South Australian
HERITAGE COUNCIL

SUMMARY OF STATE HERITAGE PLACE

REGISTER ENTRY

Entry in the South Australian Heritage Register in accordance with the *Heritage Places Act 1993*

NAME: **Naracoorte Caves Complex** **PLACE NO.:** **26459**

ADDRESS: **8kms south of Naracoorte**

DESIGNATED AS A PLACE OF GEOLOGICAL, PALAEONTOLOGICAL AND SPELEOLOGICAL SIGNIFICANCE

STATEMENT OF HERITAGE SIGNIFICANCE

The Naracoorte Caves Complex is an iconic assembly of 37 large and small caves including 'Blanche & Victoria Fossil Caves, Naracoorte Caves National Park' (State Heritage Place: 11604) that demonstrate a wide range of significant stages in South Australian geological history. The complex provides a World heritage-listed palaeontological record, as well as a significant record of climate change history. It also has significant associations with the scientific work of Father Julian Tenison-Woods and the early development of cave tourism in South Australia.

The limestone landscape and caves contain many significant geological elements demonstrating two very important geological phases in the formation of coastal South Australia – the developing of the new Southern Ocean limestone sea floor (37-12 million years ago) in the Palaeogene and Neogene Periods following separation of Australia from Antarctica, and the commencement of the thirteen ancient coastlines across the region resulting from the Quaternary global Ice-age cycles in the last million years. Evidence of past climates and environmental changes are obtained from dating and chemical analysis of the many speleothems (stalactites, stalagmites and flowstone) and deep sediment sequences contained within multiple caves. The special combination of the Naracoorte ridge and caves within it which record this geological history is not repeated in South Australia or indeed on the Australian continent. Such a dense combination of varied but linked natural cave features set in a unique geological sequence does not occur elsewhere in South Australia.

Directly associated with the sediments, the world's largest and most comprehensive assemblage of Australian mammal fossils dating from 0.5 million years ago is excellently preserved within Victoria Fossil Cave and other sites. These are recognised by UNESCO World Heritage and Australian Natural Heritage designations and are on display to the public with high-quality scientific interpretations. Rated among the world's ten greatest fossil sites, the Naracoorte fossils are a superb illustration of the key stages in the evolution of the unique fauna of Australia - the world's most isolated continent.

RELEVANT CRITERIA (under section 16 of the *Heritage Places Act 1993*)

(a) it demonstrates important aspects of the evolution or pattern of the State's history.

The Naracoorte Caves Complex has significant associations with the early development of tourism in South Australia, particularly cave tourism. After its discovery in 1845, Blanche Cave became popular for public visits, with private operators in Naracoorte advertising daily trips by horse-drawn trap to visit them. In 1885, the caves were taken over by the South Australian Woods and Forests Department, with William Reddan as cave manager. Reddan spent considerable effort improving the caves for tourists, including cleaning up the caves, organising formal tours, and introducing fern gardens based on the European gardening tradition. Around 1900, Reddan discovered the Alexandra and Victoria Caves, the latter containing the internationally significant fossil beds.

The three caves proved to be important tourist attractions, and a range of interpretation materials were developed, many of which were the first of their kind in South Australia. These include the opening of a working fossil excavation site (1970), and South Australia's only bat interpretation centre (1994). In 1994, the Naracoorte Fossil deposits were granted UNESCO World Heritage status, thus reinforcing their role as a significant tourist destination. The caves are currently the only World Heritage Place in South Australia.

The caves complex also provides evidence that helps to understand the impacts of tourism on a site such as Naracoorte. The complex includes a number of caves that have never been opened to the public, providing valuable comparative data on the effects of visitation on cave environments. In particular, the recently-purchased 2.5km Sand Cave comprises a significant large cave system that remains relatively untouched, making it an important 'Reference Cave' for comparison purposes.

(c) it may yield information that will contribute to an understanding of the state's history, including its natural history.

The Naracoorte Caves Complex contains diverse excellently-preserved natural features whose interpretation provides a lengthy and detailed record of important past phases in South Australia's environmental and landscape development.

Geological, paleontological, biological, environmental and climatic information is able to be interpreted from an abundance of elements protected within a series of

natural time capsules and the setting in which they are found, which are unrepeated in South Australia. Research into many such themes has been continuing at Naracoorte for over 50 years.

The cave systems at Naracoorte are located in a limestone range which records a series of specific geological events that document the important Quaternary phase of cave and coastal development in south eastern South Australia –

37-12Ma Extensive Tertiary period marine transgression and seafloor deposition of a series of vast limestone sheets across southern South Australia.

1-1.5Ma The large, ancient regional Kanawinka Fault reactivated and fractured the limestone that runs along the caves ridge, allowing cave development by groundwater solution to commence.

1Ma Stoney Point Gorge at the Naracoorte Caves is cut by Mosquito Creek when the Kanawinka Fault movement tilted the landscape and deflected its course.

1Ma Mosquito Creek flooded the limestone fractures and contributed to cave development by dissolving the interior of the rock, particularly in the major Victoria Fossil Cave.

870ka The ocean which was at the foot of the Naracoorte Caves range at this time began the first of 13 Ice-age cycles of retreat and return, leaving the first dune of the Ice-age sequence on the range itself above the caves.

*Ma = million years *ka = thousand years Dates approximate but scientifically determined

The significance of the Naracoorte Caves in this geological setting is their capacity to provide physical evidence within their structure and sediments spanning one million years. This directly informs a better understanding about the special coastal building sequence of the modern South Australian South-eastern and Coorong coastline and the environmental and climatic conditions under which this occurred.

