, criterion (b).

2.4 OVERVIEW HISTORY

The underlying State Circle Shale unit was deposited in the Early Silurian (about 435 million years ago) in a marine basin following a major tectonic event (known as the Benambran Orogeny¹) which folded and faulted the older deep water Ordovician sediments (which are not represented in the cutting). Further folding and faulting of the State Circle Shale sediments (during a later phase of the Benambran Orogeny at about 430 million years ago) resulted in a break of sediment deposition for a period of about 7 million years after which the shallow water marine sediments and volcanic rocks of the Canberra Formation were laid down. The overlying Camp Hill Sandstone Member is part of the Canberra Formation which is also considered to be Early Silurian in age and was deposited between 428-425 million years ago.

The Benambran Orogeny is considered (Finlayson *et al* 2008) to be the most important tectonic event in Southeastern Australia in terms of transforming a deep ocean basin into what eventually became the Australian land mass. It initiated many of the major faults in the region. Phase 2 of this Orogeny (which is represented by the unconformity in the cutting) was primarily responsible for the uplift of the land in the whole Canberra region but further to the west in a large area from Wagga Wagga down into Victoria, this event metamorphosed thick sequences of sediments (up to 10 km) by folding under high pressure and temperature.

There are a wide range of sediment types in this Formation. In the cutting, there are sandstones, siltstones and mudstones, while rocks of the same age elsewhere in Canberra include the Acton limestone and the Narrabundah Ashstone member. In addition, there are a range of small structures in the sediments which provide evidence of the environment of deposition of the sediments.

The unconformity at Capital Hill was first described in a paper published by A A Öpik in 1954.

State Circle was part of Walter Burley Griffin's initial plan for Canberra in 1911, although it was called Capitol Circuit in earlier schemes. It was one of two concentric roads encircling Griffin's Capitol Hill (now Capital Hill), the site of his proposed Capitol (now the site of Parliament House). State Circle was gazetted as a road on 20 September 1928, although it was initially formed to some extent by 1927. It was subsequently completed as a circle, and remodelled at least in 1960. Further planning for the circles was undertaken in about 1969, and Capitol Circle was initially constructed in about 1970, with reconstruction and duplication of a section of State Circle from Flynn Drive to Brisbane Avenue in the same period. Capitol Circle was opened in 1971.

While details have not been found, it is surmised the State Circle Cutting was first exposed during the construction works in 1969-71 as part of the remodelling of State Circle and in anticipation of the construction of Capital Circle. (See Figures 17 to 19 below)

¹ Orogeny is a geological term which refers to forces leading to deformation of the Earth's crust due to the movement of tectonic plates. The word is derived from the Greek words for mountain (Oros) and creation (Genesis).

Figure 17. View of the Cutting showing the exposure of the upper and lower faces - date unknown but before 1983

Source: Geological Society of Australia



Figure 18. View of State Circle with Cutting in background behind Capital Circle bridges, 1971 Source: National Archives of Australia, A6135, K7/9/71/2



Figure 19. Aerial view of Canberra with Cutting in foreground, 1974 Source: National Archives of Australia, A6135, K14/6/74/5



Construction of the new Parliament House in the 1980s necessitated the removal of the top of Capital Hill, construction of the new building (much of which is underground) and its associated roads, followed by re-sculpting of the hill. Proposals for the related roadworks were considered in about 1982. The roadworks were undertaken in the period 1983-89. These works involved modifications to the cutting, including battering and landscaping of the upper face, and construction of a random stone coping and concrete drain in the bench above the lower face. It is possible shotcrete and dowels were also used to stabilise the cutting, as shown in the following figure. However, it is not known if these works were actually undertaken. A viewing platform on the southern side of State Circle was also part of the project.

'The stability of the rock face was investigated and drainage works were designed to prevent surface water flowing over it and to minimise seepage and ground water pressure behind the face.' (Downey & Connal 1990, p. 230)

The proposed changes were a matter of concern to the Geological Society of Australia at the time, which advocated the conservation of the cutting. The resulting compromise was an acceptable result although not its preferred outcome. The reason the upper face was battered and landscaped was an aesthetic one arising out of concern for the view down Federation Mall from the new Parliament House.

Accordingly, partial conservation of the cutting became an objective of the project to design and construct the related roadworks.

In about 1995 a drain was created at the base of the cutting.

The cutting has been used as a geological teaching site following its exposure in 1969-71.

Figure 20. Plan of Remedial Works (undated) which may have been undertaken

Source: DoE file for the State Circle Cutting



2.5 Aesthetics

The State Circle Cutting is a large and dramatic landscape feature with its richly coloured and patterned rocks. However, its location makes it difficult to readily appreciate for the casual visitor, except for those travelling along State Circle. On the other hand, the site does attract visitors and students interested in the geology, who presumably also admire its aesthetic qualities. The cutting can be appreciated from the viewing platform opposite.

However, no specific research has been undertaken into communities or groups who might value such qualities, nor has such evidence emerged from other sources of information about the cutting.

2.6 SCIENTIFIC VALUE

The significance of angular unconformities goes back to the late 18th century when Scottish geologist James Hutton began formulating his theories on the formation of the Earth. He observed several examples of where older sediments which had been deposited horizontally on a sea floor had been folded and tilted and younger sediments deposited on the older sediments were often at a different angle. These are angular unconformities and these observations were crucial in Hutton's work. There are other slightly different types of unconformities but in terms of significance and the context of this report, the angular unconformity is the major focus.

While the angular unconformity has been recognised for a long time from the outcrop on Capital Hill, the State Circle cutting has provided geologists with a significant new exposure. This has enabled a more detailed and accurate interpretation of the geological history of both Canberra and the whole region. The State Circle Cutting is one of the very few sites in Canberra which helps with this understanding, the Parliament House unconformity (otherwise called the Capital Hill Unconformity) being another.

As evidence of its scientific value, this site has been listed by the Geological Society of Australia as one of only two sites in the ACT as being of international significance (Cochrane & Joyce 1986). It is also listed on the Commonwealth Heritage List.

2.7 SOCIAL VALUE

No specific research has been undertaken into communities or groups who might value the cutting for reasons related to social value, nor has such evidence emerged from other sources of information about the cutting.

While the geological community do value the cutting, the evidence suggests this is for scientific rather than social values.

3. ANALYSIS OF EVIDENCE

This analysis has been prepared by the consultants using the evidence presented in Chapter 2 which has been analysed against the Commonwealth Heritage Criteria (reproduced at Appendix D), and judgements have been reached on the basis of the professional expertise of the consultants. The analysis is divided into sections related to the Commonwealth Heritage Criteria.

This analysis leads to a statement of significance which differs in some ways from the official Commonwealth Heritage values.

(a) the place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history

The site meets this criterion as it represents a significant event in the geological evolution of south eastern Australia. The angular unconformity is indicative of a major tectonic event (the second phase of the Benambran Orogeny) and its exposure in the State Circle Cutting has enabled geologists to better understand the processes and sequence of events during the Early Silurian period, and the geological evolution of south eastern Australia.

(b) the place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history

Angular unconformities are very important in our understanding of the geology and geological evolution of the Earth. However, they are relatively rare and most are inaccessible or unknown to the general public. There are only two known sites of this unconformity in the Canberra area. One is exposed under Parliament House but can only be seen when organised tours are conducted (see Section 2.3). In contrast, the exposure in the State Circle Cutting is readily accessible and can be seen easily by the general public.

In NSW there is the Quidong example of this age, and there would also be several angular unconformities in NSW but these are of different ages. While many of these unconformities are inferred, they are rarely exposed as in the Canberra examples and none of them are as readily visible and as easily accessible as the State Circle Cutting and Parliament House example.

The site meets this criterion.

(c) the place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history

The site has enabled professional geologists to better understand the geological evolution of south eastern Australia. It lead to a major paper (Crook *et al* 1973) which recognised the unconformity in the cutting as a major tectonic event. This was highly significant in the interpretation of the geological evolution of Southeastern Australia, in particular the Ordovician and Silurian sediments which comprise most of the sediments of the region. The paper described how the present day area was transformed by tectonic activity from a deep ocean basin to a shallow sea with volcanism which eventually became land and part of the Australian land mass.

This event was originally called the Quidongan Orogeny, after the Quidong locality near

Bombala where it was first recognised. However, it is now considered to be a second phase of the Benambran Orogeny, named after the town of Benambra in Victoria (Finlayson *et al* 2008). As geological techniques (eg. dating of rocks and geological concepts further develop) the site has the potential to provide even more information relating to the geology of the region.

The site has also been used to teach geology and geological processes to a wide range of students at both the secondary and tertiary level.

The site meets this criterion.

(d) the place has significant heritage value because of the place's importance in demonstrating the principal characteristics of:

(i) a class of Australia's natural or cultural places; or

(ii) a class of Australia's natural or cultural environments

The cutting is significant in demonstrating the principal characteristics of an angular unconformity, which is a characteristic feature of the geological evolution of an area that has been formed as a result of tectonic movements.

Unconformities are characterised by two rock masses or strata of different ages which indicates there has been a break in sedimentation. In some cases, the strata lie on top of each other with no difference in the angle of the strata. However, with an angular unconformity, the strata are at different angles relative to each other which indicates there has been some tectonic movement which has resulted in the break in sedimentation. These angular unconformities are a highly significant geological feature and have played an important role in our understanding of the evolution of the Earth.

In the case of the State Circle Cutting, it has both features being two rock masses of different ages indicating a break in sedimentation, and strata at different angles as evidence of tectonic activity.

The site meets this criterion.

(e) the place has significant heritage value because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group

The cutting has obvious aesthetic qualities as a large and dramatic landscape feature with its richly coloured and patterned rocks.

However, no specific research has been undertaken into communities or groups who might value such qualities, nor has such evidence emerged from other sources of information about the cutting.

Accordingly, there is no current evidence of value under this criterion.

(f) the place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period

There is no evidence of value under this criterion.

(g) the place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

No specific research has been undertaken into communities or groups who might value the cutting for reasons related to social value, nor has such evidence emerged from other sources of information about the cutting.

Accordingly, there is no current evidence of value under this criterion.

(h) the place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history

There is some association between the cutting and the geologist A A Öpik. His work is significant for the interpretation of the geological history of the Canberra region and its geological mapping.

In a broader context, Öpik was an important geologist working in Australia. One appraisal of his work is as follows.

'J. N. Casey, Assistant Director of the Bureau of Mineral Resources, summed up Öpik's work and his standing among his colleagues in the BMR memorial to which we have referred. He remarked that Öpik's discovery of the first Ordovician rocks in the Fitzroy Basin of the Kimberleys in 1949 opened up the Canning Basin to petroleum exploration which began in 1950 and is still continuing. His numerous new discoveries in the Cambrian and Ordovician rocks of the Amadeus and Georgina basins enabled new correlations and new environmental interpretations to be carried out in ongoing basin studies throughout Australia.' (Glaessner, Shergold & Teichert 1985)

On this basis, a special association may exist with sites in the Fitzroy, Amadeus and Georgina Basins.

In the case of the Canberra unconformity, this was the subject of a paper by Öpik in 1954, and he promoted excursions to visit the unconformity at least in the mid 1960s. Öpik named the Camp Hill Sandstone and the type section locality was designated in 1990 and includes the cutting (Australian Stratigraphic Units Database). He also named the State Circle Shale and the reference locality (not the type section locality) was also designated in 1990 and includes the cutting. However, it is noted that Öpik also named several other geological features in Canberra, such as the Pittman Formation, Black Mountain Sandstone, Mount Painter Volcanics and the Yarralumla Formation.

A clear case for a special association relates to the expression of the unconformity which is now under Parliament House. This was a focus of Öpik's original research about Canberra's geology, and his efforts to promote geological excursions.

The justification for a special association with the State Circle Cutting is less clear. The cutting was only exposed in 1969-71, it was not directly the subject of his Canberra research or early educational efforts, and it only became a type section or reference locality after his death.

Accordingly, there is some doubt there is sufficient value to meet this criterion.

None the less, the current official Commonwealth Heritage values of the place includes the site's association with the work of Öpik. Accordingly, until this can be formally reviewed,

the current value is included in the statement of significance in the following chapter.

(i) the place has significant heritage value because of the place's importance as part of indigenous tradition

There is no evidence of value under this criterion.

4. STATEMENT OF SIGNIFICANCE

4.1 STATEMENT OF SIGNIFICANCE

This section contains a statement of significance for the State Circle Cutting. References to criteria in the following section relate to the Commonwealth Heritage Criteria (reproduced at Appendix D). The references are provided after the relevant text.

This statement of significance differs in some ways from the official Commonwealth Heritage values. The key differences are:

- a more detailed discussion of the value under criterion (a); and
- it redefines the value under criterion (d) to better address the criterion.

In addition, the current Commonwealth Heritage value under criterion (h) is included below for consistency with the current official Commonwealth Heritage values of the site, although the analysis above raises some doubt about this value.

•

The State Circle Cutting is an exposed rock face which is a significant geological site. The cutting, which was excavated between 1969 and 1971, enabled geologists to reassess the relationship between different rock formations, deposited before and after a major tectonic event, which resulted in a more detailed and accurate interpretation of the geological history of both Canberra and the whole region. This major tectonic event is represented in the cutting by an angular unconformity, which are very rare in southeastern Australia. The cutting also has the potential to provide more information about the geology of the region, because of its role in teaching geology and geological processes, and because it demonstrates the principal characteristics of an angular unconformity. It has been recognised by the Geological Society of Australia as a site of international geological significance.

The cutting is one of two sites in Canberra that exposes the major angular unconformity between the Early Silurian State Circle Shale unit (deposited about 435 million years ago) and the overlying Early Silurian Camp Hill Sandstone Member of the Canberra Formation (deposited about 428-425 million years ago). The underlying State Circle Shale unit represented in the cutting by fine sandstones and siltstones was deposited in a marine basin following a major tectonic event which folded and faulted older sediments (which are not represented in the cutting). Further folding and faulting of these sediments resulted in a break of sediment deposition for a period up to 10 million years after which the shallow water marine sediments and volcanic rocks of the Canberra Formation were laid down. The overlying Camp Hill Sandstone Member is part of the Canberra Formation which is also considered to be Early Silurian in age. There are a wide range of sediment types in this Formation. In the cutting there are sandstones, siltstones and mudstones, while rocks of the same age elsewhere in Canberra include the Acton limestone and the Narrabundah Ashstone member.

Angular unconformities are one of the fundamental concepts in geology. They represent an erosional surface between strata of different ages indicating there has been a break in sedimentation. With the different strata at different angles, it means there has been some tectonic movement as all marine strata are laid down horizontally.

While the site demonstrates such an unconformity, it is not readily recognisable as the cutting only exposes this geological feature in two dimensions. To fully appreciate the nature of an angular unconformity, it needs to be seen in three dimensions rather than as a cross section. The only other site in Canberra where it can be seen is under the Senate Chamber of Parliament House. While the latter site has been known for a long time, the State Circle Cutting has provided geologists with a significant new exposure. This has enabled a more detailed and accurate interpretation of the geological history of both Canberra and the whole region, and lead to the recognition that the unconformity in the cutting was the result of a major tectonic event.

(Criterion (a))

Angular unconformities are relatively rare and the State Circle Cutting is one of only two known sites of this unconformity in the Canberra area.

(Criterion (b))

The site has the potential to provide even more information relating to the geology of the region.

The site has also been used to teach geology and geological processes to a wide range of students at both the secondary and tertiary level. Interpretation of the site shows how a major tectonic event affected the geological evolution of Canberra and the whole region. In addition, there are a range of small structures in the sediments which provide evidence of the environment of deposition of the sediments.

In terms of its overall significance, interpretation of the geology of the site demonstrates the enormous power of the tectonic forces that have shaped the Earth. The older Ordovician sediments and the State Circle Shale were deposited in ocean basins which were fairly deep water. Phase 2 of the Benambran Orogeny (represented by the unconformity in the cutting) folded and uplifted these sediments so that following a period of erosion and denudation further sedimentation occurred in a shallow warm sea. Limestone rocks are commonly found in these and younger overlying sediments both in Canberra and the region. This gave rise to the name Limestone Plains used for the Canberra area by the early European settlers. Hence the importance of this tectonic event for Canberra.

(Criterion (c))

The cutting is significant in demonstrating the principal characteristics of an angular unconformity, which is a characteristic feature of the geological evolution of an area that has been formed as a result of tectonic movements.

(Criterion (d))

The site is associated with the work of A A Öpik, who was one of the pioneers of the interpretation of the geological history of the Canberra region and its geological mapping.

(Criterion (h))

4.2 ATTRIBUTES RELATED TO SIGNIFICANCE

The following list of attributes are features that express or embody the heritage values detailed above, and these are useful in ensuring protection for the values.

