

Jenolan Caves

Grand Arch Precinct Master Plan | 2024



The Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the land at and surrounding this precinct in the traditional Country of the Gundungurra Nation and pays its respects to Elders past, present and future.

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Cover photo: Jenolan Caves House, JPW.

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Published by:

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ISBN 978-1-922767-63-9

2024

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List of abbreviations

JCRT	Jenolan Caves Reserve Trust
DCCEEW	Department of Climate Change, Energy, the Environment and Water
PoM	Plan of Management
CMP	Conservation Management Plan
NPWS	NSW National Parks and Wildlife Service
JCH&PS	Jenolan Caves Historical & Preservation Society
WSUD	Water Sensitive Urban Design
OEH	Office of Environment and Heritage



**We acknowledge and convey
our respects to the people of
the Gundungurra Nation, the
Traditional Custodians of the land
on which this project is located
and pay our respects to Elders
past, present and emerging.**



This is the traditional land of the Gundungurra Nation, an ancient karst landscape with spectacular cave displays steeped in early tourism history and teeming with rich diversity in flora and fauna.

1. Executive summary

Project proposal

The Grand Arch Precinct at Jenolan Caves is a place of extraordinary natural beauty, featuring rich ecological diversity interwoven with a layered cultural landscape of many perspectives and histories.

It is the traditional land of the Gundungurra Nation, an ancient karst landscape with spectacular cave displays steeped in early tourism history and teeming with a vast diversity of flora and fauna.

Jenolan Caves Grand Arch Precinct is located within the Jenolan Karst Conservation Reserve in the Central Tablelands region, west of the Blue Mountains in New South Wales (see Figure 4.1 Location Plan).

Jenolan Caves features the largest and most spectacular caves display in Australia. It is a complex environment with significant cultural, natural and historic values. It is an important place for the local community and a significant tourism destination, both locally and internationally.

JPW has been engaged by the Jenolan Caves Reserve Trust (JCRT), a part of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), to develop a master plan for the precinct.

Jenolan Caves Grand Arch Precinct Master Plan will establish a set of design principles to protect the qualities that make the precinct a major tourist attraction, while managing the evolving tastes and changing needs of increasing visitor numbers.

The guiding theme is to enrich the visitor experience, upgrade visitor safety and provide access for a broad range of visitors. This master plan caters to the current visitor level while respecting the natural and cultural values of the place.

The master plan considers the challenges and opportunities across the Grand Arch Precinct and the broader Visitor Use and Services Zone for a coordinated implementation of future projects.

It is strategic and is structured to allow for updates to meet the issues and challenges of the future.

The master plan aims to deliver high-quality, nature-based visitor experiences in the Grand Arch Precinct to improve the visitor service offering and quality of experience. It presents concepts for revitalising visitor facilities and services within the precinct, tying together capital projects, flood recovery works and business-as-usual improvements into a cohesive plan, consistent with the *Jenolan Karst Conservation Reserve Plan of Management (PoM)* (OEH 2019) and the *Jenolan Karst Conservation Reserve Conservation Management Plan (CMP)* (Urbis 2017).

Central to the master plan is the proposal for a new Gateway Centre and redesign of the Jenolan Village. The master plan focuses on improving pedestrian connectivity throughout the site, primarily by introducing a shared zone from De Burghs Bridge to Carlotta car park. Primary vehicle access is proposed to be via the Two Mile section of Jenolan Caves Road, helping to improve and rationalise movement throughout the precinct.

Solutions proposed in the plan are focused on resolving visitor flow and access and do not include long-term parking and access solutions for the precinct.

The master plan also includes:

- revised and upgraded walking tracks including tracks closed due to rockfall, an upgraded walking track to the Camping Precinct and a new walk from Cambridge car park to Surveyors Creek Dam
- a new accessible connection from Carlotta car park to Carlotta Arch lookout, including an upgraded viewing platform
- a new self-guided walk through Nettle and Arch caves via the Devils Coach House
- proposed upgrades to the Blue Lake Walk
- proposed uses and upgrades to existing buildings
- a revitalised camping area along the Jenolan River

- guidelines for materials and new built form
- upgrades and locations for new wayfinding signage
- rockfall protection measures.

This master plan has been prepared and exhibited to meet a requirement of the reserve's PoM, to guide future provision of visitor facilities and services including day-use activities, camping, traffic management, landscape and signage in the reserve's Visitor Use and Services Zone. Once the master plan is exhibited and approved, the works outlined in the master plan become permissible under the PoM.

All future works will be subject to detailed design and environmental assessment. The majority of the proposed development will occur on karst. Karst environments are highly sensitive to disturbance and considerable care is required to minimise the impact of development (e.g. during the demolition of existing infrastructure and construction of new services). *Guidelines for Undertaking Development on Karst in OEH Reserves* (OEH 2013) applies to all development on karst.

2. Background

Why is this master plan needed?

In 2017 and 2019 the NSW Government announced funding to upgrade existing visitor facilities within the Grand Arch Precinct.

This funding will support the delivery of key upgrades to visitor facilities including a new Gateway Centre, refurbishing Caves House and significantly improve visitor experiences by improving the quality and accessibility of visitor facilities and accommodation.