The Naracoorte Caves Complex is a comprehensive and unique natural data source. The caves themselves are a direct product of the geology and groundwater of the locality. Various caves within the array show many differing aspects and phases of cave development including:

- large chambers with extensive daylight zones and ‘roof windows’
- marine fossils within the limestone walls
- extensive low-level phreatic (groundwater-dissolved) tunnel and maze systems
- significant sediment accumulations spanning hundreds of thousands of years
- special geological features e.g. ‘avens’, ‘phytokarst’, ‘scalloping’, sand cones etc
- enclosed rock collapse passages with zones of decoration and columns
- an array of excellent examples of stalactites, stalagmites and flowstone
- some outstanding assemblages of pristine straws, helictites and dogtooth spar crystal
- sand/silt floors containing abundant excellently-preserved mammal fossils

- fossil deposits covering ~0.5 million years of South Australian marsupial megafauna and diverse associated species, the best such assemblage on the planet.
- several chambers are critical bat maternity or winter hibernating rooms

Nearly all the above-listed features are available and interpreted for the public.

The regional geology examples together with aspects regarding the fossils, bats and the Mosquito creek cutting are unique to Naracoorte and are not repeated elsewhere in Australia. All the above features are contained within a coherent group of caves within the Naracoorte Caves National Park, administered by DEWNR. Some aspects of the cave development processes and decoration contents are found in other South Eastern caves and at Kelly Hill on Kangaroo Island but not as comprehensively, nor as better examples.

(d) it is an outstanding representative of a particular class of places of cultural significance.

The Naracoorte Caves Complex is an outstanding representative of a cave complex. Cave complexes are important to South Australia as geological, environmental and scientific time capsules. Other cave occurrences and complexes exist across South Australia but the localised concentration and extent of the Naracoorte Caves Complex, together with the wide variety and quality of features contained within them make the Naracoorte Caves Complex an outstanding example of this category in the State. The significance of this category to South Australia is its notable and well-preserved multiple contents, many of which are well-recognised in scientific literature. Outstanding examples are –

- The cave themselves are directly derived from the unique association of a coastal Limestone platform and large regional fault line within the South Australian landscape.
- The geological ridge in which the caves are contained is the first of a world-recognised sequence of stranded Ice-age coastal dune systems which commenced ~1 million years ago. These particular geological circumstances directly contributed to the caves' formation.
- Complex sedimentary sequences are found in staggered overlaps within many of the caves. The sequences cover different environmental phases of the later Quaternary period (from 0.5 million years ago to the present) and provide an outstanding continuous interpretable record of South Australia's climate and landscape changes.
- Directly associated with the sediments, the world's largest and most comprehensive assemblage of Australian Mammal fossils dating from 0.5 million years ago is excellently preserved within Victoria Fossil Cave and across many caves within the Place. These are recognised by UNESCO World Heritage and Australian Natural Heritage designations and are on display to the public with high-quality scientific interpretations.

- The rich, varied and delicate array of speleothem (decoration) formations are among the best in South Australia. Many large columns bearing phytokarst (algae/calcite growth combinations) are represented at Naracoorte in the greatest and best-preserved concentration in the State.
- A single large chamber within the Bat Cave is one of only two remaining rooms on the Australian continent and the only chamber in South Australia where the endangered Southern Bent-wing bat species *Miniopterus schreibersii bassanii* is able to continue to breed.

(g) it has a special association with the life or work of a person or organisation or an event of historical importance.

The Naracoorte Caves Complex has special associations with the mid to late 19th century scientific work of Catholic priest and trained naturalist, Father Julian Tenison-Woods. As well as being a prominent Catholic priest and educator, Tenison-Woods is well known as an accurate observer of the physical world who has made original contributions to Australian geology, palaeontology and zoology.

Tenison-Woods arrived in the Naracoorte area in 1857 and used his training to study the geology of the landscape with a special focus on the Naracoorte Caves. Inspired by what he found there, he wrote the following in 1862.

> *He sees that a cavity (but an atom in the world) has by the small dropping of water created itself into a palace, and then as it stood a silent witness to the earth's history, has become a cemetery of creation swept away in one of its changes.*
>
> *(Father Julian Tenison Woods, 1862)*

From his observations, Tenison-Woods wrote a number of important scientific papers, including *Geological Observations in South Australia*, and *History of the Discovery and Exploration of Australia* that were published in London in 1862 and 1865. His 1862 work devoted an entire chapter to the Naracoorte Caves system and also details his elementary excavations of bone in the caves.

From these excavations, and others in the region Father Julian Tenison Woods contemplated that occasional fossils may have been from creatures that no longer existed and that their evolution (a radical concept at the time) had been interrupted/terminated with no apparent extant living relatives. This thinking was at variance with his biblical instruction. Equally, his interpretations of the origins of the limestone sheet with its ancient marine fossils and associations with Mount Gambier volcanoes and large sinkholes were prescient scientific concepts.

STATEMENTS OF DESIGNATION (under section 14(7)(b) of the *Heritage Places Act 1993*)

STATEMENT OF GEOLOGICAL DESIGNATION

Through their specific location and mode of formation, the local geological setting of the Naracoorte Caves demonstrates two very important geological phases in the formation of coastal South Australia – the separation of Australia from Antarctica in the Palaeogene and Neogene Periods (37-12 million years ago) and the commencement of the thirteen Quaternary global Ice-age cycles in the last million years. The landscape and the caves contain many significant geological elements demonstrating evidence of these events. The coastal marine fossil-rich limestone is abundant in South Australia but rare worldwide. The sequence of thirteen Ice-Age coastal limestone ridges across the South East commencing with the Naracoorte Caves ridge is a major and very rare global record of the Quaternary Ice Age sea level fluctuations. Approximately 1 million years ago the Naracoorte Caves Complex began developing along the Kanawinka Fault because the sea was located along its edge.

The limestone landscape of the Naracoorte area and the Naracoorte Caves themselves preserve –

Extensive horizontal maze cave passage systems developed due to the proximity of the original coastline.

The remnants of the original coastal dune which was deposited prior to the last reversal of the earth's magnetic field 780,000 years ago.

The Stoney Point gorge cut through the Naracoorte Caves range by Mosquito Creek when the Kanawinka Fault movement deflected its course.

A comprehensive sequence of sediments in the caves which preserve at least the past 500,000 years of the Quaternary period's environmental, zoological, botanical, biological and climatic history.

An outstanding geological record of the significant effects of the first Quaternary Ice Age at the beginning of South Australia's modern coastal development.