Table 1. Attributes Related to Significance					
Criteria	Attributes				
Criterion (a) – History	Geological unconformity and exposed rock face				
Criterion (b) – Rarity	Geological unconformity and exposed rock face				
Criterion (c) – Research potential	Geological unconformity and exposed rock face				
Criterion (d) – Representativeness	Geological unconformity and exposed rock face				
Criterion (h) – Special association	Geological unconformity and exposed rock face				

5. DEVELOPMENT OF POLICY - OPPORTUNITIES AND CONSTRAINTS

5.1 IMPLICATIONS ARISING FROM SIGNIFICANCE

Based on the statement of significance presented in Chapter 4, the following management implication arises:

• the geological unconformity and exposed rock face should be conserved.

This implication does not automatically lead to a given conservation policy in Chapter 6. There are a range of other factors that must also be considered in the development of the policy, and these are considered in the rest of this Chapter. Such factors may modify the implication listed above to produce a different policy outcome.

5.2 LEGISLATIVE REQUIREMENTS

The management of the State Circle Cutting operates within a legislative framework which includes the:

- Australian Capital Territory (Planning and Land Management) Act 1988 (Commonwealth); and
- Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).

In addition, there are a range of relevant subsidiary plans and policies. This framework and relevant elements are briefly described below.

Australian Capital Territory (Planning and Land Management) Act 1988 (Commonwealth)

The Act establishes the National Capital Authority, and requires the NCA to prepare and administer a *National Capital Plan* (National Capital Authority 2011). The *National Capital Plan* defines Designated Areas and sets out detailed policies for land use and detailed conditions for planning, design and development within them. Works approval must be obtained from the NCA for all 'works' proposed within a Designated Area.

The cutting is part of the Central National Area (The Parliamentary Zone), and the area is a Designated Area as defined in the *National Capital Plan*. Therefore all 'works' affecting the area require written approval from the NCA. The cutting is also on National Land.

The following section describes the *National Capital Plan*. However, the NCA also has an asset management role and this is separately described in Section 5.4 below.

National Capital Authority and National Capital Plan

The object of the plan (National Capital Authority 2011) is to ensure that Canberra and the ACT are planned and developed in accordance with their national significance. In particular, the plan seeks to preserve and enhance the special characteristics and those qualities of the National Capital which are of national significance.

The plan describes the broad pattern of land use to be adopted in the development of Canberra and other relevant matters of broad policy. The plan also sets out detailed

conditions for the planning, design and development of National Land which includes the State Circle Cutting. As noted above, works within a Designated Area require written approval from the NCA and must meet these detailed conditions. Such works include:

- new buildings or structures;
- installation of sculpture;
- landscaping;
- excavation;
- tree felling; and
- demolition.

Specific relevant sections of the plan include:

- principles and policies for the Parliamentary Zone and its Setting (*National Capital Plan,* Sections 1.1.2 and 1.1.3);
- detailed conditions of planning, design and development (NCP, Section 1.7 and Figure 5);
- heritage and environment (NCP, Chapters 10 and 11);
- design and siting conditions for signs (NCP, Appendix H, Part 3); and
- master plan for the Parliamentary Zone (NCP, Appendix T.6: Master Plan for the Parliamentary Zone).

The plan provides extensive and detailed guidance on a wide variety of matters. It is difficult to meaningfully distill the relevant guidance however, its scope includes:

- the role of the capital;
- preferred uses;
- character to be achieved/maintained;
- hydraulics and water quality;
- access;
- development conditions, including scale of development;
- parking and traffic arrangements;
- standard and nature of building, and urban design and siting, including landscaping;
- management planning for features;
- heritage places;

- signage;
- maintenance and management of the lake; and
- infrastructure.

The land use relevant to the cutting is defined as Road (NCA 2011, p. 46).

Environment Protection and Biodiversity Conservation Act 1999

This Act has certain relevant provisions relating to heritage places generally, and especially relating to places on the Commonwealth Heritage List. The State Circle Cutting is entered in the Commonwealth Heritage List. It is also part of the Parliament House Vista which is also on the Commonwealth Heritage List.

The EPBC Act requires approval from the Minister for the Environment for all actions likely to have a significant impact on matters protected under Part 3 of the Act. This includes Commonwealth actions (section 28) and Commonwealth land (section 26). Actions by the National Capital Authority may be Commonwealth actions and the cutting is Commonwealth land for the purposes of the Act.

The Act provides that actions:

- taken on Commonwealth land which are likely to have a significant impact on the environment will require the approval of the Minister;
- taken outside Commonwealth land which are likely to have a significant impact on the environment on Commonwealth land, will require the approval of the Minister; and
- taken by the Commonwealth or its agencies which are likely to have a significant impact on the environment anywhere will require approval by the Minister.

Significant impact is defined as follows.

'A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. You should consider all of these factors when determining whether an action is likely to have a significant impact on the environment.' (DEWHA 2010, p. 3)

The definition of 'environment' in the EPBC Act includes the heritage values of places, and this is understood to include those identified in the Commonwealth Heritage List and possibly in other authoritative heritage lists. The definition of 'action' is also important. Action includes:

- a project;
- a development;
- an undertaking;
- an activity or series of activities; and

• an alteration of any of the things mentioned.

However, a decision by a government body to grant a governmental authorisation, however described, for another person to take an action is not an action for the purposes of the Act. It is generally considered that a government authorisation entails, but is not limited to, the issuing of a license or permit under a legislative instrument. (Sections 523-4 of the EPBC Act)

If a proposed action on Commonwealth land or by a Commonwealth agency is likely to have a significant impact on the environment, it is necessary to make a referral under sections 68 or 71 of the EPBC Act. The Minister is then required to decide whether or not the action needs approval under the Act, and to notify the person proposing to take the action of his or her decision.

In deciding the question of significant impact, section 75(2) of the EPBC Act states that the Minister can only take into account the adverse impacts of an action, and must not consider the beneficial impacts. Accordingly, the benefits of a proposed action are not relevant in considering the question of significant impact and whether or not a referral should be made.

It is possible to obtain an exemption from seeking approval for an action if an accredited management plan is in place. This plan is not an accredited management plan.

Other specific heritage provisions under the Act include:

- the creation of a Commonwealth Heritage List and a National Heritage List; and
- special provisions regarding Commonwealth Heritage and National Heritage (these are discussed below).

The EPBC Act is complex and the implications of some aspects are not entirely clear. Given this situation, and that significant penalties can apply to breaches of the Act, a cautious approach seems prudent.

Commonwealth Heritage Listing

As noted above, this list is established under the EPBC Act. The State Circle Cutting is entered on the Commonwealth Heritage List, as well as being part of the Parliament House Vista conservation area (see Appendix B for the relevant Commonwealth Heritage List place record for the cutting).

Commonwealth Heritage places are protected under certain general provisions of the EPBC Act related to Commonwealth actions and Commonwealth land, and these are described above. In addition, all Commonwealth Government agencies that own or control (eg. lease or manage) heritage places are required to assist the Minister for the Environment and the Australian Heritage Council to identify and assess the heritage values of these places. They are required to:

- develop a heritage strategy;
- develop a register of places under their control that are considered to have Commonwealth Heritage values;
- develop a management plan to manage places on the Commonwealth Heritage List
consistent with the Commonwealth Heritage management principles and management plan requirements prescribed in regulations to the Act; and

• ensure the ongoing protection of the Commonwealth Heritage values of the place when selling or leasing a Commonwealth Heritage place.

The NCA has prepared a heritage strategy which addresses a range of general issues related to heritage places and asset management systems.

Guidelines for management plans prepared by the Department of the Environment are available and have been used in the preparation of this plan (DEH 2006). This plan has been developed consistent with the requirements of the Act, and Appendix H records how this heritage management plan complies with the various EPBC Act requirements.

This plan takes into account the existing Commonwealth Heritage values of the cutting, and provides for the conservation of formally identified attributes. To the extent that the plan provides a better understanding of the heritage values of the site, it generally encompasses the existing Commonwealth Heritage values and expands or extends the values. A table in Appendix H notes the policies and strategies which are relevant to the conservation of the attributes.

A summary of the statutory and other heritage listings relevant to the cutting is provided in the following table.

Table 2. Heritage Listings relevant to the State Circle Cutting				
List and Places	Listing Body and Implications			
Commonwealth Heritage List				
State Circle Cutting Parliament House Vista	Minister for Sustainability, Environment, Water, Population and Communities.			
	Places are subject to statutory protection and other measures under the EPBC Act 1999.			
ACT Heritage Register				
State Circle Cutting (nominated)	ACT Heritage Council. Although a statutory list with protective powers, no such powers would apply in this case as the place is only nominated. In any event, listing would not directly invoke the protective powers, though it may do so indirectly through the powers exercised by the National Capital Authority in accordance with Chapter 10 of the National Capital Plan.			
National Trust of Australia (ACT) List of Classified Places				
State Circle and Capital Hill unconformity	National Trust of Australia (ACT).			

Table 2. Heritage Listings relevant to the State Circle Cutting	
List and Places	Listing Body and Implications
	Community listing with no statutory provisions.

5.3 STAKEHOLDERS

There are several stakeholders with an interest in and concern for the State Circle Cutting. These include the:

- users of and visitors to the area, including students;
- Commonwealth department responsible for heritage, currently the Department of the Environment;
- Australian Heritage Council;
- ACT Heritage Council;
- Geological Society of Australia; and
- National Trust of Australia (ACT).

The interests of a few of these stakeholders are related to legislation which is separately described above. The following text provides a brief description of the interests of the other stakeholders listed.

The National Capital Authority as the managing agency for the cutting and its interests are discussed in the following section.

Users and visitors

The cutting appears to attract a range of users and visitors who come to it for sight-seeing, tourism and education reasons. General issues likely to be of concern include:

- access to interpretive materials;
- access for users and visitors, including by public and private transport, by car and bus, and including safe access to the cutting, and access between the cutting and the viewing platform;
- parking for users and visitors;
- facilities for users and visitors (eg. toilets and food outlets);
- coordination in the case of major events (eg. access to the viewing platform is occasionally restricted by events in Federation Mall); and
- developments or adjacent developments affecting the cutting, including constructionphase impacts.

In addition, State Circle is a significant thoroughfare for commuters passing through the

area, including by car, bike and walking. While information about their interests have not emerged through the research, it is assumed commuters have at least a utilitarian interest in State Circle associated with travel, perhaps coupled with an appreciation of the aesthetic qualities of the cutting.

ACT Heritage Council

The ACT Heritage Council is the ACT Government's principal advisory and decisionmaking body established under ACT legislation. While it has no statutory role in the case of the cutting, it maintains a broad interest in the heritage of the ACT, and there is a nomination of the cutting for the ACT Heritage Register.

Geological Society of Australia

The Geological Society of Australia is a non-profit organisation which aims to promote, advance and support Earth sciences in Australia. Key strategies are to:

- cater for a wide diversity of members;
- influence the decision making processes of government, particularly to support geoscience research and teaching;
- encourage and promote wider community awareness and application of Earth sciences; and
- provide media and forums for communication in the Earth sciences.

The Society 's members represent all Earth science professions.

The Society has a Division in each state and territory, including the ACT. Specialist Groups cater to different sectors of the Earth sciences. The GSA (ACT Division) has a Geological Heritage Sub-committee.

The Society has been active over many years in promoting the conservation of the State Circle Cutting, and in education related to it. For example, the cutting is used in tours of geological sites in the region, and a copy of an information leaflet prepared by the Society about the cutting is reproduced at Appendix C. It is also promoting the use of the cutting in science education, including with individual high schools and colleges, and as a case study in the Teacher Earth Science Education Program.

The Society has a range of concerns related to the cutting:

- about the state of the cutting and its surrounding infrastructure and vegetation, and the need to ensure adequate funding for the site;
- parking in the vicinity; and
- the need to upgrade the interpretive signage.

The Society considers the cutting to be of international significance.

National Trust of Australia (ACT)

The Trust is a community-based heritage conservation organisation. It maintains a register of classified places, and generally operates as an advocate for heritage conservation. Listing on the Trust's register carries no statutory power, though the Trust is an effective public advocate in the cause of heritage.

The Trust has classified the cutting as part of the place – State Circle and Capital Hill unconformity.

The Trust is keenly interested in developments which might have an impact on the site itself.

5.4 MANAGEMENT CONTEXT, REQUIREMENTS AND ASPIRATIONS

This section deals with:

- current NCA management structure and systems;
- uses and users of the cutting;
- interpretation;
- management issues; and
- future requirements and aspirations.

Current NCA management structure and systems

The State Circle Cutting is generally the responsibility of and managed by the National Capital Authority.

General management framework

The NCA is an Australian Government statutory authority established under the *Australian Capital Territory (Planning and Land Management) Act 1988.* This Act is briefly described in the legislation section above, especially with regard to the *National Capital Plan* and the development control role of the NCA.

The NCA undertakes design, development and asset management for some of the National Capital's most culturally significant landscapes and national attractions, including the State Circle Cutting, as well as for other assets located on National Land. In managing these assets the NCA must ensure that they are created, maintained, replaced or restored to:

- enhance and protect the unique qualities of the National Capital; and
- support activities and events which foster an awareness of Canberra as the National Capital.

The NCA has an asset management strategy linked to its corporate plan and operational activities. The strategy:

• provides the framework for the NCA's decision-making about the creation of new assets and the care of existing assets; and

• guides decision-making about the level and standard of care required for assets.

In managing its assets, the NCA aims to ensure that maintenance and other practices are consistent with the design intent, and support the objectives of the *National Capital Plan*.

The NCA has a management structure relevant to the State Circle Cutting. In the 2011-12 financial year the NCA's overall expenditure was \$17.2 million and it had 59 employees.

Day-to-day management, operation and maintenance

The National Capital Estate Unit has responsibility for all aspects of asset management on National Land. This includes:

- estate development and renewal;
- asset management; and
- venue management.

The Estate Development and Renewal team delivers the NCA's Capital Works Program. These works include regular maintenance, works to enhance or protect national assets, construction of public infrastructure, and development of the landscape settings for new building sites, public parks and places, commemoration and celebration.

The Estate Management team has responsibility for the maintenance and management of the State Circle Cutting. The site is maintained under contracts for various components or classes of work, and relate to the:

- landscape (irrigation systems, hard surfaces, plants, lawn and garden areas); and
- cleaning.

Works approval

The Development Assessment & Heritage team has a role in providing works approval under the *National Capital Plan*, as discussed in Section 5.2 above.

Heritage management plans

Another layer of management guidance for significant places relevant to the cutting are heritage management plans. The relevant plan is for the Parliament House Vista (Marshall and others 2010), which includes the cutting.

The guidance provided in this plan has been taken into account in the development of conservation policies and strategies in Section 6.3 below, with the aim of achieving consistency and compatibility.

Uses and users of the State Circle Cutting

The cutting area is used by a range of users for a range of uses, and these are described in the preceding section about stakeholders. There are individuals and groups who are tourists, students or commuters.

Interpretation

The State Circle Cutting has limited interpretation in the form of a bronze plaque mounted

at the viewing platform on the south side of State Circle, overlooking the cutting. The plaque is somewhat out of date, as it shows the upper face of the cutting prior to its removal and replacement by a landscaped battered slope. This platform is also somewhat hidden and unless visitors know about it, they are not likely to find it.

As noted above, the cutting is also interpreted by others, notably the Geological Society of Australia.

In addition, this site can be observed by many thousands of people each day and while they may not have a detailed understanding of what it is and represents, it does provide observers with some clues about the geology of Canberra and the geological processes that have resulted in the present day landscape.

Key management issues

The geotechnical assessment undertaken for this report found,

'In summary, there does not appear to any geotechnical hazards on the slope which could present an unacceptable level of risk to passing traffic or infrastructure. However, fallen rock will continue to present a hazard to cyclists who use the footpath along the batter toe.

Furthermore, it is expected that a relatively limited scope of remedial work would be required to repair the weathered sections of the batter face, to provide the necessary protection to the batter face from the elements, and to reduce the requirement for on-going maintenance for some years to come.'

Further details are provided in Section 2.2 above and in Appendix I.

The range of management issues relating to the cutting include:

- weed management, especially on the cutting face;
- water management, including maintenance of the drainage system, irrigation design and management, surface water flowing over the cutting face, and water flowing through the face;
- erosion, including rock falls onto the footpath and roadway;
- visitor damage to the cutting face;
- traffic and pedestrian safety, and the desirability of extending the length and increasing the height of the kerb at the toe of the cutting;
- access for visitors, including by public and private transport, by car and bus, and including safe access to the cutting, and access between the cutting and the viewing platform;
- parking for visitors;
- facilities for visitors (eg. toilets, water points and rest places);
- interpretation;
- signage, including tourism and interpretive signs;
- the out of date plaque at the viewing platform; and

• construction-phase impacts.

Another issue to arise is the depth of the geological feature which should be protected. The current heritage listing appears only to protect the exposed face of the cutting, involving no depth of the feature beyond. The best option would be to protect a depth from the face of the cutting to the top of the battered slope above the cutting, about 3.7 metres.

Finally, given the Geological Society of Australia has identified the cutting as a site of international geological significance, the NCA could consider investigating and encouraging its National Heritage Listing.

5.5 CONDITION AND INTEGRITY

The State Circle Cutting is in fair to good condition, and displays high integrity. There is minor erosion/instability of the cutting face. More details about the condition of the cutting are provided in Section 2.2 above and in Appendix I.

The drainage system in the bench above the cutting is in poor condition, being partly overgrown by ground cover plants, partly blocked by debris, and the stormwater system connection is blocked at the western end. The gutter at the toe of the cutting is also partly blocked by debris. Mounds of erosion debris have also accumulated at the toe of the cutting in places. There is one loose stone in the stone capping.

In this report, condition relates to the state of an attribute, often the physical state – for example an original gravel path which is badly eroded would be a condition issue. Integrity relates to the intactness of the attribute – for example a modern cobblestone path replacing an original gravel path might be an integrity issue irrespective of its condition. It is often useful to distinguish between these matters, especially as integrity relates closely to significance.

6. CONSERVATION POLICY AND IMPLEMENTATION STRATEGIES

6.1 **OBJECTIVE**

The objective of this policy is to achieve the conservation of the natural heritage significance of the State Circle Cutting.

6.2 **DEFINITIONS**

The definitions for terms used in this report are those adopted in the *Australian Natural Heritage Charter* (Cairnes 2002), a copy of which is provided at Appendix G. Key definitions are provided below.

Place means a geographically defined site or area with associated natural features of *biodiversity*, *geodiversity* and *ecological processes*.

Natural significance means the importance of *ecosystems, biodiversity* and *geodiversity* for their existence value or for present or future generations, in terms of their scientific, social, aesthetic and life-support value.

Geodiversity means the natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes. *Geodiversity* includes evidence of the past life, *ecosystems* and environments in the history of the earth as well as a range of atmospheric, hydrological and biological processes currently acting on rocks, landforms and soils.

Conservation means all the processes and actions of looking after a *place* so as to retain its *natural significance* and always includes *protection, maintenance* and *monitoring*.

Protection means taking care of a *place* by managing impacts to ensure that *natural significance* is retained.

Maintenance means the continuous protective care of the *biodiversity* and *geodiversity* of a place.

Monitoring means ongoing review, evaluation and assessment to detect changes in the *natural integrity* of a *place*, with reference to a baseline condition.

6.3 CONSERVATION MANAGEMENT POLICY AND IMPLEMENTATION STRATEGIES

The following table provides an index to the policies and strategies for the State Circle Cutting, organised according to the major categories of:

- general policies;
- liaison;
- geological feature;
- setting;
- use;
- new development;
- interpretation;
- unforeseen discoveries;
- keeping records; and
- further research.

The table also gives an indication of the priority for the policies and strategies, and a timetable for their implementation. After the table are the policies and strategies.

Table 3. Policy and Strategy Index, Priority and Implementation Timetable					
Number	Policy Title	Strategies	Priority	Timetable	
General Po	licies				
Policy 1	Significance the basis for management, planning and work		High	Ongoing	
Policy 2	Adoption of the Australian Natural Heritage Charter		High	Ongoing	
Policy 3	Adoption of policies	3.1 Priority and implementation timetable	High	On finalisation of the plan	
Policy 4	Planning documents for or relevant to the State Circle Cutting		High	As needed	
Policy 5	Compliance with legislation	5.1 ManageCommonwealth Heritagevalues5.2 Compliance withEPRC Act provisions	High High	Ongoing As needed	
		EFDC ACI provisions			

Table 3. Policy and Strategy Index, Priority and Implementation Timetable				
Number	Policy Title	Strategies	Priority	Timetable
		5.3 Boundary issues	Medium	6/2014
		5.4 Non-compliance	Medium	As needed/ ongoing
Policy 6	Expert heritage conservation advice		Medium	As needed
Policy 7	Decision making process for works or actions	7.1 Process	High	As needed
		7.2 Log of actions	High	6/2014
		7.3 Criteria for prioritising work	Medium	As needed
		7.4 Resolving conflicting objectives	Medium	As needed
		7.5 Annual review of implementation	High	Annually
Policy 8	Review of the management plan	8.1 Reasons to instigate a review	Medium	In 5 years or as needed
Liaison				
Policy 9	Relationship with DoE	9.1 Provide HMP to DoE	High	12/2013
Policy 10	Relationship with other stakeholders	10.1 List of stakeholders	Medium	Ongoing
		10.2 Informing stakeholders	High	As needed
Geological	Feature			
Policy 11	Conservation of geological feature	11.1 Stabilisation work	Medium	12/2014
Policy 12	Maintenance planning and works	12.1 Review of existing maintenance planning	High	6/2014
		12.2 Maintenance and monitoring	High	Ongoing
		12.3 Maintenance actions	As indicated in Appendix E	As indicated in Appendix E
		12.4 Maintenance schedule	High	12/2013
Policy 13	Upgrading and adaptation works		Medium	As needed
Policy 14	Condition monitoring	14.1 Monitoring	High	7/2014
		14.2 Reporting by contractors	High	12/2013
Setting				
Policy 15	Maintenance of an appropriate setting for the	15.1 Visitor safety barrier	High	As needed

Table 3. Policy and Strategy Index, Priority and Implementation Timetable					
Number	Policy Title	Strategies	Priority	Timetable	
	cutting				
Use of the S	Site				
Policy 16	Use of the cutting	16.1 Parking	Medium	12/2014	
New Develo	opment		·	·	
Policy 17	New development		High	As needed	
Interpretat	ion				
Policy 18	Interpreting the	18.1 Interpretive strategy	High	12/2014	
	significance of the State Circle Cutting	18.2 Review of strategy	High	At least every 5 years	
Unforeseen	Discoveries				
Policy 19	Unforeseen discoveries or disturbance of heritage components		High	As needed	
Keeping Ro	Keeping Records				
Policy 20	Records of intervention and maintenance	20.1 Records about decisions	Medium	Ongoing	
		20.2 Records about maintenance and monitoring	Medium	Ongoing	
		20.3 Summary of changes in heritage register	Medium	Ongoing	
Further Research					
Policy 21	Addressing the limitations of this management plan		Low	As the opportunity arises	

General policies

Policy 1 Significance as the basis for management, planning and work

The statement of significance set out in Chapter 4 will be a principal basis for management, future planning and work affecting the State Circle Cutting.

Policy 2 Adoption of the Australian Natural Heritage Charter

The conservation and management of the cutting should be carried out in accordance with the principles of the Australian Natural Heritage Charter (Cairnes 2002), and any revisions of the Charter that might occur in the future.

Policy 3 Adoption of policies

The policies recommended in this heritage management plan should be endorsed as a primary guide for management as well as future planning and work for the cutting.

Implementation Strategies

3.1 The NCA will adopt the priority and implementation timetable for policies and strategies which is indicated in Table 3.

Policy 4 Planning documents for or relevant to the State Circle Cutting

All planning documents developed for the cutting should refer to this heritage management plan as a primary guide for the conservation of its heritage values. The direction given in those documents and in this plan should be mutually compatible.

Commentary: An example would be the heritage management plan for the Parliament House Vista, which will be reviewed in future.

Policy 5 Compliance with legislation

The NCA must comply with all relevant legislation and related instruments as far as possible, including the:

- Australian Capital Territory (Planning and Land Management) Act 1988; and
- Environment Protection and Biodiversity Conservation Act 1999.

In addition, it must comply with relevant subsidiary requirements arising from this legislation.

Implementation Strategies

5.1 The NCA will manage the formal Commonwealth Heritage values of the State Circle Cutting consistent with the requirements of the EPBC Act.

Commentary: The overall suite of policies and strategies in this plan help achieve this strategy.

5.2 The NCA will seek to comply with the provisions of section 341S of the EPBC Act and the related regulations to:

- publish a notice about the making, amending or revoking of this plan;
- advise the Minister for the Environment about the making, amending or revoking of this plan; and

• seek and consider comments.

5.3 The NCA will consult with the Commonwealth Department responsible for heritage (currently the Department of the Environment) about the apparent need for, and process to review the appropriateness of the current boundaries for the cutting.

Commentary: It is apparent the current boundaries of the Commonwealth Heritage listed area may not be the most appropriate to fully capture the significance of the cutting, and that some depth to the cutting should be included. The suggested depth is 3.7 metres.

5.4 Where the NCA is not able to achieve full compliance with relevant legislation, the non-complying aspect will be noted and the reasons for this situation appropriately documented.

Policy 6 Expert heritage conservation advice

People with relevant expertise and experience in the management or conservation of heritage sites, in particular geoheritage sites, should be engaged for the:

- provision of advice on the resolution of conservation issues; and
- for advice on the design and review of work affecting the significance of the cutting.

Policy 7 Decision making process for works or actions

The NCA should ensure that it has an effective and consistent decision-making process for works or actions affecting the cutting which takes full account of the heritage significance of the site. All such decisions should be suitably documented and these records kept for future reference.

Implementation strategies

- 7.1 The process will involve:
 - early consultation with internal and external stakeholders relevant to the particular decision, including consideration of the values held by associated communities not able to be directly consulted;
 - an understanding of the original and subsequent character, and later changes to the area involved;
 - documentation of the proposed use or operational requirements justifying the works or action; and
 - identification of relevant statutory obligations and steps undertaken to ensure compliance.

7.2 The NCA will consider maintaining a log of decisions with cross-referencing to relevant documentation.

7.3 Where some work is not able to be undertaken because of resource constraints, work will be re-prioritised according to the following criteria to enable highest priority work to be undertaken within the available resources. Prioritising work to heritage components or elements will be decided on the basis of:

- in general terms, the descending order of priority for work will be protection, maintenance, reinstatement, enhancement or modification, where such work is appropriate. However, this priority order may be influenced by conditions attached to funding (eg. government decisions may tie funding to particular works);
- work related to alleviating a high level of threat to significant aspects, or poor condition will be given the highest priority followed by work related to medium threat/moderate condition then low threat/good condition; and
- the level of threat/condition will be considered in conjunction with the degree of significance (for example aspects in poor condition and of moderate significance might be given a higher priority compared to aspects of moderate condition and high significance).

7.4 If a conflict arises between the achievement of different objectives, the process for resolving this conflict will involve:

- reference to the conflict resolution process outlined in the NCA's Heritage Strategy;
- implementation of a decision-making process in accordance with Policy 7;
- compliance with the Australian Natural Heritage Charter;
- possibly involving heritage conservation experts in accordance with Policy 6;
- possibly seeking the advice of the Department of the Environment; and
- possibly seeking advice from the Minister consistent with the normal provisions of the EPBC Act.

Commentary: The outcome of this process may be a matter to be recorded in the NCA's Heritage Register.

7.5 The implementation of this plan will be reviewed annually, and the priorities reassessed depending on resources or any other relevant factors. The review will consider the degree to which policies and strategies have been met or completed in accordance with the timetable, as well as the actual condition of the place (Policy 14). The Criteria for Prioritising Work (Strategy 7.3) will be used if resource constraints do not allow the implementation of actions as programmed.

Policy 8 Review of the heritage management plan

This management plan will be reviewed:

- once every five years, consistent with section 341X of the EPBC Act; and
- to take account of new information and ensure consistency with current management circumstances, again at least every five years; or
- whenever major changes to the place are proposed or occur by accident (such as natural disaster); or
- when the management environment changes to the degree that policies are not appropriate to or adequate for changed management circumstances.

Implementation Strategies

8.1 The NCA will undertake a review of the management plan if it is found to be out of date with regards to significance assessment, management obligations or policy direction.

Commentary: Heritage management planning for areas which are part of, include or are adjacent to the cutting may lead to changed circumstances and a need to review this plan (eg. in the case of the Parliament House Vista).

Liaison

Policy 9 Relationship with the Commonwealth Department responsible for Heritage The NCA will maintain regular contact with this department, including informal consultations where appropriate, and formally refer any action that potentially impacts on any heritage values or places as required by the EPBC Act, and any amendments to this Act.

Implementation Strategies

9.1 The NCA will provide a copy of this plan to the Commonwealth department responsible for heritage, for consideration of possible amendments to the Commonwealth Heritage listing, to better align that listing with the plan.

Policy 10 Relationship with other stakeholders

The NCA will seek to liaise with other relevant stakeholders, including community and professional groups, on developments affecting the site. It will seek to actively consult prior to decisions directly impacting on the significance of the cutting.

Consultation and planning processes should be open/transparent, well-communicated, and able to be understood by stakeholders.

Commentary: Refer to Strategy 7.1.

Implementation Strategies

10.1 The NCA will maintain a list of relevant stakeholders and the scope of their interests.

Commentary: The stakeholders listed in Section 5.3 are relevant stakeholders which will be included in the proposed list.

10.2 Periodically or as developments are proposed, the NCA will seek to inform stakeholders of activities in a timely fashion and provide them with an opportunity to comment on developments.

Commentary: To some extent, consultation mechanisms under the EPBC Act may provide one mechanism for such consultation. However, an earlier, more proactive and iterative mechanism would seem more desirable.

Geological feature

Policy 11 Conservation of the geological feature

The State Circle Cutting will be conserved, including a depth of the geological feature from the existing cutting face to the top of the batter above the bench (a depth of 3.7 metres). The protective works above the cutting will be maintained (eg. the stone coping and concrete drain).

If the opportunity arises, consideration should be given to re-exposing the geological feature above the bench.

Commentary: Prior to the Parliament House road and bridge works in the 1980s, the upper face of the cutting was exposed. While considered of lesser significance, it is none the less an important part of the overall feature.

Implementation Strategies

11.1 As necessary, stabilise small sections of the cutting face as indicated in Appendix F.

Policy 12 Maintenance planning and works

The State Circle Cutting will be well maintained and all maintenance and repair work should respect the significance of the site. Maintenance and repair will be based on a maintenance plan that is informed by:

- a sound knowledge of the site and its heritage significance; and
- regular inspection/monitoring.

It will also include provision for timely preventive maintenance and prompt repair in the event of damage or breakdown.

Implementation Strategies

12.1 The NCA will review existing maintenance planning to ensure consistency with this management plan, including to address weed growth on the cutting face.

12.2 The NCA will ensure maintenance planning is periodically informed by a monitoring program (refer to Policy 14).

12.3 The maintenance actions identified in Appendix E should be addressed according to the priority indicated.

12.4 The NCA will implement the maintenance schedule at Appendix F.

Policy 13 Upgrading and adaptation works

The NCA will replace or upgrade fabric and services, or undertake adaptation works as required by their condition or changed standards. Such works will not compromise significance unless there is no alternative, in which case every effort will be made to minimise the impact on significance.

Commentary: Adaptation in this plan involves no, or minimal impact on significance.

Policy 14 Condition monitoring

The condition of site will be monitored on an ongoing basis. This will be distinct from maintenance but should be linked to it for implementation. The information gained will identify components experiencing deterioration, which should in turn inform maintenance planning.

Implementation Strategies

14.1 The NCA will develop and implement monitoring to identify changes in the condition of the site (eg. weathering and stability of the cutting, and weed growth). Priority will be given to vulnerable or fragile components.

14.2 Mechanisms will be put in place to ensure timely reporting by maintenance contractors to a coordinating officer with overall responsibility for the maintenance of the cutting.

Setting

The policies in this section apply to the area around the cutting itself.

Policy 15 Maintenance of an appropriate setting for the cutting

An appropriate setting for the cutting should be maintained, including its generally open character allowing views to the cutting face, and without buildings, structures or fixtures.

Every effort should be made to avoid any street signs in front of the cutting.

Commentary: The current setting is adequate.

Implementation Strategies

15.1 Should a visitor safety barrier along State Circle prove necessary, it should be carefully designed to be as unobtrusive and as low as possible, maximising exposure of the cutting face.

Commentary: Previous suggestions have been made to install a visitor safety barrier along State Circle to prevent people accidentally walking out onto the road to view the cutting. The actual need for such a barrier has not been explored or demonstrated, but none the less may be possible if it is necessary.

Use of the site

Policy 16 Use of the cutting

The primary use of the cutting should be as a geological heritage site, accessible and visible to visitors.

Rock climbing on the face should not be permitted because of possible damage to the cutting face.

Commentary: The uses of the setting for the cutting are for vehicle transport, pedestrians and bicyclists, and these are compatible with the primary use.

Implementation Strategies

16.1 The NCA should review short-term parking opportunities in the vicinity of the

cutting, to facilitate visitor access.

New development

Policy 17 New development

No new buildings, structures or fixtures should be attached to cutting, or located on the bench above the cutting.

Commentary: See the section above related to the setting regarding new development in the vicinity of the cutting.