The caves themselves contain an array of evidence which combines to explain the geological story (in time order) –

- Fox Cave: Kanawinka Fault fracturing
- Blanche Cave: Large fault-oriented series of halls
- Wet Cave: Deep fault line cave connecting with older upper level cave system
- Sand Cave: Deepest exposed vertical transect through the depth of range
- Victoria Fossil Cave: Longest South Australian groundwater-dissolved maze passage system
- Cathedral Cave: Large 'cupola-formation' passage development
- Sand Funnel Cave: Ancient dune sands of the previous magnetic reversal
- Alexandra Cave: Exposure of deep sedimentary infill sequence
- Bat Cave: Bio-chemical wall weathering and guano minerals from bat colonies
- All caves: Stalactites, stalactites, flowstone; these also provide geological dates

STATEMENT OF PALAEONTOLOGICAL DESIGNATION

The Naracoorte Caves Complex includes one of two outstanding Pleistocene fossil localities in Australia. Both sites are formally and collectively described as the Australian Fossil Mammal Sites (Naracoorte/Riversleigh), and were inscribed on the World Heritage List in 1994 and the National Heritage List in 2007. Rated among the world's ten greatest fossil sites, the Naracoorte fossils are a superb illustration of the key stages in the evolution of the unique fauna of Australia, the world's most isolated continent.

The entrances of many Naracoorte Caves are a wide diversity of types, shapes and sizes which have closed and reopened many times over at least half a million years (the late Quaternary period). These have trapped comprehensive sequences of Australian mammals, birds, reptiles, amphibians and vegetation that evolved on an isolated continent. Their fossils are excellently preserved in deep multi-layered sediment cone infills which indicate past environmental and climatic variability. The most significant of these are represented in time order –

- Oligocene-Miocene marine species (37-12 Ma) throughout the limestone cave walls and roofs
- Oldest confirmed fossil deposits to date (528 ka) in the Inner Chamber of Cathedral Cave
- Megafauna fossils and Type Locality (500-213 ka) in Victoria Fossil Cave Tourist Chamber
- Vast Megafaunal reference deposit (untouched**) in Victoria Fossil Cave Inner Ossuary Chamber
- Pre-LGM (last Ice Age) fossil sequence (90-70 ka) in Grant Hall, Victoria Fossil Cave
- Faunal/vegetation sequence - last Ice Age (50-14 ka) in Blanche Cave – Third Entrance Chamber
- Ice Age-Holocene faunal/vegetation sequence (50-1 ka) in Wet Cave – flood-sealed upper room
- Megafauna extinction boundary (45-42 ka) in Blanche Cave Third Entrance Chamber
- Megafauna extinction boundary (45-42 ka) in Wet Cave – flood-sealed upper room
- Ice Age-Holocene faunal/vegetation sequence (24-1 ka) in Robertsons Cave
- Undisturbed deposit in Wet Cave sealed lower room (untouched**)
- Reported fossil deposit in Saddle Cave sand beyond rockpile (untouched**)

*Ma = million years *ka = thousand years

**Several sites within caves are almost untouched, in particular some fossil beds. Science recognises the intrinsic value of preserving certain important elements of the caves in their original (pre-human) condition. This provides a significant undisturbed record of the State's palaeo-environment. Science also recognises that such preservation may enable future non-invasive examination and enhanced interpretation using techniques not yet devised or invented for understanding our State's past environment.

STATEMENT OF SPELEOLOGICAL DESIGNATION

The Naracoorte Caves Complex demonstrates the values of Speleology as both a science and an adventurous culture. Caves can provide significant scientific evidence of a previous ages, including for anthropology, palaeontology, geology and environmental change. Speleology is the culture of exploration and scientific discovery within caves. In this spirit, South Australia's community of speleologists (the Cave Exploration Group of South Australia (CEGSA), affiliated with the South Australian Museum) has explored, mapped and documented all the Naracoorte Caves over 60 years, with its greatest contribution being the discovery of the World Heritage Fossils in 1969.

The significant speleological features contained within the Naracoorte Caves are:

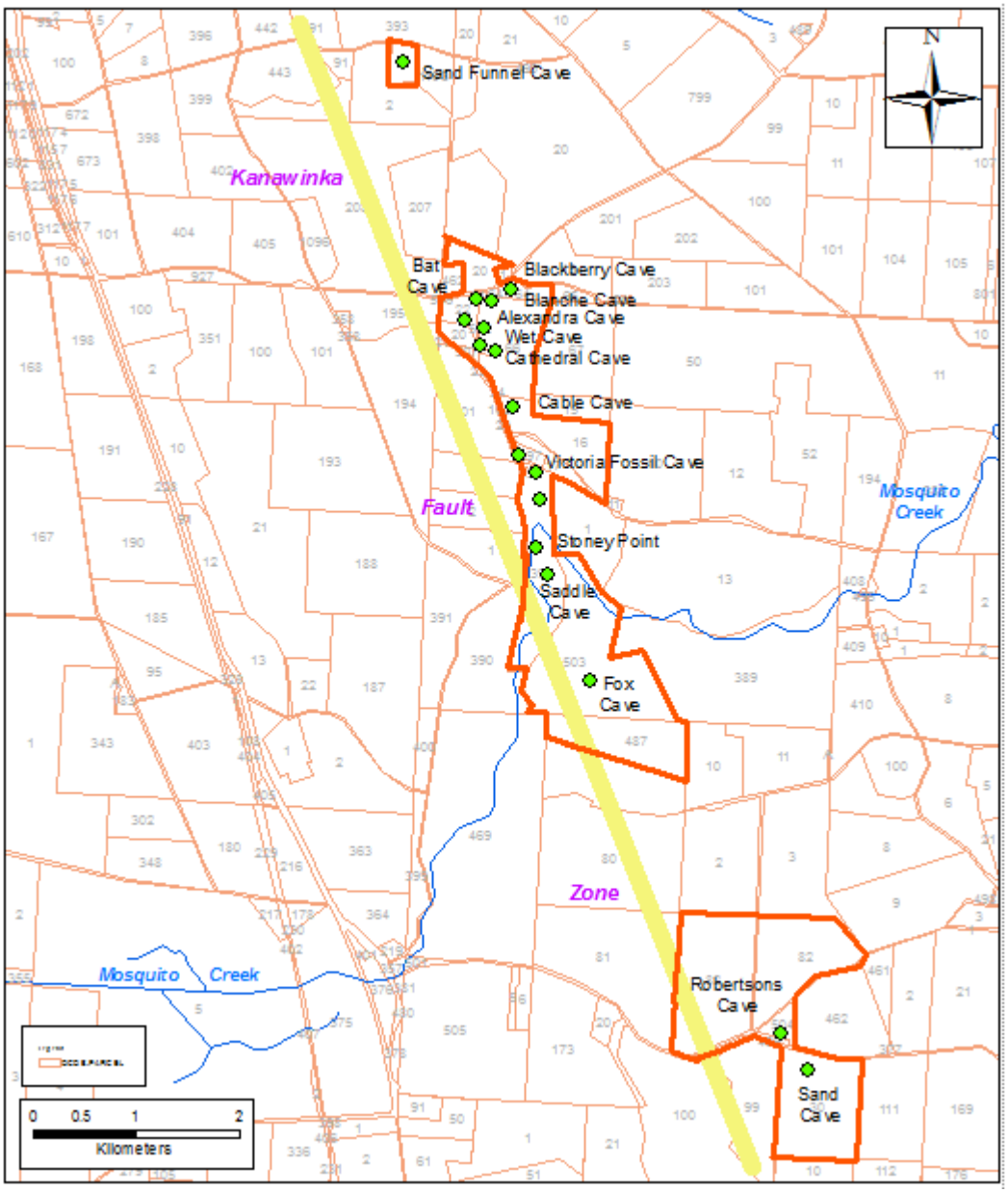
- large chambers with extensive daylight zones and 'roof windows'
- marine fossils within the limestone walls
- extensive low-level phreatic (groundwater-dissolved) tunnel and maze systems
- significant sediment accumulations spanning hundreds of thousands of years
- special geological features e.g. 'avens', 'phytokarst', 'scalloping', sand cones etc
- enclosed rock collapse passages with zones of decoration and columns
- an array of excellent examples of stalactites, stalagmites and flowstone
- some outstanding assemblages of pristine straws, helictites and dogtooth spar crystal
- sand/silt floors containing abundant excellently-preserved vertebrate fossils
- fossil deposits covering ~0.5 million years of South Australian marsupial megafauna and diverse associated species. The World Heritage listing identifies this as the most significant assemblage of its kind.
- several chambers that are critical bat maternity or winter hibernating chambers

The Naracoorte Caves Complex also has strong associations with the development of the discipline of speleology in South Australia. This is demonstrated by a number of significant records developed by CEGSA during the past few decades. In addition, many of the chambers and passages in the caves at Naracoorte have names that reflect speleological culture and their time of discovery, including 'Strawhaven', 'Great Hall', 'The Endless Crawls', Upside-Down Chamber', 'The Contrary Leg' and 'Starburst Chamber'.

SITE PLAN

Naracoorte Caves Complex
8kms south of Naracoorte

PLACE NO: 26459



Site plan generally indicating the boundary of the place. All components are contained within orange boundaries, with key components indicated by dots

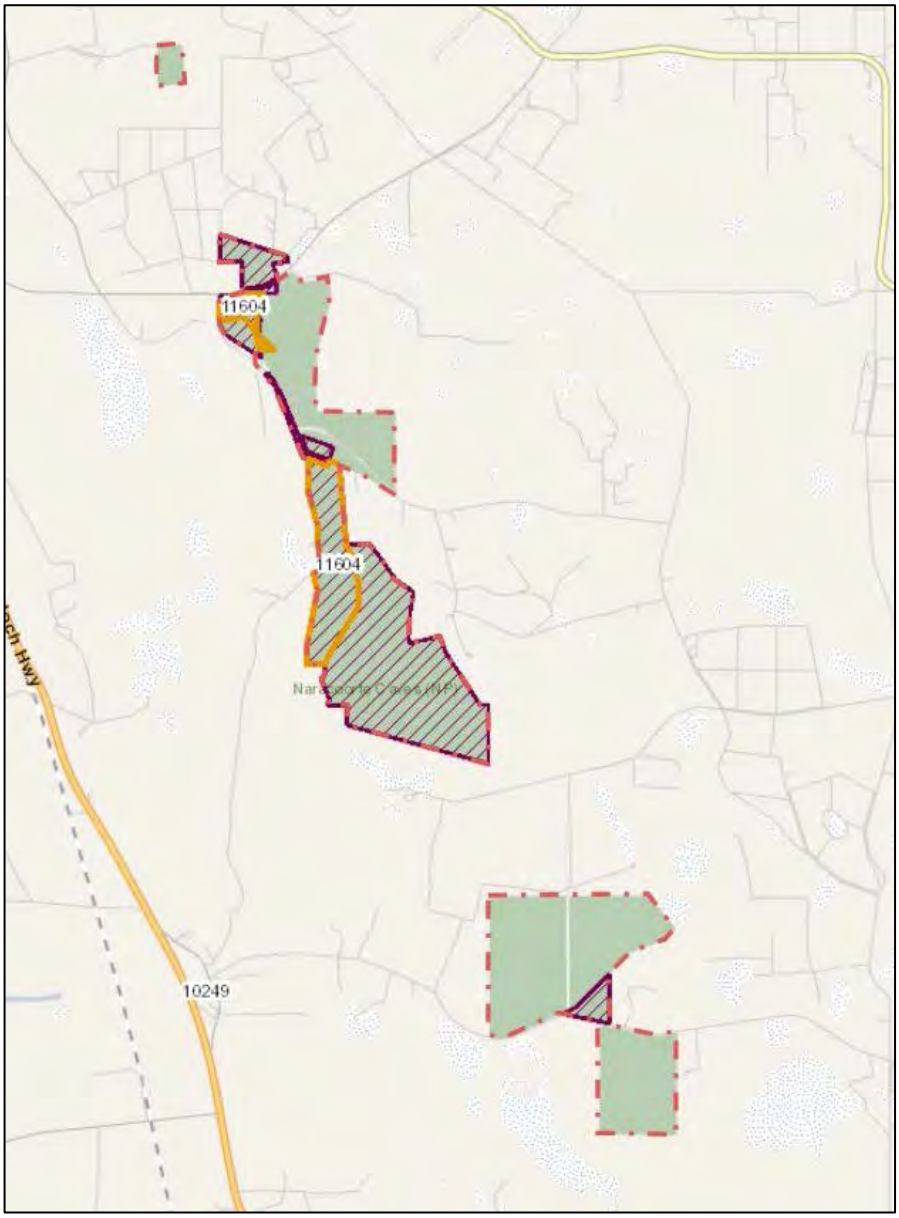
LEGEND

N ↑

- Boundary of place
- Prominent cave-systems of the place
- Location of the ancient Kanawinka fault Zone