Interpretation

Policy 18 Interpreting the significance of the State Circle Cutting

The significance of the site will be interpreted to the range of visitors who use the area, and to NCA staff responsible for the site in any way. This interpretation will include reference to the broader setting.

Implementation Strategies

18.1 The NCA will develop and implement a simple interpretive strategy considering the range of possible messages, audiences and communication techniques. The interpretation will focus on the heritage values of the site, the connection to the Parliament House unconformity, and also to encourage respect for the fragile nature of the site (eg. to not damage or climb on the cutting).

Audiences will include the local Canberra community, visitors, school children, as well as Australians living in other parts of the country.

Commentary: Limited interpretation is already provided by the NCA by a plaque at the nearby viewing platform, although this is now out of date. The Geological Society of Australia has also prepared interpretive material. Additional options might include:

- updating the existing interpretive plaque, and providing additional direction for visitors to help find the viewing platform (eg. such as by reference in the existing Parliamentary Zone interpretation signs in Federation Mall);
- additional interpretation panels, subject to careful design and siting, such as at viewing points on nearby bridges and adjacent to the cutting face;
- signage in the area and other techniques to encourage recognition of the existence of the cutting;
- including the cutting as part of one of the existing self-guided walks;
- including information in visitor information provided by Parliament House;
- providing a stand-along visitor brochure, available from the National Capital Exhibition and elsewhere; and
- inclusion of information on the NCA's website and in *The Canberra Guide* smartphone application.

Coordination with the Department of Parliamentary Services and Geological Society of Australia is also highly desirable, including the possibility of sharing interpretation of the cutting.

Refer to the Parliament House Vista heritage management plan regarding new signage.

18.2 The interpretive strategy will be periodically reviewed as part of the review of this management plan (see Policy 9).

Unforeseen discoveries

Policy 19 Unforeseen discoveries or disturbance of heritage components

If the unforeseen discovery of new evidence or the unforeseen disturbance of heritage fabric or values requires major management or conservation decisions not envisaged by this heritage management plan, the plan will be reviewed and revised (see Policy 9).

If management action is required before the management plan can be revised, a heritage impact statement will be prepared that:

- assesses the likely impact of the proposed management action on the existing assessed significance of the site;
- assesses the impact on any additional significance revealed by the new discovery;
- considers feasible and prudent alternatives; and
- if there are no such alternatives, then considers ways to minimise the impact.

If action is required before a heritage impact statement can be developed, the NCA will seek relevant expert heritage advice before taking urgent action.

Urgent management actions shall not diminish the significance of the site unless there is no feasible and prudent alternative.

Commentary

Unforeseen discoveries may be related to location of new documentary or physical evidence about the site or specific heritage values that are not known at the time of this report, and that might impact on the management and conservation of the site. Discovery of new heritage values, or the discovery of evidence casting doubt on existing assessed significance would be examples.

Discovery of potential threats to heritage values may also not be adequately canvassed in the existing policies. Potential threats might include the physical deterioration of fabric.

Unforeseen disturbance might be related to accidental damage to fabric, or disastrous events.

Such actions may be referable matters under the EPBC Act.

Keeping records

Policy 20 Records of intervention and maintenance

The NCA will maintain records related to any substantial intervention or change in the site, including records about maintenance.

Commentary: Refer to the NCA's Heritage Strategy and heritage register regarding provisions about records.

Implementation strategies

20.1 The NCA will retain records relating to actions taken in accordance with Policy 7 – Decision making process for works or actions.

20.2 The NCA will retain copies of all maintenance plans prepared for the site, including superseded plans, and records about monitoring. (Refer to Policies 12 and 14)

20.3 A summary of substantial interventions, changes and maintenance will be included in the NCA heritage register entry for the site, including a reference to where further details may be found.

Further research

Policy 21 Addressing the limitations of this management plan

Opportunities to address the limitations imposed on this study (see Section 1.4) should be taken if possible, and the results used to revise the management plan.

6.4 IMPLEMENTATION PLAN

Responsibility for implementation

The person with overall responsibility for implementing this management plan is the person holding the position of Chief Executive, National Capital Authority.

Commitment to best practice

The NCA is committed to achieving best practice in heritage conservation, in accordance with its legislative responsibilities and Government policy, and in the context of its other specific and general obligations and responsibilities. This is reflected in the preparation of this management plan and in the adoption of:

- Policy 1 Significance the basis for management, planning and work;
- Policy 2 Adoption of the Australian Natural Heritage Charter; and
- Policy 6 Expert heritage conservation advice.

Works program

Refer to Strategy 3.1 and Table 3 in the preceding section. This includes policies and strategies which refer to Appendix E – Priority Works and Appendix F – Maintenance Schedule.

Criteria for prioritising work

See Strategy 7.3.

Resolving conflicting objectives

See Strategy 7.4.

Annual review

Refer to Strategy 7.5.

Resources for implementation

It is difficult to be precise about the budget for maintenance of the State Circle Cutting because funding details are not kept for just the study area. Accordingly, it is not currently possible to isolate the maintenance budget for just this area.

None the less, funding has been provided in previous years in a range of categories relevant to the cutting, including:

- maintenance of civil infrastructure on National Land;
- open space maintenance; and
- irrigation water.

As noted in Section 5.4, the NCA has staff who undertake management of the maintenance

contracts, interpretation planning, new works planning, functions management, and the NCA otherwise uses contractors to undertake actual maintenance. These staff and contractors will, to some extent, be involved in implementing aspects of this plan.

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APPENDIX A: PROJECT BRIEF EXTRACTS

The following are relevant extracts from the project brief.

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The Goods and/or Services

The Commonwealth is seeking offers for the preparation of a Heritage Management Plan for State Circle Cutting.

1.0 Introduction

The NCA, a Commonwealth Agency, manages the State Circle Cutting, an exposed rock face on the northern side of State Circle between Commonwealth Avenue and Kings Avenue, Parkes. It is listed on the Commonwealth Heritage List as State Circle Cutting Place ID 105733.

The State Circle Cutting (along with the Capital Hill unconformity beneath Parliament House) is considered by the Geological Society of Australia as an outstanding exposure of an important folding event. The sandstone rafts, ripple marks and a pallid zone, reveal the varied environments that existed in the region during the Ordovician (approx. 460-440 million years ago) and Silurian (approx. 440-420 million years ago) geological periods. Marine fossil graptolites found during the excavation of the cutting indicated that the deposits were laid down in a deep oceanic environment. It is only one of two sites in the ACT listed by the Geological Society of Australia as being of international significance.

The original State Circle Cutting was excavated between 1969 and 1971, and produced cuttings at two levels. The lower cutting forms a steep, almost vertical rock face up to 6 metres high. The upper rock face rose less steeply to a height of up to 7 metres. The cutting at the upper level was partly removed during the construction of the two bridges and roads for the new Parliament House. Only the lower part of the original cutting remains exposed today.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) s341S(1) requires Commonwealth Agencies to make a written plan to protect and manage the Commonwealth Heritage values of a Commonwealth Heritage place it owns or controls.

A Heritage Management Plan does not exist for the site.

2.0 Project Purpose and Scope of Works

The purpose of the project is to prepare a:

- Heritage Management Plan for the State Circle Cutting;
- Conservation and Maintenance Works Program; and
- Public Consultation Report.

2.1 Heritage Management Plan

The HMP must meet the requirement of the *EPBC Act* and be consistent with the Commonwealth Heritage Management Principles. The HMP will be submitted to the Commonwealth Department responsible for heritage for review and endorsement.

The required components of a Heritage Management Plan for a Commonwealth Heritage place is defined by the *EPBC Act* and set out under Schedule 7A of the EPBC Regulations 2003 (No. 1). A guide for preparing Heritage Management Plans for a Commonwealth Heritage place is available on the Department of the Environment's website:

Management Plans for Places on the Commonwealth Heritage List: A guide for Commonwealth Agencies (Department of Environment and Heritage, 2006).

2.2 Conservation & Maintenance Works

The combination of natural weathering, the vibrations created by the high volume of traffic flow on State Circle and the removal of plantings along the upper level cutting has resulted in the partial destabilisation and erosion of the outcrop.

The Consultant will be required to assess the stability of the cutting and provide measures to ensure its long term conservation and management. These recommendations must be sufficiently detailed so that the information can be used for project briefs and specifications. General costings are needed to guide the NCA's budget estimates. A Cyclical Maintenance Schedule is also required. This should be presented in a clear, user friendly and easily read format.

The project team should possess appropriate skills and experience in assessing and conserving geological formations/features.

2.3 Public Consultation

The NCA will seek public comment on the draft heritage management plan. This will include consultation with stakeholders and the general public information session. The Consultant will be required to make a presentation at a public information session (to be organised by the NCA). This will be a daytime event on a week day. Any comments received will be forwarded to the Consultant, to be addressed in a Public Consultation Report.

3.0 Study Area

The HMP study area includes the State Circle Cutting. It is located immediately adjacent to traffic lanes in State Circle at Capital Hill between Commonwealth Avenue and Kings Avenue. The road cutting is approximately 320 metres in length, and is visible on two levels extending up to 6 metres and 7 metres respectively.

•••

Standards and Best Practice

The preparation of the HMP should be guided by:

Management Plans for Places on the Commonwealth Heritage List: A guide for Commonwealth Agencies (Department of Environment and Heritage, 2006)

Working Together: Managing Commonwealth Heritage Places. A guide for Commonwealth Agencies (Department of the Environment, Water, Heritage and the Arts, 2008).

Copies of these guidelines are available on the Department of the Environment's website.

APPENDIX B: COMMONWEALTH HERITAGE LIST PLACE Record

State Circle Cutting, State Ccl, Parkes, ACT, Australia

List Commonwealth Heritage List

Class Natural

Legal StatusListed place (03/06/2005)

Place ID 105733

Place File No 8/01/000/0041

Summary Statement of Significance

State Circle Cutting, along with Capital Hill unconformity beneath Parliament House, is ranked by the Geological Society of Australia as being of high significance as an outstanding exposure of an important folding event. State Circle Cutting is an important teaching locality for the interpretation of the early geology of the Canberra region, and the site is also of geological interest in interpreting the geological history of adjacent areas in eastern Australia.

Official Values

Criterion A Processes

The unconformity at the State Circle Cutting is a significant geological feature, and along with the nearby Capital Hill feature, provide keys to the interpretation of the ancient geological landscape in the Canberra region. It is one of only two sites in the ACT listed by the Geological Society of Australia as being of international significance (Cochrane & Joyce 1986, Owen et al. 1988).

Other geological features at the site include sandstone rafts, ripple marks and a pallid zone, all of which are important indicators of the varied environments that existed in the region during the Ordovician (approx. 460 - 440 million years ago) and Silurian (approx. 440 - 420 million years ago) geological periods. Structural features, such as folds and faults, point to the nature of the deformation of these rocks. (Mayer 1995, Owen 1987)

The relationships revealed by its excavation in the early 1970's led to a major re-assessment of Ordovician and Silurian geology of the Canberra region (Crook et al. 1973, Owen 1987), and led to the recognition of the Quidongan Movement as a significant tectonic event in southeast New South Wales which resulted in a major mid-Silurian unconformity (Owen 1987).

Criterion B Rarity

The place is one of the few sites that exposes the Early Silurian unconformity. The State Circle Cutting, along with the Capital Hill outcrop beneath Parliament House, represent the only two known sites in the Canberra region which clearly expose the Early Silurian unconformity. As the rock sequences that underlie the unconformity surface are different at each of these two localities, both sites display unique geological exposures. (Mayer 1995)

Criterion C Research

Perhaps the greatest importance of the State Circle Road Cutting lies in its value as a teaching site. The site lends itself to teaching on account of the excellent clarity of the geological features. The site provides the observer with learning opportunities that range from the most simple geological concepts to aspects of a complex nature. This, together with its easy accessibility, makes it an ideal site for observation of

geological features and the study of geological history. It is a perfect illustration of features and concepts taught at tertiary level and it serves as a reference to geological scientists. (Mayer 1995)

The State Circle Cutting is likely to provide further information that will enhance the understanding of the area's natural history through continued research of its strata and the fossils they contain. (Mayer 1995)

Criterion D Characteristic values

The site is a geological benchmark site for the Early to Mid – Silurian age of the Canberra region. (Mayer 1995, Owen 1987), and the site is a notable example of place that provides evidence of ancient geological landscapes and the habitats of now extinct faunas (Mayer 1995)

Criterion H Significant people

The place is associated with the works of A. A. Opik, who was one of the pioneers of geological mapping and the interpretation of geological history in the Canberra region (Mayer 1995).

Description

The State Circle Cutting is located immediately adjacent to traffic lanes in State Circle at Capital Hill between Commonwealth Avenue and Kings Avenue. The road cutting is approximately 320 metres in length. The exposure clearly shows the unconformable contact between the older State Circle Shale, and the younger Camp Hill Sandstone. A number of faults are present in the cutting, and some minor folds can also be seen. The gently folded Camp Hill Sandstone overlies the State Circle Shale, which is slumped and contorted.

Geological context:

430 million years ago a large deep sea covered the Canberra area. Fine grained, silty sediments were deposited in deep water. When compacted they became the rocks of the State Circle Shale. An older sequence of sandstones broke up on an unstable slope and slumped down to the seafloor as large blocks. These blocks can be seen today in the roadcut as pink coloured sandstone rafts surrounded by the lighter brown, finer grained rocks of the State Circle Shale. 425 million years ago the rocks of the State Circle Shale became strongly folded by forces acting within the earth and were uplifted above sea level.

The Canberra area then became dry land. Erosion then wore down the land and shaped the ancient land surface which we can still see in the roadcut as an unconformity. Again the sea flooded the ancient land surface and the sediments of the Camp Hill Sandstone were deposited in shallow water.

After the deposition of the Camp Hill Sandstone on the eroded landsurface, some 420 million years ago, the sequence of rocks was gently folded and uplifted to form dry land again. The sea retreated from the Canberra region and has never returned since. The uplifted land was then eroded down to its present level.

Following the uplift and mild folding of the land a number of fractures or faults developed along which the rocks of the State Circle Shale and the Camp Hill Sandstone were displaced.

Specific features in the cutting:

The State Circle Shale here is formed of mainly siltstone and very fine sandstone which has been strongly contorted by slumping. Marine fossil graptolites were found during excavation of the cutting, the most common species being *Monograptus exiguous*, which confirms the deposits were laid down in a deep oceanic environment, and they also help to indicate the age of the sediments. The age of these rocks has been estimated at approximately 430 million years old, which places them in the Early Silurian Period.

The Camp Hill Sandstone, which is approximately 425-420 million years old, is comprised of fine to coarse quartz sandstone, interbedded with siltstone and silty mudstone. The unit is fossiliferous, with poorly preserved brachiopods, corals and trilobites found during the excavation work.

Sandstone rafts: The presence of large slabs or rafts of sandstone, which are now completely enclosed within the finer grained shale, probably originated when a large packet of sandstone and siltstone layers, resting on a sloping oceanic surface, started to slide towards the deeper parts of the ocean basin. As the

sequence of sediment layers tumbled downslope, the sandstone beds broke up into slabs of various sized and mixed with the finer grained sediments.

Pallid zone: The uppermost 20 to 50 cm thick horizon of the State Circle Shale has a pale, almost white colour, which supports the argument that the plane of the unconformity represented an ancient land surface exposed to weathering.

Ripple marks: The unconformity in the State Circle Cutting marks a geologically short time of just a few million years. This is the time that elapsed between the elevation of the State Circle Shale from the floor of the ocean, its transformation into a hilly land of severely deformed rocks, and its subsequent wearing down by erosion to a low-lying area that could then be reclaimed by the sea.

It was in this younger sea that the Camp Hill Sandstone was deposited. Ripple marks have been preserved on the top surfaces of some of the sandstone layers, and fossils, particularly brachiopod shells of the genus *Rhipidium*, as well as specimens of corals and trilobites, have been found in the Camp Hill Sandstone. The presence of ripple marks and these fossils indicates that the sea was a shallow one.

History Not Available

Condition and Integrity

The original State Circle Cutting, excavated between 1969 and 1971, produced cuts at two levels. The lower of these forms a steep, almost vertical rock face up to 6 meters high. Above this another rock face rose less steeply to a height of up to 7 meters. The cutting of the upper level was partly removed during the construction of the two bridges and roads for the new Parliament House. Subsequent to this work, the remaining part of the upper level cutting was planted with low, dense shrubs as part of the landscaping of the area surrounding the new Parliament House. Only the lower part of the original cutting remains exposed today.

In the 33 years since its excavation, the cutting has suffered relatively little damage. However, a combination of natural weathering, the vibrations created by the high volume traffic flow on State Circle, and, to a lesser extent, the removal of rock samples by the public, has resulted in the partial destabilization of the outcrop. The accumulation of loose material at the base of the rock face provides evidence for this.

Location

The exposed rock face on the northern side of State Circle between Commonwealth Avenue and Kings Avenue, Parkes.

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APPENDIX C: OTHER REFERENCE INFORMATION

C.1 REGISTER OF THE NATIONAL ESTATE NOMINATION – 1995

REGISTER OF THE NATIONAL ESTATE

STATE CIRCLE CUTTING AND CAPITAL HILL UNCONFORMITY

NOMINATED BY:

Classification Committee of the National Trust of Australia (ACT)

STATUS OF PLACE AT NOMINATION:

Register of the National Estate, Registered 01/11/1983 (State Circle Cutting only)

Indicative list of ACT Government Heritage Places Register (State Circle Cutting only)

Classified by the National Trust of Australia (ACT) (State Circle Cutting only)

Listed under: 'Geological Monuments in the Australian Capital Territory' (Owen, 1988), (State Circle Cutting only).

LOCATION OF PLACE:

1. Outcrop in a roadcut on the northeastern side of State Circle between Commonwealth Avenue and Kings Avenue. The rock outcrop at this locality forms the outer perimeter of the ring road over a distance of about 300 meters. Excavations for State Circle between 1969 and 1971 have produced cuts at two levels. The lower of these forms a steep, almost vertical rock face up to 6 meters high. Above this, a level bench, several meters in width, gives way to another rock face rising less steeply to a height of up to 7 meters. The cutting of the upper level was partly removed during the construction of the two bridges and roads connecting the old with the new Parliament House. Subsequent to this work the remaining part of the upper level cutting was planted with low, dense shrubs as part of the landscaping of the area surrounding the new Parliament House. Only the lower part of the original cutting remains exposed today.

The original plan of the design for the road bridge crossing State Circle would have resulted in the removal of the geologically most significant part of the outcrop, including the part that best displays the unconformity, to make room for one of the massive supporting piers of the bridge. Following representations by the Geological Society of Australia, ACT Division, and by the Heritage Commission, the design was altered so as to anchor the bridge support in the rock behind the face of the cutting. This modification, which incurred an additional cost of \$500,000, left the outcrop undisturbed in its entirety.

2. The Capital Hill Unconformity, once prominently exposed at the top of Capital Hill, has been preserved, following site excavations, in the basement of Parliament House. It is exposed in the vertical face of a cut rock bank, about 3 meters in height, which has remained undisturbed since the completion of site work.

DESCRIPTION OF PLACE:

Both the State Circle Cutting and the outcrop below Parliament House display an important and significant geological feature, known as an unconformity. This is a planar surface which separates, with a marked angular discordance, two sedimentary rock units of different character and origin. The presence of an unconformity in these outcrops provides us with a window to the past that reveals glimpses of an earlier world and helps us to understand the geological history of the Canberra region.

Unconformities mark a revolutionary change in the geological history of a region. Their presence may chronicle a remarkable chain of events that bring about the transformation of an oceanic environment to one of dry land, only to see it revert to its former state after a brief interval of geological time.

The powerful tectonic processes that cause such upheavals of the ocean floor also deform and mould the pliable marine strata and and raise them up to form hills and mountains. However, no sooner does land emerge from the sea than it will be subjected to destructive erosion. The slow but persistent breakdown of rocks and the washing away of the resulting detritus eventually wears the land down to a low - lying erosion surface. This may expose the diminished land to flooding by a rising sea in which new sediments will deposit a horizontal sequence of younger strata.

The old land surface now represents the plane of an unconformity which we recognise in the outcrop as a line or a horizon that separates two mismatched sequences of sedimentary rocks lacking conformity in the disposition of their strata.

There is a further significant aspect that is represented by an unconformity. As the land was worn down by erosion a portion of the older rock sequence was removed so that bundles of strata, that may have taken millions of years to deposit, are now missing. This creates a time gap in the sequence. The geological record of that time, of perhaps just a few millions or as many as tens of millions of years, is now represented by a mere thin line in the outcrop, while the concrete evidence for the time elapsed, in the form of rock strata, has been destroyed.

At the site of the State Circle Cutting fine grained rocks with a predominantly pink, purple or buff colour, the State Circle Shale, outcrop below the unconformity at the base of the cutting. The age of these rocks has been estimated at about 425-430 million years which places them in the Early Silurian Period. Close observation of the outcrop reveals that these sedimentary rocks are made up of very thin deformed layers of silt-sized and, sometimes, fine sand-sized grains. Some of the intense bending and twisting in the shale is believed to be due to the dislodgement and slumping of partly consolidated strata down the slope at the margin of an ocean basin. Support for such chaotic movement on the ancient seafloor is present in the outcrop in the form of large slabs or rafts of sandstone, some several meters long, which are now completely enclosed within the finer grained shale. They probably originated when a large packet of interbedded sandstone and siltstone layers, resting on a sloping surface, started to slide towards the deeper parts of the basin. A disturbance, such as an earthquake, may have triggered the movement. As the sequence of sediment layers tumbled downslope the sandstone beds broke up into slabs of various sizes and mixed with the finer grained sediments. The silty rocks, being of a more plastic nature, became strongly twisted and contorted and enveloped the broken sandstone blocks (see attached figure).

During excavation of the cutting, small marine fossils, known as graptolites, were discovered in the 'tate Circle Shale and have helped to confirm the age of these rocks. Graptolites are long extinct life rorms. They had chitinous skeletons made up of single or multiple branches with many tubes or cups that housed the soft parts of the organisms. Most graptolites formed colonies that floated freely in the oceans. They are preserved today, particularly in shales, as flattened films of carbon, up to a few centimetres long. The casual observer might mistake them for pencil marks inscribed on the smooth surface of a rock. The most common graptolite species present in the State Circle Shale is *Monograptus exiguus*.

The uppermost 20 to 50 cm thick horizon of the State Circle Shale, which lies just below the unconformity surface, has a pale, almost white colour and contains small iron concretions. This supports the argument that the plane of the unconformity represented an ancient land surface exposed to weathering. Heavy rainfall may have partly dissolved some minerals and freed the iron they contained. That iron would then have been carried in solution through cracks and pores in the ground to the substrate, there to be reprecipitated in the form of nodules. Some geologists have even suggested that this pallid zone directly below the erosion surface may represent a fossilised soil horizon.

The unconformity in the State Circle Cutting marks a geologically short time gap of just a few million years. This is the time that elapsed between the elevation of the State Circle Shale from the floor of an ocean, its transformation into a hilly land of severely deformed rocks, and its subsequent wearing down by erosion to a low-lying area that could then be reclaimed by the sea.

It was in this younger sea that the Camp Hill Sandstone, the lowermost member of the Canberra Formation, was deposited. This rock sequence, lying above the unconformity in the State Circle Cutting, is made up of alternating layers of reddish to yellow-brown sandstone and grey siltstone. Near its base it also contains a thin horizon of grit or very small pebbles. In contrast to that of the State Circle Shale, the layering in the Camp Hill Sandstone is well developed in strata several centimetres to tens of centimetres thick. Ripple marks have been preserved on the top surfaces of some of the sandstone layers which outcrop in the cutting. Rare fossils, particularly brachiopod shells of the genus *Rhipidium*, as well as specimens of corals and trilobites, have been found in the Camp Hill Sandstone. The presence of ripple marks and the above named fossils indicates that the sea was a shallow one. Some hard bands may represent volcanic ash. Volcanic ash is well represented in the cutting at the important Woolshed Creek site (Fairbairn Avenue) and represents the beginning of a very strong volcanic episode, which accompanied the earth movements subsequent to the unconformity.

The Camp Hill Sandstone, following its deposition in a shallow marine environment, did not escape the effects of a later, but milder, deformation which produced gentle open folds in these rocks. These wavy undulations in the strata of the Camp Hill Sandstone can be followed with ease in the outcrop of the State Circle Cutting. The unconformity surface, which originally would have reflected the relatively flat surface of an eroded land, was itself folded during this later period of deformation.

The outcrop in the State Circle Cutting also displays some good examples of geological faults. These are fracture planes along which adjacent blocks of rocks have moved relative to each other, in either an upward or downward direction. Most of the fault planes in this outcrop are steeply inclined, their traces show up as more or less straight lines of fractures in the cutting. In one or two cases it is possible to determine the movement along these faults by matching identical layers on either side of the fractures and measuring the distance over which the formerly adjacent horizons have been displaced. This shows, for example, that one block of rock to the left of a fault exposed in the cutting has moved down with respect to its neighbour by a distance of 3 to 4 meters.

The second locality cited in this document, the Capital Hill Unconformity outcropping in the basement of Parliament House, is geologically both similar to and different from the exposure in the State Circle Cutting. It displays the same unconformity surface but the pairing of rock units across the erosion surface differs.

The outcrop below Parliament House that includes the trace of the unconformity is only about 6 meters long and 2 to 3 meters high. As in the State Circle Cutting, the thinly bedded sandstones and siltstones beds of the Camp Hill Sandstone member overlie the erosion surface. The layers dip at a gentle angle to the south. Below the unconformity massive, thicker layers, identified as part of the Black Mountain Sandstone, dip in the opposite direction towards the north. This does seem puzzling, given the succession encountered in the nearby State Circle Cutting. However, elsewhere in Canberra geologists have found outcrops which show the State Circle Shale to lie conformably below the Black Mountain Sandstone. This would indicate that the Black Mountain Sandstone, in which no fossils have been found, is younger than the State Circle Shale but older than the Camp Hill Sandstone. As both of the last two formations are of Early Silurian age, the Black Mountain Sandstone, occupying a place between them, can be assigned to that same age interval, approximately between 430 million and 420 million years ago.

The fact that the Black Mountain Sandstone is missing in the State Circle Cutting can be explained by the differing effects of erosion on a landscape. Downcutting at this site, perhaps once the location of an ancient valley, may have been severe enough to have removed the Black Mountain Sandstone completely, while lesser erosive forces left behind remnants of the rock on the higher grounds on Capital Hill.

BACKGROUND:

In 1954, A.A. Opik, in a paper on the geology of the Canberra district, published a description of an unconformity at the summit of Capital Hill. There he identified the thick- bedded Black Mountain Sandstone in unconformable contact with the overlying thinner-strata of the Camp Hill Sandstone. This discovery proved to be one of major significance in the unravelling and understanding of the geological history of the Canberra region and areas beyond.

The importance of the find led to the declaration of the site as one of the first Geological Monuments in the ACT. The protection accorded to the outcrop by this citation had to be revoked when it became necessary to excavate Capital Hill for the construction of the new Parliament House. It was generally assumed by members of the geological community that the unconformity had been buried beneath the concrete floors of the building. It was not until January 1995, when the intact rock sequence, containing the unconformity, at a level 20 meters below its original outcrop, was rediscovered in the basement of Parliament House.

At the time when Öpik carried out his pioneering work, in and around this city, few public works had provided excavations that revealed reliable evidence of the vertical succession of geological formations. Limited and often widely separated natural outcrops, together with only a small number of excavations, provided the sources of information on which interpretations had to be based. His mapping of such outcrops led Öpik to the conclusion that the place of the State Circle Shale in the geological succession was above that of both the Black Mountain Sandstone and the Camp Hill Sandstone. This became the accepted view among Canberra geologists until 1971 when road excavations at the base of Capital Hill clearly showed the State Circle Shale to underlie the Camp Hill Sandstone and, therefore, marked it as the older of the two formations. The clear demonstration of this relationship, described in 1973 by BMR geologist GHM Henderson, has turned the State Circle Cutting into a site of enormous geological significance.

We now have two exposures of the same unconformity but different formations succeed each other in the two outcrops. The site of the State Circle Cutting is by far the most extensive example. The outcrop beneath Parliament House, while small in size, shows the unconformity in a three-dimensional form and is of equal geological significance.

ANALYSIS AGAINST THE CRITERIA SPECIFIED IN SCHEDULE 2 OF THE LAND (PLANNING AND ENVIRONMENT) ACT 1991:

Criterion (iv): A place which is highly valued by the community or a cultural group for reasons of strong or special religious, spiritual, cultural, educational or social associations.

The State Circle Cutting has been hailed as the most significant geological monument in the ACT. It is of considerable value to the community as an educational resource which provides the observer with learning opportunities that range from the most simple geological concepts to aspects of a complex nature. This, together with its easy accessibility, makes it an ideal site for observation of geological features and the study of geological history for people of a broad range of educational backgrounds.

Since its excavation the cutting has been visited annually by hundreds of students from both primary and secondary schools in Canberra and the surrounding region. The study of the site is on the geological curriculum of the Canberra Institute of Technology, the University of Canberra and the Australian National University. Local field excursions arranged for delegates to national and international conferences that are held in Canberra, normally include this site on the itinerary. Members of the general public, whether as individuals or as members of an organised group, are frequent visitors to the cutting. The State Circle Cutting can be regarded as a major community asset for the people of Canberra and beyond.

During the construction of the two bridges and roads connecting the old with the new Parliament House, close cooperation between planners and representatives from the geological community resulted in engineering design modifications for the purpose of preserving a national feature of great scientific and educational value.

The unconformity below Parliament House, only rediscovered in 1995, has a similar educational value to that of the State Circle Cutting, although access is more limited. Despite this it has been visited by a surprisingly large number of people during the last year. Its significance as a site of educational value has also been emphasised by a number of newspaper articles, a television segment and a video prepared by the Joint House Department of Parliament House.

Given the expressed intention of the Parliament House authorities to preserve and to protect the site and their generous cooperation in arranging visits, this important outcrop is likely to remain a monument of great value to geological education.

Criterion (v): A place which is the only known or only comparatively intact example of its type.

The State Circle Cutting and the outcrop below Parliament House are the only known sites in the Canberra region which expose the Early Silurian unconformity. As the rock sequences that underlie the unconformity surface are different at each of these two localities, both sites display unique geological exposures.

Criterion (vi): A place which is a notable example of a class of natural or cultural places or landscapes and which demonstrates the principle characteristics of that class.

The locality below Parliament House presents an unusual and, perhaps, unique example of the preservation of evidence of a landscape, albeit lowered by excavation, that still retains all its original reological features.

Both sites are notable examples of natural places that provide us with evidence of ancient geological landscapes and the habitats of now extinct faunas.

Criterion (vii) A place which has strong or special associations with a person, group, event, development or cultural phase which played a significant part in local or natural history.

Both the Capital Hill and the State Circle Cutting have strong associations with persons and events that played a significant part in local natural history.

A. A. Öpik, of the then Bureau of Mineral Resources, is one of the pioneers of geological mapping and the interpretation of geological history in the Canberra region. He was the first person to carry out a comprehensive survey of the area's geology and the first to attempt a thorough interpretation of the events that influenced the ancient history of the district. He also first named many of the geological formation recognised in Canberra.

The highlight of Öpik's work was undoubtedly his discovery of the unconformity on top of Capital Hill in the 1950's, the same unconformity that is now preserved under Parliament House. This find was of enormous significance for Öpik and for all future geological scientists in the Canberra region, as it , provided unambiguous visual evidence for a period of mountain building in the ancient past that had intervened between the deposition of different sedimentary sequences in an oceanic environment.

Criterion (viii) A place which represents the evolution of a natural landscape, including significant geological features, landforms, biota or natural processes.

Unconformities are significant geological features. Their presence in the exposures in the State Circle Cutting and below Parliament House provide the key to the interpretation of the ancient geological landscape in the Canberra region. Other significant geological features at these sites, such as sandstone rafts, ripple marks and a pallid zone, are important indicators of the varied environments that existed in the region during ancient geological times. Structural features, such as folds and faults, point to the nature of the deformation of these rocks.

Criterion (xi) A place which demonstrates a likelihood of providing information which will contribute significantly to a wider understanding of natural or cultural history, by virtue of its use as a research site, teaching site, type locality or benchmark site.

The two localities cited are already geological benchmark sites for the Early Silurian age of the Canberra region, by virtue of the critical evidence they uniquely contain about this period in geological time. The unconformity below Parliament House may also be regarded as the type locality of the Capital Hill Unconformity even though it is now located some 20 meters below the spot where this feature was first discovered and named.

Both sites are likely to provide further information that will enhance the understanding of the area's natural history through continued research of its strata and the fossils they contain.