HERITAGE LISTING (NATIONAL, WORLD & STATE)

Naracoorte Caves Complex **PLACE NO: 26459**
8kms south of Naracoorte



Plan generally indicating the boundaries of the various heritage protection relevant to this place.

LEGEND N ↑

- Boundary of Naracoorte Caves Complex State Heritage Place
- Existing State Heritage Place within boundary of Naracoorte Cave Complex
- Boundary of **World** and **National** heritage listings

COMMENTARY ON THE LISTING

Description and notes with respect to a place entered in the South Australian Heritage Register in accordance with the *Heritage Places Act 1993*

Physical Description

The Naracoorte Caves Complex is a system of caves within the East Naracoorte Range orientated along the large regional Kanawinka fault of the Gambier Limestone sheet. The many caves contain different combinations of stalactites, stalagmites, flowstone and other ornate micro-decoration, extensive sediment thicknesses, marine fossils in the limestone, and World Heritage vertebrate fossil deposits in a number of inner chambers (including megafauna fossils). Major caves are over 200m in length and up to 30m deep, with interconnecting passages generally formed where groundwater has laterally dissolved the limestone.

Well known caves in this system include:

- Blanche Cave – known for large open chambers with huge columns, settler history and a fossil excavation interpretation site
- Alexandra Cave – known for red sediment chambers with beautiful speleothem decorations
- Wet Cave – known for the self-guided large-room cave with adventure passages and geological features
- Victoria Fossil Cave – known for several decorated chambers and the World Heritage Fossil Beds display used for on-site interpretation

The Naracoorte Caves Complex includes the following existing State Heritage Place as a significant component of the place:

- Blanche & Victoria Fossil Caves, Naracoorte Caves National Park (SHP11604)

The components identified as being intrinsic to the heritage significance of Naracoorte Caves Complex include:

- Bat Cave
- Alexandra Cave
- Appledore Cave
- Blackberry Cave
- Wet Cave
- Cathedral Cave
- Brown Snake Cave
- Sand Cave

- Robertson's Cave
- Fox Cave
- Little Victoria Cave
- Wombat Cave
- Saddle Cave
- Sand Funnel Cave
- Little Cathedral Cave
- Karst pavement (area over Cathedral Cave)
- Stoney Point Cutting including 'Old Swimming Hole' at Stoney Point, Mosquito Creek

The extent of listing excludes:

- Man-made structures and buildings.

History of the Place

Geological History

Approximately 45 million years ago, Australia had finally separated from Antarctica. The Southern Ocean filled the rift and deposited vast deep sheets of marine-fossil limestone across the South East of South Australia, the Murray Plains and the Nullarbor Plain. The Naracoorte region is widely covered by this limestone which contains the caves. Approximately 1 million years ago in the mid-Quaternary period these plains began to be slowly uplifted, a process that continues today. At that time, the sea was located along a coastal limestone ridge at Naracoorte associated with the large Kanawinka Fault.

Due to the proximity of the sea, the Naracoorte Caves Complex began to develop along this fault. At the same time, the first of 13 Quaternary global Ice-age cycles commenced. These caused the sea to withdraw and return approximately every 80,000 years or so. However due to the land's uplift, the sea left 13 progressively younger coastal limestone ridges in a sequence across the limestone plain of the South East to the west of the Naracoorte Caves ridge.

Three major fault lines run across the limestone region and the largest of these, the Kanawinka Fault, runs underneath the length of the East Naracoorte Range. The Fault's movements fractured the limestone in the Naracoorte area and a series of caves developed as local groundwater subsequently dissolved and widened the fractures.

Episodically, the caves have had their 'roofs' collapse which have then acted as natural pitfall traps, resulting in an extensive fossil assemblage of Australian marsupials & mammals (including the Australian megafuana known to have become extinct c43 000ka), birds, reptiles and amphibians, excellently preserved in the extensive dry sands and soil contained within many cave chambers.

European discovery of the Naracoorte Caves Complex

The first cave to be discovered by Europeans was the Big Cave (later renamed Blanche Cave) in 1845 by stockmen. Subsequently, the largest and most obvious caves where the limestone was most heavily fractured became popular for public visits and private operators in Naracoorte advertised daily trips by horse-drawn trap to visit them.

The large open daylight chambers of Blanche Cave in particular became popular as a picnic place and ballroom! One event was reported to have had 1,000 candles installed around the walls of the big room for a dance evening which was attended by the Governor of South Australia and in the year 2000 the Olympic Torch was carried through the length of the chambers.

Early Scientific Documentation of the Caves

Tenison-Woods was well known as an accurate observer of the physical world who had made original contributions to Australian geology, palaeontology and zoology.

> *In 1885 he had been asked to survey the mineral potential of the Indian Archipelago. He also travelled widely in Australia and published over 150 papers in the journals and transactions of Australian learned societies and overseas periodicals; he contributed popular scientific articles to leading Australian newspapers. His substantial reports to government departments described his geological surveys of coal resources and tin-mines in Queensland and the natural history of New South Wales; he published two accounts in 1864 and 1887 of the physical geography, mineral reserves and natural history of the Northern Territory*
>
> (Australian Dictionary of Biography, 1976, Vol. 6)

And despite being in conflict with his faith, Father Tenison Woods made scientific observations with regard to evolution (note that Charles Darwin's *The Origin of Species* was first published in 1859):

> *It has not been mentioned, in the treating of the osseus caves, that the bones of the animals when found in caves, if like existing species, were always much larger than any which are contemporaries with man... and may be stated as having become almost a law in geology... that animals immediately preceding those at present existing on the earth were identical in every particular with the present, only very much larger.*
>
> (Tenison Woods, 1862, p333-34)

Through his interest in caves, he explored a number of sites, not only at Naracoorte, but also more further afield including in Victoria and the Northern Territory. He first wrote of the 'Caves at Mosquito Planes' as they were then called in 1858. The caves were then made the subject of an entire chapter of his 1862 regional study *'Geological Observations in South Australia: principally in the district south-east of Adelaide'* which:

> *...contained descriptions of the volcanic landforms and crater lakes of Mount Gambier, the limestone caves of that area and those at Naracoorte, and notes*

on the abundant fossils of the Tertiary (Miocene) age of this region, including those from the Murray River cliffs. From these strata in the vicinity of Mannum, Tenison Woods described in 1862, the first fossil echinoid from Australia, referred by him to Spatangus and now known as Lovenia forbesii. Many of these fossils are identical to those he later described from Victoria, especially the fauna from Muddy Creek near Hamilton, Batesford Quarry near Geelong, and Fossil Beach on the Mornington Peninsula. He recognised the faunal similarities and correlation of these widely separated localities.

(King, 2016)

A chapter of his *'Geological Observations in South Australia: principally in the district south-east of Adelaide' (1862)* included an account of his excavation of a fossil bed in the Naracoorte Caves Complex nearby Deep Cave:

Long before I had visited these caves, my attention was called to what was stated to be a small pile of bones which were found one day by the accidental breaking of the stalagmite with which they were covered over... The platform is about fourteen feet long by eight broad, and I have no hesitation saying that, excepting the thin layer of stalagmite on top, it consists nearly entirely of bones... how deep the deposit goes, I do not know... I was able to scrape away to a depth of two feet.

(Tenison Woods, 1862, p334)

In this excavation he discovered remains including rodent species, however he notes that there were no bones of a large animal found that would be similar to the large kangaroo bones previously found in the Wellington Valley caves.

The scientific writings of Father Julian Tenison Woods also theorised on the hydrogeological processes of the greater Gambier limestone sheet, which he believed were demonstrated at the Naracoorte Caves, the Mount Gambier Area and the Murray River cliffs.

Bat Colonies and the Guano-mining Industry

The large bat populations of Blanche Cave, Bat Cave, Wet Cave, Cathedral Cave and Robertson's Cave were decimated from the 1860s by Guano miners seeking the hundreds of thousands of years of nitrate rich bat-droppings to use as fertiliser. The miners were known to use noisy and hot equipment to mine the Guano, which they would then lift out through holes they made in the roof of the caves for the purpose. The local bat species is now listed as 'Critically Endangered'.

William Reddan's role and his cave discoveries

Guano mining of the caves system did not remain viable into the 20th Century. Around this time the South Australian Government's Woods and Forests Department directed the local overseer William Reddan to search for more caves. Reddan was able to locate many caves with smaller entrances including Alexandra & Victoria Cave which he persuaded the Department to develop for public viewing.

The area became a Public Pleasure Resort under the South Australian Tourist Bureau and William Reddan spent the next 30yrs developing underground tours and 'beautifying' the entrances. The Tourist Bureau continued management of the Naracoorte Caves Complex until it was transferred to National Parks & Wildlife in 1972.

Contemporary history

In 1969, speleologists including Professor Rod Wells of the Flinders University Department of Biological Sciences discovered a vast extension in the Victoria (tourist) Cave leading to over 4kms of passage systems with two chambers containing an extensive fossil assemblage of Australian marsupials, mammals, birds, reptiles and amphibians, excellently preserved in the extensive dry sands and soil.

These have since been the focus of substantial scientific investigation and were included in the World Heritage Register in 1994.

Chronology

Geology

160 Ma	Australia began separating from Antarctica
60 Ma	Final separation of the two continents; Australia began moving northwards
	Southern Ocean became an unrestricted circumpolar ocean
37-15 Ma	Limestone sea floor developed during the Palaeogene – Neogene periods
15-10Ma	South-eastern Australia underwent a large regional tectonic activation (the Neogene Tectonics) and the limestone seafloor adjacent to the southern continent began to be lifted from the sea
5 Ma	Volcanoes began appearing across Western Victoria, culminating in Mount Gambier's Blue Lake crater
1 Ma	The Kanawinka Fault at Naracoorte fractured the limestone allowing groundwater to begin the development of the Naracoorte Caves to begin
870 ka	The Southern Ocean shoreline was located along the foot of the Kanawinka Fault line, leaving a sand dune along the ridgetop above the developing caves
	A series of ancient dune ridges have been deposited parallel to the coast from Naracoorte to Robe after each of 13 Ice Age cycle sea level fluctuations.
	The dunes are preserved because the limestone landscape continues to rise steadily.
528 ka	Oldest dated fossil records so far confirmed at Naracoorte

60 ka	Approximate time of arrival of indigenous peoples on the Australian continent
45-42 ka	Megafaunal extinction event
6-5 ka	Mount Schank and Mount Gambier erupt, becoming the most recent volcanoes on the Australian continent

European Settlement

1845	First settlers began arriving in the District.
	Pastoral Lease for "Mosquito Plains" granted to Mr. John Robertson. The lease included the Caves Range area.
~1845	Blanche Cave first discovered by Mr. Benjamin Sanders, while searching for stolen sheep.
	Discovery of a calcified body of an Aboriginal adult male in Blanche Cave.
1857	Body examined in situ by Government Interpreter.
1857-58	Blanche Cave visited by Rev. J. Tenison-Woods, who later published a very detailed account of his experience in his book "Geological Observations of South Australia".
1861	Theft of Aboriginal body from Blanche Cave. Court case in Adelaide over theft.
	Body replaced in Blanche Cave by court order, but stolen again.
1862	Report that the body had been taken overseas to London.
	Publication of Tenison-Wood's book.
	First of many "New Year Parties" held in Blanche Cave.
1866	Report from England that "Petrified Native's" body had been auctioned.
1869	Last report of body
1871	Government permitted mining of Guano from caves for use as fertilizer.
1879	Lengthy complaints about vandalism in Blanche Cave. Caves Reserve was as yet unsupervised.
1886	William Reddan appointed as Forester-in-Charge, guide for the Caves and to beautify the area.
1894	S.A. Government voted funds to search Reserve area and surrounding district for more caves and more guano.
1894	Mr. William Reddan discovered Victoria Cave.
1897	S.A. Government Caves Regulation Act, Forest Act 252/82 for the "preservation of the stalactites and stalagmites".