Perhaps the greatest importance of the outcrops lies in their use as teaching sites. They represent examples of some geological features in such clarity that they can be taught to, and understood with ease, by school children. They are perfect illustrations of features and concepts taught at tertiary level and they serve as a reference and as a challenge for further investigation to geological scientists.
TATEMENT OF SIGNIFICANCE: The two geological sites at the State Circle Cutting and below Parliament House are of considerable scientific, educational and historical value. They both display angular unconformities which, at each locality, separate different successions of strata and which hold the key to an understanding of the early geological history of the Canberra district. The sites are also of geological interest in interpreting the geological history of adjacent areas in eastern Australia and also in other parts of the world (i.e. QUIDONG, south-east of Cooma; and LLANDOVERY in Wales). The extensive outcrop and clear display of geological features at the State Circle Cutting, and the three-dimensional view presented by the smaller outcrop under Parliament House, make these sites ideal for educational instruction and learning for school and university students as well as for the general public. The association of these sites with pioneer Opik of geological work in the Canberra district and with the development of geological thought and ideas about the ages of these rocks their succession and geological evolution, gives these sites an added historical significance. CONSERVATION POLICY: The rock outcrop in the State Circle Cutting forms a near vertical face which, because of the favourable disposition of the strata, has a high degree of stability. In the 25 years since its excavation the cutting has suffered relatively little damage. Despite this a combination of natural weathering, the vibrations created by the high volume traffic flow on State Circle and, to a lesser extent, the removal of rock samples by the public, has resulted in the partial destabilisation of the outcrop. The accumulation of loose material at the base of the rock face provides evidence for this. A close watch needs to be kept on the site in order to detect any further and more serious deterioration. In time, it may be necessary to develop remedial action to halt further deterioration. Any published information or educational literature produced on the site should also include references to the fragility of the rocks and a request to visitors to refrain from activities likely to cause damage. The second site in the basement below Parliament House is in a much safer and more protected environment. The major requirement is that the locality be exempted from future excavation and that the outcrop be physically preserved in its entirety. SPECIFIC REQUIREMENTS: MANAGEMENT RECOMMENDATIONS: The two sites are important geological monuments and are of considerable educational and scientific interest to the public and to scholars from the local community and elsewhere. In order to inform interested groups or individuals about the significance of these geological monuments, a simple pamphlet or brochure should be prepared and made available to schools, tourist operators and the general public. 7.

The location of the viewing platform above State Circle, with its explanatory plaque, appears to be a vell kept secret, known to only a few. It would greatly benefit visitors to the site if a sign were erected directing them to this lookout and to the adjacent car park. The explantory plaque is now out of date as it was prepared before the upper part of the State Circle cutting was covered. The plaque should be replaced as it is out of date.

The examination of the rock face in the State Circle Cutting by members of the public can pose a potential danger, particularly when large groups of visitors are present. It is common for observers to step off the pavement in order to get a better view of the whole exposure or for jostling students to push each other into the busy road. The site could be made much more attractive and safer for the public if barriers or rails were erected at the roadside edge of the pavement along the entire length of the outcrop. The approach roads to the site should have signs to draw the visitors attention to the geological feature and indicate the location of the nearest car park.

If the site below Parliament House is to be made accessible to the public on a more regular basis, the present path in the basement needs to be extended for a few additional metres to reach the outcrop. This may involve some excavation to allow visitors to pass comfortably beneath the overhead rails that carry the mail system.

Whilst both sides are of considerable interest in terms of their educational value, they should also be important tourist attractions. It is therefore most desirable that the Joint House Department and the ACT Government, as managing authorities for the respective places, consult together, and with the National Trust, Geological Society and the Australian Heritage Commission regarding future improvements, planning, management and promotion of these two outstanding geological monuments.

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C.2 GEOLOGICAL SOCIETY OF AUSTRALIA NOTES



ACCESS: The locality is easily examined from State Circle, and a footpath is present between the road and the face of the cutting. Car parking is available in the parkland between Old Parliament House and the new Parliament House or in the public underground parking for Parliament House visitors.

GEOLOGICAL VALUE: The State Circle road cut is probably the most significant geological monument in the A.C.T. The relationships revealed by its excavation in the early 1970's led to a major re-assessment of Ordovician and Silurian geology of the Canberra region (Crook et al. 1973), and led to the recognition of the Quidongan Movement (Benambran Orogeny Phase 2, 431-428 Ma) as a significant tectonic event in southeast New South Wales which resulted in a major mid-Silurian unconformity.

The cutting is also an important educational locality, visited by several hundred school children as part of their earth sciences course each year, as well as university students, geological conference fieldtrips, and the general public.

Because of its importance, the State Circle road cut was one of the first geological sites in the ACT to be added to the Register of the National Estate.

STATE OF PRESERVATION: The remaining face in the cutting is in reasonably good condition. Some problems have occurred with water seepage from the face; however the National Capital Authority has placed drains behind the face in an attempt the alleviate this problem. Some natural weathering is occurring due to the soft friable nature of the sediments, but is not yet a major problem; however it may again become significant in future and need some assessment of preventative measures.

RECOMMENDATIONS: The final appearance of the cutting after the bridge construction has been an acceptable compromise for the Geological Society. While the full preservation of the cutting would have been desirable, the most valuable part has been preserved for future geologists to examine. The natural weathering of the face needs to be monitored, and weed growth needs to be periodically removed to slow the weathering process.

As one of our most obvious, as well as most important geological monuments, some interpretive public signs are needed, and the problems of parking in the area for visitors will also need examining.



Nearmap May 2011





APPENDIX D: FRAMEWORK FOR ASSESSING HERITAGE SIGNIFICANCE

D.1 DEFINITION OF NATURAL HERITAGE

For the purposes of this plan, the following definitions of natural heritage are used.

Natural heritage means:

- natural features consisting of physical and biological formations or groups of such formations, which demonstrate natural significance;
- geological and physiographical formations and precisely delineated areas that constitute the habitat of indigenous species of animals and plants, which demonstrate natural significance; and/or
- natural sites or precisely-delineated natural areas which demonstrate natural significance from the point of view of science, conservation or natural beauty. (Cairnes 2002, p. 8)

The heritage value of a place includes the place's natural and cultural environment having aesthetic, historic, scientific or social significance, or other significance, for current and future generations of Australians. (Subsection 3(2) of the *Australian Heritage Council Act 2003*; Section 528 of the *Environment Protection and Biodiversity Conservation Act 1999*)

D.2 COMMONWEALTH HERITAGE CRITERIA

The Commonwealth Heritage criteria for a place are any or all of the following:

(a) the place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history;

(b) the place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history;

(c) the place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history;

(d) the place has significant heritage value because of the place's importance in demonstrating the principal characteristics of:

(i) a class of Australia's natural or cultural places; or

(ii) a class of Australia's natural or cultural environments;

(e) the place has significant heritage value because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

(f) the place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period;

State Circle Cutting Heritage Management Plan

(g) the place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;

(h) the place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history;

(i) the place has significant heritage value because of the place's importance as part of indigenous tradition.

The cultural aspect of a criterion means the indigenous cultural aspect, the non-indigenous cultural aspect, or both. (*Environment Protection and Biodiversity Conservation Amendment Regulations 2003 (No. 1)*, Section 10.03A)

APPENDIX E: PRIORITY WORKS

The following list of proposed priority works has arisen from inspections undertaken during the project. The list may change according to circumstances, including new discoveries made in the course of undertaking the works. Policies in Section 6.3 relate to the implementation of the works.

Table 4. Priority Works				
Feature	Feature Issue Proposed Works		Priority/ Timing	
Concrete drain in bench above cutting	Partly overgrown by ground cover plants, partly blocked by debris, connections to stormwater system blocked	Prune back ground cover plants, clean drain of debris, clear connection to stormwater system at western end	High/12-2013	
Concrete gutter at toe of cutting	Partly blocked by debris	Clear gutter of debris	Medium/12- 2013	
Stone capping	There is one loose stone in the stone capping	Re-set stone and mortar in place	Medium/12- 2013	
Cutting face	Cutting face Minor erosion/ instability Undertake minor scaling works of loose blocks and 'dental' work to protect friable layers and underpin the stone capping where necessary – refer to Appendix I for details. A neutral material coloured to match the beds to be stabilised should be used (possibly synthetic stone). Fallen rocks should not be used. However, rocks removed through the scaling process may be used in the same bed from which they are removed, noting the need for careful control of this process.		Medium/12- 2014	
		Care needs to be taken because this work could present a confusing picture of the geology of the cutting.		
		The suggested dental work should be trialled in a small section to test the effectiveness and impact, and any mortar used should be weaker than the surrounding rock. The trial should be discussed with stakeholders prior to being undertaken, including with the Geological Society of Australia, and the results of the trial assessed, again including the views of stakeholders.		
Concrete kerb at the toe of the cutting	The kerb does not extend the full length of the cutting, and is relatively short	Increase the length of the kerb the full length of the cutting, and increase the height to 200 mm	Medium/12- 2014	

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Table 4. Priority Works			
Feature Issue Proposed Works		Proposed Works	Priority/ Timing
Toe of cutting	Mounds of erosion debris has accumulated at the toe of the cutting in places	Clear debris, in particular behind concrete kerb	Low/12-2013

APPENDIX F: MAINTENANCE SCHEDULE

The following schedule should be implemented, as indicated in Section 6.3.

Table 5. Maintenance schedule			
Timeframe	Task		
Every 6 months	Prune back ground cover plants from drain in bench		
	Clean drain of debris		
	Clear connections to stormwater system		
	Remove any fallen material from behind the kerb, in the gutter at toe of cutting, or on the pathway at the toe		
	Carefully remove any weed/plant growth on face of cutting (cut back plant to cutting face and poison stump)		
Annually	NCA inspection of the cutting and capping stones for deterioration		
Every five years or as needed	Geotechnical assessment		

APPENDIX G: AUSTRALIAN NATURAL HERITAGE CHARTER

The following are extracts from Cairnes (2002).



Part A Definitions

Alphabetical listing

Words printed in italics in this document have definitions set out below.

Biodiversity	1.5	Modification	1.28
Community	1.13	Monitoring	1.30
Conservation	1.20	Natural heritage	1.1
Degradation	1.19	Natural integrity	1.8
Earth processes	1.16	Natural significance	1.3
Ecological processes	1.15	Organism	1.11
Ecosystem	1.14	Place	1.2
Enhancement	1.26	Presentation	1.29
Evolutionary processes	1.17	Preservation	1.27
Genetic diversity	1.7	Protection	1.21
Geodiversity	1.4	Regeneration	1.23
Habitat	1.12	Reinstatement	1.25
Indigenous species	1.9	Restoration	1.24
Introduced species	1.10	Species diversity	1.6
Maintenance	1.22	Succession	1.18

Listing by topic

Article 1

For the purpose of the Charter the following definitions apply.

Natural heritage means:

GENERAL

1.1

1.2

Note for Article 1.1

This definition is based on that used in the World Heritage Convention which is also known as the Convention Concerning the Protection of the World Cultural and Natural Heritage. This convention was adopted by the General Conference of UNESCO in 1972 and is now being adhered to by more than 150 countries.

- natural features consisting of physical and biological formations or groups of such formations, which demonstrate natural significance
- geological and physiographical formations and precisely delineated areas that constitute the habitat of *indigenous* species of animals and plants, which demonstrate natural significance, and/or
- natural sites or precisely-delineated natural areas which demonstrate natural significance from the point of view of science, conservation or natural beauty.

Place means a geographically defined site or area with associated natural features of *biodiversity*, *geodiversity* and *ecological processes*.

AUSTRALIAN NATURAL HERITAGE CHARTER



'vulnerable species' or 'endangered species', have not been defined in this Charter. However, these concepts might contribute to the natural significance

Some legislation sets a date for the historically-known range of species, but this Charter leaves the interpretation of this aspect to individual users.

of a place.

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Articles		Explanatory Notes
VALUES		
1.3	Natural significance means the importance of ecosystems, biodiversity and geodiversity for their existence value or for present or future generations, in terms of their scientific, social, aesthetic and life-support value.	
1.4	Geodiversity means the natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes. Geodiversity includes evidence of the past life, ecosystems and environments in the history of the earth as well as a range of atmospheric, hydrological and biological processes currently acting on rocks, landforms and soils.	
1.5	Biodiversity means the variability among living organisms from all sources (including terrestrial, marine and other aquatic <i>ecosystems</i> and the ecological complexes of which they are part) and includes diversity within and between species and the diversity of <i>ecosystems</i> .	Note for Article 1.5 This definition is essentially the same as that used in Australia's National Strategy for the Conservation of Biological Diversity [1996], and in the Commonwork the Sprimmer
1.6	Species diversity means the variety of species in a place.	Protection and Biodiversity Conservation
1.7	Genetic diversity means the variety of genetic information contained in the total genes of individual plants, animals and microorganisms in a place.	Act 1999. The term 'biodiversity' is in widespread use and for consistency has been used in this Charter in preference to 'biological diversity'.
1.8	Natural integrity means the degree to which a <i>place</i> or <i>ecosystem</i> retains its natural <i>biodiversity</i> and <i>geodiversity</i> and other natural processes and characteristics.	However, the meanings and concepts of the two terms are the same.
1.9	Indigenous species means a species that occurs at a <i>place</i> within its historically known natural range and that forms part of the natural <i>biodiversity</i> of a <i>place</i> .	Note for Article 1.9 Special classes of indigenous species, often defined in legislation by terms such as 'threatened species',

Definitions





CONSERVATION PROCESSES

AVAIION PROCESSES	
Conservation means all the processes and actions of looking after a <i>place</i> so as to retain its <i>natural significance</i> and always includes <i>protection</i> , <i>maintenance</i> and <i>monitoring</i> .	Note for Article 1.20 Conservation may, according to circumstance, also include regeneration, restoration, enhancement, reinstatement, preservation or modification, or a combination of more than one of these. Conservation includes conserving natural processes of change (as opposed to
Protection means taking care of a <i>place</i> by managing impacts to ensure that <i>natural significance</i> is retained.	artificially accelerated changes).
Maintenance means the continuous protective care of the <i>biodiversity</i> and <i>geodiversity</i> of a place.	Note for Article 1.22 Maintenance may also need to be done outside the place.
Regeneration means the natural recovery of <i>natural</i> integrity following disturbance or degradation.	Note for Article 1.23 Aegeneration applies to both the geodiversity and biodiversity of a place, and indudes the process of natural succession.
Restoration means returning existing <i>habitats</i> to a known past state or to an approximation of the natural condition by repairing <i>degradation</i> , by removing <i>introduced species</i> or by <i>reinstatement</i> .	Note for Articles 1.24 and 1.25 The timeframe that would apply to the past state as reference for restoration and reinstatement is not specified. It should be determined for each situation through the conservation policy.
Reinstatement means to introduce to a <i>place</i> one or more species or elements of <i>habitat</i> or <i>geodiversity</i> that are known to have existed there naturally at a previous time, but that can no longer be found at that <i>place</i> .	Note for Article 1.25 Aeinstatement has the same meaning as the term 'reintroduction' that is commonly applied for plant and enimal species.
	Conservation means all the processes and actions of looking after a place so as to retain its natural significance and always includes protection, maintenance and monitoring. Protection means taking care of a place by managing impacts to ensure that natural significance is retained. Maintenance means the continuous protective care of the biodiversity and geodiversity of a place. Regeneration means the natural recovery of natural integrity following disturbance or degradation. Restoration means returning existing habitats to a known past state or to an approximation of the natural condition by repairing degradation, by removing introduced species or by reinstatement. Reinstatement means to introduce to a place one or more species or elements of habitat or geodiversity that are known to have existed there naturally at a previous time, but that can no longer be found at that place.

Definitions

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Part B Conservation Principles

BASIS OF CONSERVATION

Article 2	The basis for <i>conservation</i> is the assessment of the <i>natural</i> significance of a <i>place</i> , usually presented as a statement of significance.
Article 3	The aim of conservation is to retain, restore or reinstate the natural significance of a place.
Article 4	A self-sustaining condition is preferable to an outcome that requires a high level of ongoing management intervention.
Article 5	Conservation is based on respect for biodiversity and geodiversity. It should involve the least possible human intervention to ecological processes, evolutionary processes and earth processes.
Article 6	Conservation should make use of all the disciplines and experience that can contribute to the study and safeguarding of a <i>place</i> . Techniques employed should have a firm scientific basis or be supported by relevant experience.
Article 7	Conservation of a place should take into consideration all aspects of its natural significance, and respect aspects of cultural significance that occur there.



Note for Article 2

If cultural values exist for the place they should also be considered as part of the significance of the place and included in the statement of significance.

Note for Article 4

A self-sustaining condition allows continuation of natural processes of change.

Note for Article 5

The best conservation often involves the least work. Conservation should not be undertaken unless adequate resources are available to ensure that the piece is not left in a disturbed or vulnerable state.

Note for Article 7

Some places with natural significance might also have Indigenous or historic cultural heritage values that should be conserved. Conservation of places with cultural significance is explained in *The Burta Charter*, which defines cultural significance to mean aesthetic, historic, scientific, social or spiritual value for past, present or future generations. For places with Indigenous heritage values, reference should be made to Ask First. A guide to respecting Indigenous heritage places and values.

Conservation Principles

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Note for Article 8

of use of the place.

Note for Article 9

Note for Article 10

Note for Article 11

Note for Article 12

be considered.

species.

There may be relevant legislative or

statutory requirements that need to

An example of the use of this Article

is the conservation of migratory bird

Provision for scientific collecting should be incorporated into the conservation

plan where appropriate. Accepted protocols for scientific collecting

should be observed where they exist.