1897	Victoria Cave opened to public inspection by Woods and Forests Department.
1897	First SA Government regulation “For the preservation of the stalactites and stalagmites”
1908	Alexandra Cave discovered by William Reddan.
1909	Alexandra Cave opened to tourists. Visiting days extended to 5 days per week.
1915	Electric Lighting installed by Woods and Forests Department
	Visiting hours extended- All caves on Saturdays, Alexandra on Sundays.
	Tickets 1/- on weekdays and 1/6d on Sundays
1917	Caves Reserve handed over to S.A. Tourist Bureau. William Reddan resigned from Woods and Forests Department to become curator of the caves for the Tourist Bureau.
1920’s	Sawmill run by Forests Department when trees reached maturity.
1943	Bat Cave guano deposits re-assessed for possible war use.
Mid-50’s	Victoria Cave entrance extended to more accessible sinkhole nearby. .
1969	New Ticket Office and Kiosk replaced tin shed above Alexandra Cave after 60 years.
	Fossil Chambers Chamber discovered in Victoria Cave by Dr Grant Gartrell, Dr Rod Wells and other CEGSA members.
1972	Fossil Chamber included as Victoria Cave tour highlight.
	Naracoorte Caves Reserve transferred to National Parks and Wildlife Service.
1975	Victoria Cave name changed to Victoria Fossil Cave.
1977	Booklet "Discover Naracoorte Caves" published and released by CEGSA.
1984	Blanche and Victoria Fossil Caves registered on State Heritage list
1994	UNESCO World Heritage status granted for Naracoorte Fossil deposits
	Infra-red Camera Bat Observation Centre opened to the public
1995	Wonambi Fossil and Megafauna Interpretation Centre opened
2001	*Miniopterus schreibersii bassanii* bats declared a ‘Conservation Dependent’ species
2004	*Miniopterus schreibersii bassanii* bats declared a ‘Critically Endangered’ species
2008	Centenary Celebrations for the opening of Alexandra Cave
2015	New DEWNR Master Plan in preparation

References

This Summary was compiled using the following references:

- Borchardt, D. H., 1976. *Tenison-Woods, Julian Edmund (1832-1889).* [Online] Available at: http://adb.anu.edu.au/biography/tenison-woods-julian-edmund-4700/text7787
  [Accessed 3 August 2016].
- King, R. J., 2016. Julian Tenison Woods: natural historian. Proceedings of the Linnean Society of New South Wales. *138,* pp. 49-56.
- Lewis, Ian D., 2016. *Naracoorte Caves Complex Heritage Assessment Report,* Adelaide, South Australia: State Heritage Unit, Department of Environment, Water and Natural Resources.
- Reed, E., 2016. The mystery photographer and the unknown engraving: new formation on the first photographs of the Naracoorte Caves. *Journal of the Australasian Cave and Karst Management Association,* Volume 103.
- Woods, J. E., 1858. South Australian Geology No. 3: The Caves at Mosquito Plains. *The South Australian Register*, 29 March 1858.
- Woods, J. E., 1862. *Geological Observations in South Australia: principally in the district south-east of Adelaide*. London: Longman Green.
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SITE DETAILS

Naracoorte Caves Complex **PLACE NO: 26459**
8kms south of Naracoorte

FORMER NAME:	Mosquito Plains Caves, The Big Cave, The Old Caves, The Caves, Cave Range	
DESCRIPTION OF PLACE:	37 caves on 22 adjacent land parcels in three groups along the centre of the East Naracoorte Range, Naracoorte, South Australia	
STATE HERITAGE STATUS:	**Description:**	Confirmed
	Date:	17 May 2017
DESIGNATION(S):	Geological, Speleological, Palaeontological	
OTHER HERITAGE STATUS:	A substantial part of this place is included in the World Heritage List and the National Heritage Register. Two caves were also included in the SA Heritage Register in 1984: Blanche & Victoria Fossil Caves, Naracoorte Caves National Park (SHP11604). This place is not included in the local heritage register.	
CURRENT USE:	**Description:**	National Park
	Dates:	1972
PREVIOUS USE(S):	**Description:**	Guano Mining; Forestry Site; SA Tourist Bureau;
	Dates:	1860s-1900s; 1880s-1925; 1925-1972
ARCHITECT:	**Name:**	N/A
	Dates:	N/A
BUILDER:	**Name:**	N/A
	Dates:	N/A
LOCAL GOVERNMENT AREA:	**Description:**	Naracoorte Lucindale Council
LOCATION:	**Street:**	8kms south of Naracoorte, SA
	Post Code:	5271

LAND DESCRIPTION:

CR5980/729 A1 D66931	CR5970/594 A66 D55385	CR5622/225 S82 H440800
CR5918/914 A102 D63720	CR6043/689 Q16 D66930	CR5622/225 S487 H440800
CR5658/437 A20 D51601	CR6043/689 Q17 D66930	CR5622/225 S499 H440800
CR5849/443 A20 D54456	CR5849/443 Q23 D54456	CR5622/225 S503 H440800
CR5658/438 A21 D51601	CR5849/443 Q24 D54456	CR5622/225 S504 H440800
CR5658/439 A22 D51601	CR5622/224 S398 H440800	CR5622/225 S506 H440800
CR6062/981 A30 D44224	CR5622/225 S392 H440800	CR5622/225 S507 H440800
CR5970/592 A64 D55385	CR5622/225 S397 H440800	CR5658/438 S647 H440700

PHOTOS

Naracoorte Caves Complex
8kms south of Naracoorte

PLACE NO: 26459

Blanche Cave – large columns in the first chamber approaching the second (middle) entrance (Source: Steve Bourne)

Victoria Fossil Cave – Undisturbed fossil remains of the Inner Ossuary (Source: DEWNR)

PHOTOS

Naracoorte Caves Complex **PLACE NO: 26459**
8kms south of Naracoorte

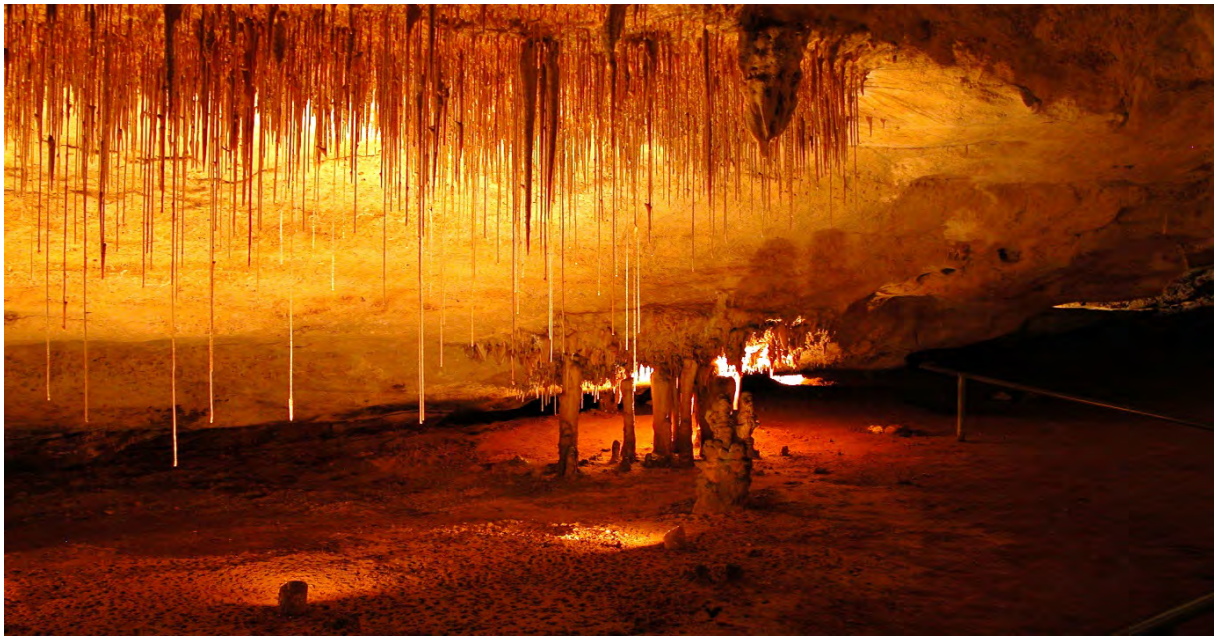
Alexandra Cave Mirror Pool – straws and helictites in the centre chamber
(Photo: Steve Bourne)

PHOTOS

Naracoorte Caves Complex
8kms south of Naracoorte

PLACE NO: 26459

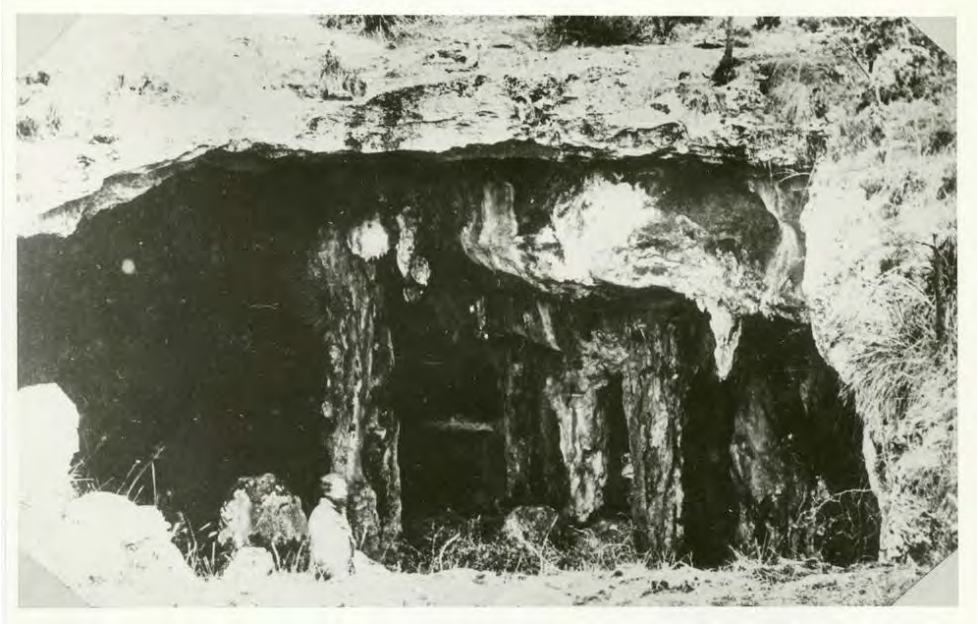
Tree roots penetrating into Fox Cave (Photo: Steve Bourne)



Assembly of straws in Alexandra Cave (Photo: Tripadvisor)

PHOTOS

Naracoorte Caves Complex **PLACE NO: 26459**
8kms south of Naracoorte



Julian Tenison-Woods at Blanche Cave, 1860, photographer Thomas Hannay.
(State Library of South Australia, B36860) – Source: Reed, 2016, p6

Fox Cave, photographer: Steve Bourne

A typical passage of major caves in the Naracoorte Caves Complex. This chamber in Fox Cave contains a large sand cone which has accumulated progressively through a small circular 'solution tube' entrance above. Sand cones are of particular interest to palaeontologists as they contain the remains of many creatures which have fallen into the tube entrances (known as 'pitfall traps'). Sand layering within the sand cone structure is complex and contains much environmental information.