An example is poisoning or draining a water body to eliminate an introduced

species of fish and to prevent its wider

spread, even though this action may threaten other indigenous species in the same stretch of water.

more detail on developing the conservation policy for a place.

CONSERVATION POLICY The conservation policy for a place should be determined Article 8 Protecting Natural Heritage includes by a clear understanding of natural significance and other management issues. These should be used to determine the desired conservation outcomes and future condition for the place. 'Management issues' include factors such as the owner's needs, resources, external constraints and the past history

Article 9 The conservation policy should determine uses that are compatible with the natural significance of a place. Uses that will degrade the natural significance should not be introduced or continued. Article 10

The conservation policy should consider ecological processes and other processes that extend beyond the stated boundaries of a place, and their level of impact or influence on the natural significance of the place.

REMOVAL OF ELEMENTS

Article 11 Elements of the geodiversity and biodiversity that contribute to the natural significance of a place should not be removed from the place unless this is the sole means of ensuring their survival, security or preservation and is consistent with the conservation policy.

Article 12

14

The destruction of elements of habitat or geodiversity that form part of the natural significance of a place is unacceptable unless it is the sole means of ensuring the security of the wider ecosystem or the long-term conservation of the natural significance.

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INTRODUCED ELEMENTS

Article 13

Some introduced elements may need to be considered as part of the *ecosystem*. Some may contribute permanently to the *natural significance* of the *place*. Others may need to be retained until a condition of sustainable *natural integrity* can be achieved. The conservation policy should stipulate requirements for longer-term retention, control or eradication.

DEGRADED NATURAL ECOSYSTEMS

Article 14

Some remnants of natural ecosystems that have suffered degradation may never recover their natural integrity but nevertheless may have natural significance that should be conserved.

Article 15 Extreme natural 'catastrophic' events may cause disturbance. This is a natural phenomenon, but is not *degradation* unless human *modification* of the natural environment has contributed to the event or the effects. If conservation decisions are needed after such events, this difference should guide the decisions.

Note for Article 13 Examples include:

- where loose rocks have been removed, they might be replaced by other rocks to provide reptile habitat, and
- where a prolific introduced species of plant may be the preferred habitat for a range of birds and immediate removal may have a dramatic adverse affect on the birds.

Many factors will influence decisions related to conservation practices involving introduced elements.

Note for Article 14

This does not provide an excuse for allowing the natural integrity of a place to be degraded as long as other aspects are protected.

Conservation Principles

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Part C **Conservation Processes**

Note for Article 16

Protection may include direct protective action (such as erection of a fence) and indirect measures such as binding legal agreements, planning instruments, land acquisition, placing a protective covenant on a land title or reserving the place as a protected area.

PROTECTION

Protection may include conservation management measures Article 16 that are either direct or indirect. The aim of protection is to prevent or minimise impacts that may degrade the natural significance of the place and to facilitate regeneration.

MAINTENANCE

Article 17

Article 18

Note for Article 18 The main distinction between regeneration and restoration is the extent of direct or indirect intervention. The activity known as bush regeneration consists of restoration and other conseniation processes defined here

Note for Articles 19 and 20

In considering restoration and reinstatement, the length of time that has passed since the existence of the 'earlier state' will influence decisions on conservation policy and will be a matter of judgment by the practitioner for each place.

Note for Article 20

For example, returning an element of geodiversity that has been seriously depleted, eg, adding gravel to expand the shallows and riffles of a stream that has been deepened by mining.

Maintenance techniques and action should be consistent with the conservation processes adopted for a place and should not detract from its natural significance.

REGENERATION

Regeneration is essentially dependent on natural processes facilitating recovery from disturbance or degradation. It does not include physical intervention, but should be accompanied by monitoring and protection measures that do not create degradation.

RESTORATION

Article 19 Restoration is appropriate only if there is sufficient evidence of an earlier state to guide the conservation process and if returning the biodiversity, geodiversity or habitat of the place to that state is consistent with the natural significance of that place.

REINSTATEMENT

Article 20

15

Reinstatement is appropriate only if:

- there is evidence that the species or habitat elements or features of geodiversity that are to be reintroduced have existed there naturally at a previous time, and
- returning them to the place contributes to retaining the natural significance of that place, and
- processes that may threaten their existence at that place have been discontinued.

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ENHANCEMENT

- Article 21 Enhancement is appropriate only if there is evidence that the introduction of additional habitat elements, elements of geodiversity or individuals of an organism which exist at that place are necessary for, or contribute to, the retention of the natural significance of the place.
- Article 22 Where organisms or elements of geodiversity are introduced to a place for the purpose of enhancement, the individuals introduced to the place should not alter the natural species diversity, genetic diversity or geodiversity of the place if that would reduce its natural significance.
- Article 23 Enhancement in existing natural systems should be limited to a minor part of biodiversity or geodiversity of a place and should not change ecosystem processes nor constitute a majority of the habitats or features of geodiversity of the place.

PRESERVATION

- Article 24 Preservation is appropriate where the natural significance of a place is fully manifested in its existing stage of natural succession or the existing state of its geodiversity, and where the natural significance is dependent on retaining existing conditions which may otherwise be lost by progression in natural processes.
- Article 25 Preservation should be limited to the minimum intervention, or the change of maintenance actions, needed to suspend the natural earth processes or processes of succession. The intervention or change should not adversely affect surrounding ecosystems.

Note for Article 21

An example of enhancement is planting large numbers of a specific tree species to provide a habitat for a bird species identified as a particular part of the natural significance.

Note for Article 22

This means that genotypes different to the local genotype of a species at a place should not be introduced to it unless it is necessary for restoration or preservation of the natural significance

Note for Article 23

This Article refers to existing natural systems and is not an argument against the creation of a new habitat.

Note for Article 24

Presentation is an exception to the general conservation principle of allowing natural ecological processes, evolutionary processes, earth processes and succession to continue. There may be situations where the conservation policy is to maintain the ecosystem of a place at a particular point in its succession, eg, presentation may be an appropriate conservation process for the locality of the Wollemi pine in New South Wales, thought to be a rare surviving relic of a previous climatic environment.

Conservation Processes

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Note for Article 28 Presentation does not need to be limited to on-site activity and can include off-site programs.

Note for Article 30

Monitoring should be designed and conducted so as to identify changes relevant to the conservation program and unforeseen effects of conservation actions.

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MODIFICATION

Article 26	ticle 26 Modification of a place to accommodate other non-conservation uses is acceptable where natural significance is retained and where the modification will not adversely affect the natural significance of other places.		
Article 27	Modification should be limited to that which is essential to a use for the <i>place</i> , such use being determined in accordance with the conservation policy.		
PRESENT	TATION		
Article 28 Presentation should interpret to visitors and others the natural significance of the place and should encourage appreciation and respect. It should also encourage an appropriate level of awareness, understanding and support for the heritage values and conservation objectives of a conservation program or activity.			
Article 29	Presentation may not be appropriate for all <i>places</i> for reasons of security and privacy or cultural significance. It should only commence after a <i>place</i> has been given adequate <i>protection</i> .		
MONITO	RING		
Article 30	Monitoring, which allows review of the effectiveness of conservation programs and re-examination of the appropriateness of decisions, is fundamental to improving conservation practice. It requires keeping adequate records.		

AUSTRALIAN NATURAL HERITAGE CHARTER

Part D Conservation Practice

OBTAINING INFORMATION ABOUT A PLACE

OBIAINI	NG INFORMATION ABOUT A PLACE
Article 31	Work on a <i>place</i> should be preceded by research and by review of the available physical, oral, documentary and other information about the existing <i>biodiversity</i> and <i>geodiversity</i> , including information from Indigenous people.
Article 32	Studies should be of as high a quality as possible. They should be prepared or reviewed by other people with appropriate experience, knowledge or professional qualifications. Information should be checked on site before any decisions about intervention activities are made.
Article 33	Evidence of the existing <i>biodiversity</i> , geodiversity and any other significant features of the <i>place</i> (such as cultural heritage) should be recorded before any disturbance of the <i>place</i> .
Article 34	Study of a <i>place</i> may require some disturbance to provide the data needed for deciding its <i>natural significance</i> and the conservation policy. In these cases the disturbance should have minimal impact on the <i>biodiversity</i> and <i>geodiversity</i> of the <i>place</i> and the actions should be recorded.

- Article 35 Physical intervention is justified where it is needed to secure evidence about to be lost or made inaccessible through necessary conservation work or other unavoidable action.
- Article 36 Investigation that requires physical disturbance of a *place* may be permitted if it will create, or add substantially to, a body of knowledge and provided that it is consistent with the conservation policy of a *place*.

Conservation Practice

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Note for Article 31

The minimum information required before work or other conservation actions or processes start at a place is the identification of its natural significance.

Note for Article 33

If the place is known to, or likely to have cultural heritage values, reference can be made to Ask Fist: A guide to respecting indigenous heritage places and values or The Burra Charter to assist in understanding, documenting and respecting these values.

Note for Article 34

A permit or licence is likely to be required for such studies.



Note for Article 37

The conservation policy should be of as high a quality as possible. It should be prepared or reviewed by a person with appropriate experience, knowledge or professional qualifications.

See Articles 8, 9, 10.

If management objectives are used instead of a conservation policy, key elements of Article 37 should be taken into account.

Note for Article 38

The process to develop a conservation plan is shown as a diagram on page 7.

The conservation plan may also acknowledge or reflect the local, state and territory, national and international policies, agreements, strategies and plans that may be statutory or guiding documents.

The conservation plan may be a component of a broader management plan for a range of land uses for the place, eg a farm plan, a plan of management for a reserve or a land or vegetation rehabilitation program. Note that 'conservation management plan' is a commonly used alternative term.

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CONSERVATION POLICY

Article 37

A conservation policy outlines the desired goals for conserving the *natural significance* of a *place* in both the short and long term. It should be a succinctly written statement which considers:

- the statement of significance and its supporting evidence
- a description of other management issues
- the implications of these issues for future management of the place, and
- the desired conservation outcomes and desired future condition.

This policy should be incorporated into a conservation plan for the place.

CONSERVATION PLAN

Article 38

A conservation plan should be prepared which outlines how the conservation policy will be implemented. The plan should include:

- a statement of significance
- a description of the management issues
- the conservation policy
- the conservation processes to be used
- organisations and/or individuals responsible for implementing the conservation plan
- a monitoring program to log changes in the place, and
- an evaluation process for assessing the success of the conservation plan in achieving the desired conservation outcomes.

AUSTRALIAN NATURAL HERITAGE CHARTER



Note for Article 39

Note for Article 43

The benefits of consultation include

the benefit of additional knowledge

or experience concerning a place and assistance in resolving any conflict prior to commitment to a management. regime. It is recognised that some landholders may wish not to consult where there is no statutory obligation to do so. If a place appears to have heritage values for Indigenous people, steps for effective consultation can be found in Ask First: A guide to respecting Indigenous heritage places and values.

Conservation processes may be used in combination or sequentially to achieve the desired conservation outcomes.

Article 39	The conservation processes to be used should be determined with reference to the conservation policy and to the conservation principles.
Article 40	There should be a process to ensure that the conservation plan is regularly reviewed and updated.

- Article 41 The requirements of the conservation plan should be made known as part of the presentation of the place.
- Article 42 Appropriate expert direction and supervision should be maintained at all stages of implementing the plan, a log kept of new evidence, and additional decisions recorded as amendments to the conservation plan.

CONSULTATION

Article 39

Article 43 Consultation with individuals and organisations with an interest in the natural significance or future use of a place is highly desirable, especially at the time of developing the conservation policy and the conservation plan.

RECORDS

Article 44

The records associated with all stages of the conservation of a place should be kept in a permanent archive and made publicly available, subject to requirements of security and privacy.

Conservation Practice

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APPENDIX H: COMPLIANCE WITH COMMONWEALTH HERITAGE MANAGEMENT PRINCIPLES AND REQUIREMENTS FOR MANAGEMENT PLANS UNDER THE EPBC REGULATIONS

The regulations under the EPBC Act 1999 provide a list of Commonwealth Heritage management principles as well as requirements for (conservation) management plans for Commonwealth Heritage places (*Environment Protection and Biodiversity Conservation Amendment Regulations 2003 (No. 1)*, Schedules 7A and 7B). The following tables provide a summary of compliance with these requirements.

Table 5. Commonwealth Heritage Management Principles			
No.	Requirement (Schedule 7B)	Compliance Comment	
1.	The objective in managing Commonwealth Heritage places is to identify, protect, conserve, present and transmit, to all generations, their Commonwealth Heritage values.	Complies: Section 6.1. The plan effectively adopts this as the objective for the development of the conservation policy and implementation strategies.	
2.	The management of Commonwealth Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their Commonwealth Heritage values.	Complies: Chapter 6 - Policies 2, 6, 10	
3.	The management of Commonwealth Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.	Complies: Chapter 6 – Policies 1 and 4	
4.	The management of Commonwealth Heritage places should ensure that their use and presentation is consistent with the conservation of their Commonwealth Heritage values.	Complies: Chapter 6 – Policies 16, 18	
5.	 The management of Commonwealth Heritage places should make timely and appropriate provision for community involvement, especially by people who: (a) have a particular interest in, or associations with, the place; and (b) may be affected by the management of the place; 	Complies: Chapter 6 – Policies 8, 10	
6.	Indigenous people are the primary source of information on the value of their heritage and that the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.	Complies: Not applicable	
7.	The management of Commonwealth Heritage places should provide for regular monitoring, review and reporting on the conservation of Commonwealth Heritage values.	Complies: Chapter 6 – Policies 8, 14	

Table	able 6. Management Plan Requirements		
No.	Requirement (Schedule 7A)	Compliance Comments	
(a)	establish objectives for the identification, protection, conservation, presentation and transmission of the Commonwealth Heritage values of the place; and	Generally complies through the provision of policies addressing an overall objective in Chapter 6. There is no identification objective or policy as such, as this matter is substantially addressed in Chapters 2-4.	
(b)	provide a management framework that includes reference to any statutory requirements and agency mechanisms for the protection of the Commonwealth Heritage values of the place; and	Complies: Chapter 6	
(c)	provide a comprehensive description of the place, including information about its location, physical features, condition, historical context and current uses; and	Complies: Chapters 2, 5	
(d)	provide a description of the Commonwealth Heritage values and any other heritage values of the place; and	Complies: Chapter 4	
(e)	describe the condition of the Commonwealth Heritage values of the place; and	Complies: Sections 2.2 and 5.5	
(f)	describe the method used to assess the Commonwealth Heritage values of the place; and	Complies: Chapter 3 and Appendix D	
(g)	describe the current management requirements and goals, including proposals for change and any potential pressures on the Commonwealth Heritage values of the place; and	Complies: Section 5.4	
(h)	have policies to manage the Commonwealth Heritage values of a place, and include in those policies, guidance in relation to the following:	See below	
(i)	the management and conservation processes to be used;	Complies: Chapter 6	
(ii)	the access and security arrangements, including access to the area for indigenous people to maintain cultural traditions;	Complies with regard to general access: Chapter 6, especially Policy 16	
(iii)	the stakeholder and community consultation and liaison arrangements;	Complies: Chapter 6 – Policies 8, 10	
(iv)	the policies and protocols to ensure that indigenous people participate in the management process;	Not applicable	
(v)	the protocols for the management of sensitive information;	Not applicable	
(vi)	the planning and management of works, development, adaptive reuse and property divestment proposals;	Complies: Chapter 6 – especially Policies 7, 11, 12	
(vii)	how unforeseen discoveries or disturbance of heritage are to be managed;	Complies: Chapter 6 – including Policy 19	

n

Table 6. Management Plan Requirements				
No.	Requirement (Schedule 7A)	Compliance Comments		
(viii)	how, and under what circumstances, heritage advice is to be obtained;	Complies: Chapter 6 – Policy 6		
(ix)	how the condition of Commonwealth Heritage values is to be monitored and reported;	Complies: Chapter 6 – Policies 8, 14		
(x)	how records of intervention and maintenance of a heritage places register are kept;	Complies: Chapter 6 – Policy 20		
(xi)	the research, training and resources needed to improve management;	Complies: Chapter 6 generally, especially Policy 21. Training is dealt with in the NCA's Heritage Strategy.		
(xii)	how heritage values are to be interpreted and promoted; and 18			
(i)	include an implementation plan; and Complies: Table 3, Chapt – Strategy 3.1 and Section			
(j)	show how the implementation of policies will be monitored; and	Complies: Chapter 6 – Policies 7, 8		
(k)	show how the management plan will be reviewed.	Complies: Chapter 6 – Policy 8		

APPENDIX I: GEOTECHNICAL ASSESSMENT



Report on Geotechnical Assessments

Heritage Management Plan State Circle Cutting Capital Hill, Canberra

Prepared for National Capital Authority (NCA)

> Project 77284.00 April 2013



Douglas Partners Geotechnics | Environment | Groundwater

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QUALITY MANAGEMENT SYSTEM



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Heritage Management Plan

State Circle Cutting, Capital Hill, Canberra

1. Introduction

This report presents the results of a geotechnical assessment undertaken by Douglas Partners Pty Ltd (DP) as part of heritage management planning for the State Circle road cutting at Capital Hill, Canberra.

It is understood that a geotechnical assessment of the cutting's stability is required along with advice on management strategies and conservation and maintenance works to assist in future preservation of the road cutting as a site of geological significance. This report forms part of a broader heritage and cultural study of the road cutting

The assessment was commissioned by and carried out for Mr Duncan Marshall, heritage consultant, acting on behalf of the National Capital Authority (NCA). It comprised a walkover inspection and geological mapping of the road cutting, associated drainage structures and the adjoining hill slope. Reference has also been made to the following documents provided by Duncan Marshall or sourced from the internet:

- State Circle Cutting, Heritage Management Plan (in Draft, Version 1) by Duncan Marshall and Phil Creaser.
- Australian Heritage Database Commonwealth Heritage List (Place ID 105733) and Register of National Estate (Place ID 13321).
- Canberra's Engineering Heritage The Roads and Bridges Leading to The New Parliament House (2008) by Keith Downy and John Connal.
- Commonwealth of Australia Standard Form Request for Offer (RFO) 2012/3 dated 24 September 2012.

2. Site Location, Description and Geology

The State Circle road cutting is located on the northern side of State Circle at Capital Hill between Commonwealth Avenue and Kings Avenue (refer to Drawing 1). For the purposes of site descriptions in this report, the cutting along State Circle is assumed to lie in an east to west orientation.

The cutting is approximately 315 m in length and comprises two excavated batter faces with a combined total height in the order of 12 m, separated by a 3 m to 5 m wide, mid-level bench. The upper batter face has a slope angle in the order of 30° (below horizontal) and is generally soil covered and planted with shrubs. The lower batter face is up to 5 m to 6 m maximum height and is wholly excavated in bedrock with a slope angle in the order of 80° below horizontal.

A general view of the roadway and the adjacent cutting, looking eastbound, is presented below in Plate 1.







Plate 1 - General view of the excavated batter face looking eastbound along the entry ramp from Commonwealth Avenue and State Circle

Comments pertaining to the management and future preservation of the lower excavated batter face forms the main focus of this assessment and report.

The toe of the cutting is typically located 3 m from the edge of the eastbound traffic lanes of State Circle. The entry ramp to State Circle from Commonwealth Avenue lies below the far western end of the cutting. A concrete footpath/bike path is at the bottom of the full length of the cutting, typically situated within 0.5 m to 1 m of the toe. The remainder of the area between the toe of the batter and the road edge has a gravelled surface.

A 100 mm wide concrete gutter has been constructed between the toe of the cutting and the footpath for approximately half the length of the slope, evidently to direct stormwater or seepage from the face towards a grated drain and sub-surface drainage lines. A 300 mm wide by 500 mm deep, concrete box drain runs along the mid-level bench for the full length of the slope. A cemented stone capping layer has been constructed along outer edge of the mid-level bench at the crest of the lower batter face (refer to Plate 2).





Plate 2 - View from the eastern end of the slope showing the concrete box drain on the midlevel bench and the cemented stone capping layer along the creast of the lower batter face

Two road bridges carrying the north-bound and south-bound lanes of Federation Mall, respectively, cross above both State Circle and the cutting. The northern abutments of both bridges have been set back from the face of the lower batter face and are founded on the mid-level bench. Cemented stone flagging covers the mid-level bench below both bridges.

Reference to the supplied documents indicates that State Circle was first excavated in the early 1970's. The subsequent regrading and landscaping of the upper batter face and the construction of the two Federation Mall bridges above was undertaken during the mid 1980's in conjunction with the construction of the new Parliament House.

There is no evidence of pre-split drill-holes remaining on the lower batter face. Therefore, DP assumes that the trimming of the lower batter during its original excavation in the 1970's was achieved using detailed rock-hammering and/or scrapping with a bucket. It is also assumed that the current alignment of the lower batter face was not altered when the regrading and landscaping of the upper batter was undertaken during the mid 1980's, and that therefore, the degree of weathering and regression of friable bedding now evident along the lower batter is the result of approximately 40 years of exposure to the elements.

The lower batter face has geological significance as it displays the angular unconformity between the lower and older State Circle Shale and the overlying and younger Camp Hill Sandstone. Both of these geological units are of Early Silurian age.

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3. Site Inspection

Walkover inspections of the site were undertaken by a senior engineering geologist on 21 February and 8 March 2013. The latter inspection was in part undertaken in the company of Mr Phil Creaser, geological heritage consultant for the project.

The cutting was measured with a measuring wheel and the footpath below was marked with temporary chainage marks. Chainage (CH) 0 m was taken to be at the eastern (Commonwealth Avenue) of the cutting with CH 315 m taken at the western (Kings Avenue) end.

In general, the main observations made during the site inspections are as follows:

- The interbedded sandstones, siltstones and mudstones belonging to both geological units are of variable strength and each rock type has weathered and regressed behind the original line of cut at different rates during the approximate forty years since the lower face was first excavated.
- The more erodible and friable beds exposed on the batter face have regressed to between 100 mm to 300 mm behind the line of the more resistant (higher strength) beds (although this increases to 500 mm behind the original cut line in some areas of the batter face). This has led to the progressive undercutting of the more resistant beds and the failure to the batter toe of both fine grained material and some bedrock joint blocks ranging from 20 mm to 100 mm diameter.
- It appears that the majority of the joint blocks that have fallen from the batter have not reached the traffic lane, but rather have lodged behind the concrete kerb at the toe of the batter or rolled onto the footpath.
- There is a solitary 150 mm diameter fragment of rock lying on the central median of State Circle, near to the central pier of the western over-bridge, approximately 15 m distant from the toe of the batter. The rock fragment appears to have originated from the opposite crest of the lower batter face beneath the bridge. It is possible that the rock fragment has fallen from the batter and rolled onto the roadway but it is unlikely to have rolled across the full width of the eastbound lanes to its present position.
- There is a 100 mm high concrete kerb extending along the northern side of the footpath at the toe of the lower batter face from CH 204m to a grated drain at CH 57m. Much of the 'channel' behind the concrete kerb is filled with fallen rock fragments.
- There does not appear to have been any significant reduction of the weathering of the lower batter face where it has been afforded some protection from the elements by the overhead Federation Mall bridges.
- There does not appear to be any visual evidence of adversely orientated jointing or defects within the bedrock exposed in the lower excavated batter that could lead to significant overall instability of the slope.
- The cemented stone capping layer along the crest of the slope generally remains intact and in good condition with only one loose stone noted (see Section 4 below for location details).
- The concrete box drain along the mid-level bench appears to be in good condition and is generally free of vegetation or soil build-up.
- There was no groundwater seepage noted from the batter face during either of the inspections.
- The cemented stone flagging on the mid-level bench below both of the over-bridges appears free of cracking or any areas of settlement.



4. Recommendations for Remedial Works

In summary, there does not appear to any geotechnical hazards on the slope which could present an unacceptable level of risk to passing traffic or infrastructure. However, fallen rock will continue to present a hazard to cyclists who use the footpath along the batter toe.

Furthermore, it is expected that a relatively limited scope of remedial work would be required to repair the weathered sections of the batter face, to provide the necessary protection to the batter face from the elements, and to reduce the requirement for on-going maintenance for some years to come.

Note that the 'minor scaling works' referred to below should be limited only to the removal from the batter of loose joint blocks that were readily dislodged by hand.

Where 'dental' work is recommended. it is envisaged that the most aesthetically appropriate method could comprise the filling of eroded gaps or beds in the batter face with fragments of the fallen rock collected from the base of the batter, held in place with coloured cement mortar.

The fallen rock and soil that has accumulated behind the concrete kerb along the toe of the batter should be removed. Consideration should also be given to doubling the height of the kerb (to approximately 200 mm) and extending the concrete kerb along the full length of the batter.

Details of the various geotechnical features noted along the lower batter face and specific remedial options are provided below.

Chainage 0m to 30m (adjacent to the entry ramp from Commonwealth Avenue)

This section of the batter face is a relatively minor slope and has a maximum height of 2 m. There is no concrete gutter separating the base of the batter and the concrete footpath. There are some loose blocks on the face but no specific remedial works are considered necessary at present.

Chainage 30m to 46m

This section of the batter face reaches a maximum height of 3.5 m. There has been some erosion of a friable layer and consequent unravelling of the face, in particular between CH 35m to CH 46m. This has led to the undermining of the cemented stone capping layer by about 0.5 m, and the accumulation of approximately 1 m³ of fallen soil and rock fragments at the toe of the slope and on the footpath (refer to Plates 3 and 4).

The undermined section of the stone capping layer depicted in Plates 3 and 4 remains intact at present.





Plate 3 - Erosion and unravelling of batter face between CH 35m and CH 46m



Plate 4 - Erosion and unravelling of batter face between CH 35m and CH 46m

Remedial options for this section of the face could include minor scaling works of the loose blocks and 'dental' work to protect the friable layers and underpin the stone capping layer where necessary.

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Chainage 46m to 106m

This section of the lower batter reaches a maximum height of approximately 5 m. There has been some differential weathering and regression of the batter face leading to the more resistant ironstone beds being undercut by up to 100 mm to 200 mm. However, most of the resistant bedding appears intact at present (refer to Plate 5).



Plate 5 - Typical differential weathering and regression of the batter face between CH 46m and CH 106m

There are also some partially detached ironstone joint blocks to 200 mm diameter along the crest of the batter, particularly near CH 88m (refer to Plate 6). A loose stone in the cemented capping layer was noted at CH 78m.





Plate 6 - Loose, 200 mm diameter ironstone joint block at batter crest at CH 88m

Remedial works on this section of the batter could be limited to the scaling of the ironstone joint blocks depicted in Plate 6 and the re-cementing of the loose capping layer stone at CH 78m.

Chainage 106m to 120m

This section of the lower batter face reaches a maximum height of approximately 5 m to 6 m.

Preferential erosion of a friable layer (which dips to the west across the face) has led to undercutting of the bedding above by up to 400 mm (refer to Plate 7). Fallen material has accumulated behind the concrete kerb at the batter toe and in some places has spilled onto the pathway.

Occasional failure of small joint blocks from the undercut beds would be expected to continue into the future. However, there does not appear to be any evidence of an imminent significant collapse of the undercut beds.

Accordingly, some 'dental' work to protect the friable layer from further erosion could be considered to reduce the need for cleaning fallen material from the toe of the batter in this area. If this is not done, eventually there will be a collapse of the undercut beds.





Plate 7 - Preferential erosion of a friable layer (which dips to the west across the face) between CH 106m and CH 120m

Chainage 120m to 150m (below the western over-bridge)

This section of the lower batter face reaches a maximum height of approximately 6 m and displays the unconformity between the Camp Hill Sandstone and the underlying State Circle Shale (refer to Plate 8).

The Camp Hill Sandstone is displayed within uppermost 1 m to 1.5 m of the batter face and there has been some gradual undercutting of its more resistant beds. In particular, there are some partially detached ironstone joint blocks located along the crest of the batter (below the stone cemented capping beam). The solitary joint block that was noted lying on the road's central median (refer to Section 3 above and Plate 7) may have originally fallen from the crest of the batter at this location.

The State Circle Shale which is exposed within the lower section of the batter face is relatively massive and displays no evidence of significant undercutting or the formation of loosened joint blocks to date.

It is considered that remedial works for this section of the batter face could be limited to minor scaling of any loosened joint blocks along the crest or alternatively, cementing in place of these joint blocks using appropriately coloured cement mortar.





Plate 8 - General view of geological unconformity below western over-bridge. Note the 150 mm diameter joint block lying on central road median in the foreground.

Chainage 150m to 165m

This section of the lower batter face reaches a maximum height of approximately 5 m to 6 m.

The State Circle Shale which is exposed over the full height of the batter face is relatively massive and displays no evidence of significant undercutting or the formation of loosened joint blocks to date.

No particular remedial works for this section of the batter face are recommended at present

Chainage 165m to 200m

This section of the lower batter face reaches a maximum height of 5 m. The geological unconformity between the Camp Hill Sandstone and the underlying State Circle Shale is also displayed in this section.

Preferential erosion of the upper-most beds of the State Circle Shale (immediately below the unconformity) has led to some undercutting of joint blocks within the overlying Camp Hill Sandstone by up to 250 mm (refer to Plates 9 and 10). Some of these joint blocks may eventually fall to the toe, although there was no evidence of imminent significant instability.

There are also some partially detached ironstone joint blocks to 150 mm diameter along the crest of the batter in this area (refer to Plate 11).





Plate 9 - General view of batter around CH 180m showing undercutting at geological unconformity.



Plate 10 - Detail of undercutting shown in Plate 8.

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Plate 11 - Detail of ironstone joint blocks along batter crest at CH 177m

Some 'dental' work with the eroded layers or cementing of the undercut joint blocks immediately above the unconformity and minor scaling works of the ironstone joint blocks along the crest would reduce the frequency of future block failures.

Chainage 200m to 215m

This section of the lower batter face reaches a maximum height of approximately 5 m.

There are some south-east trending joints which obliquely daylight out of the batter near to the road sign and light pole between CH 205m and CH 210m (refer to Plates 12 and 13). Progressive relaxation and opening of these joints has led to the formation of wedges which could ultimately topple from the batter face. However, there was no evidence of imminent failure of the wedges.

There is no concrete kerb below this section of the batter slope.





Plate 12 - Over-view of joints daylighting from batter face between CH 200m and CH 215m



Plate 13 - Detailed view of joints depicted in Plate 12

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Remedial works in this area could be limited to minor scaling of the loosened blocks on the wedges and the extension of a 200 mm high concrete kerb along the batter toe.

Chainage 215m to 315m (east edge of the easternmost over-bridge to the east end of the batter)

This section of the lower batter reaches a maximum height of 2.6 m. There is only minor spoiling of joint blocks to 100 mm diameter. The cemented stone capping layer is intact.

There is no concrete kerb below this section of the batter slope.

No particular remedial measures on this section of the face are considered necessary at present, although the extension of the concrete kerb along the full length of the batter would reduce the frequency of fallen joint blocks reaching the footpath.

5. Cyclical Maintenance Requirements

Following completion of the (limited) scope of remedial works outlined above, it is envisaged that ongoing remedial work on the slope would comprise annual inspections of the batter by NCA road maintenance staff, including the removal of any fallen material from behind the concrete kerb or the pathway at the batter toe.

Geotechnical re-appraisal of the batter could probably be limited to five yearly intervals, unless significant changes to the slope were noted during the annual NCA inspections.

6. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for the excavated road batter alongside State Circle at Capital Hill, Canberra in accordance with our email proposal to Mr Duncan Marshall dated 21 November 2012. The work was carried out under DP Conditions of Engagement. This report is provided for the exclusive use Mr Marshall and the NCA for the specific projects and purposes as described in the report. It should not be used for other projects or by a third party.

The results provided in the report are considered to be indicative of the conditions at the road batter at the time the work was carried out. DP's advice may be based on observations, measurements, and tests or derived interpretations. The accuracy of the advice provided by DP in this report is limited by unobserved features and variations in ground conditions across the site and surrounding areas or by variations with time.

This report must be read in conjunction with the attached "Notes About this Report" and any other attached explanatory notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions from review by others of this report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this report. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

This report, or sections of this report, should not be used as part of a specification for a project without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About this Report Drawing 1

About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

 In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.



Rock Strength

Rock strength is defined by the Point Load Strength Index (Is₍₅₀₎) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index Is ₍₅₀₎ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	Ĺ	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	Н	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to Is(50)

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description	
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.	
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable	
Moderately weathered	MW	Staining and discolouration of rock substance has taken place	
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock	
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects	
Fresh	Fr	No signs of decomposition or staining	

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description	
Fragmented	Fragments of <20 mm	
Highly Fractured	Core lengths of 20-40 mm with some fragments	
Fractured	Core lengths of 40-200 mm with some shorter and longer sections	
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections	
Unbroken	Core lengths mostly > 1000 mm	

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

RQD % = <u>cumulative length of 'sound' core sections ≥ 100 mm long</u> total drilled length of section being assessed

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes	
Thinly laminated	< 6 mm	
Laminated	6 mm to 20 mm	
Very thinly bedded	20 mm to 60 mm	
Thinly bedded	60 mm to 0.2 m	
Medium bedded	0.2 m to 0.6 m	
Thickly bedded	0.6 m to 2 m	
Very thickly bedded	> 2 m	



Plate 14 - Drawing 1 - Site location plan