The internal refurbishment of Caves House is expected to commence in 2024. This master plan will not detail specifics but supports the program to repair and renovate the aging asset and restore the building to its former glory as a functioning hotel.

The 2019-20 bushfires created significant damage to the reserve, as did the floods in 2020 and 2021. Work is being undertaken to restore services, replace or upgrade damaged stormwater management utilities and repair visitor infrastructure. Loss of one of only two access roads means that a re-imagining of the visitor precinct and arrival experience is necessary.

This master plan will complement other existing projects, with a coordinated and cohesive approach to improve the overall visitor experience.

Aspects of the Grand Arch Precinct identified for upgrading, renewal or reuse include: lighting, signage, furniture, hardscape materials, landscaping and heritage gardens.

Objectives

- Present a cohesive and contemporary strategy for the provision of outdoor visitor facilities and services in the precinct.
- Develop upgrades to a quality that matches its importance as an iconic tourism destination with offerings competitive at a national and international scale.
- Design guidelines to ensure new developments or alterations are aesthetically compatible with the existing natural character of the precinct.
- Provide meaningful engagement with and opportunities for Aboriginal people.
- Achieve long-term sustainability through best practice design, choice of materials and construction techniques.
- Promote, protect and respect the environmental and cultural heritage of the region and inspire future conservation advocacy and stewardship, including through interpretation.
- Provide new opportunities for fully accessible nature-based experiences.
- Present strategies to ensure walking tracks and activities are safe and protected from natural hazards.



Figure 2.1 Grand Arch Precinct Master Plan pathway

Key Precinct objectives

Customer experience

The Grand Arch Precinct can be accessed by transport options that are safe, affordable, accessible, efficient and reliable, contributing to a positive customer experience.

Environment and heritage

The unique natural and cultural values of the World Heritage Jenolan Karst Conservation Reserve and Grand Arch Precinct are conserved for present and future generations.

Resilience

The Grand Arch Precinct is resilient and responsive to challenges.

Performance and sustainability

The Grand Arch Precinct performs at its full sustainable capacity whilst providing an exceptional experience at best value to the NSW Government.

Regional benefits

The Grand Arch Precinct is highly valued by the community and makes a positive contribution to regional prosperity.

Stakeholder engagement

A stakeholder reference group has been established to provide feedback throughout the development of the master plan, to help and identify issues and opportunities and to enable consistent collaboration with the community.

Draft master plan reports were issued to the stakeholder reference group at 50% and 90% stages. Feedback provided from the public exhibition was incorporated in the final master plan prior to adoption of the master plan.

The stakeholder reference group included:

- Gundungurra ILUA Consultative Committee
- Gundungurra Aboriginal Heritage Association
- Pejar Local Aboriginal Land Council
- Oberon Business and Tourist Association
- Jenolan Environment Protection Committee
- Jenolan Caves Historical and Preservation Society
- Australian Speleological Federation
- Oberon Council
- Neighbouring property owner and former resident.

Agencies including Transport for NSW and NPWS have also been involved in those parts of the master planning process relevant to their subject matter expertise.

3. Jenolan Caves Reserve Trust strategic goals

Conservation

The natural and cultural heritage values of Jenolan Caves are conserved for present and future generations.

Our priority focus:

We will ensure the natural and cultural heritage values of Jenolan Caves are conserved by:

- minimising impacts on the reserve – our visitors are managed in a way that not only minimises their impact but also educates them about how they can minimise their broader impact on the environment
- strategically managing our assets – our assets are managed in a way that conserves and protects the values of the site, while enhancing the visitor experience
- promoting research – scientific, speleological and historical research is used and highlighted in the visitor experience and interpretation
- prioritising – activities that recognise the karst conservation reserve status of the area, its World Heritage, state and national heritage values as well as its significant catchment values are given priority.

Sustainability and performance

Jenolan Caves operates in an environmentally, socially and financially responsible and sustainable manner.

Our priority focus:

We will ensure all activities at Jenolan Caves operate in a sustainable and responsible manner by:

- thinking sustainably – we analyse and monitor the sustainability of all our activities from a commercial, environmental and social perspective
- adapting to climate change – we aim to future proof our operations by considering the impacts of climate change and responding accordingly
- being self-funded – we reinvest to enhance the visitor experience and ensure the protection and conservation of reserve values
- work health and safety and visitor safety – we get everyone home, without harm, every time
- strategically managing our assets – our assets are managed in a way that ensures they perform at optimal levels, life cycle costs are budgeted for and risks associated with assets are reduced.

Connection

We deliver life-changing visitor experiences that leave our visitors with an increased appreciation and understanding of the rich natural and cultural heritage of Jenolan Caves.

Our priority focus:

We connect our visitors to the natural and cultural heritage of Jenolan Caves by delivering immersive, inspiring and innovative visitor experiences that:

- inspire action – experiences we offer will increase knowledge and inspire positive action for the conservation of natural and cultural heritage values and the protection of the environment
- create connections – our visitors connect with each other, with the environment and with the natural and cultural heritage of Jenolan Caves
- exceed expectations – our experiences exceed visitor expectations, every time; cementing our position as one of Australia's best and most iconic tourism attractions
- create memories and evoke nostalgia – our visitors leave with life-long memories that inspire them to share stories of their experience and to return with their children, grandchildren, friends and family to share the magic of Jenolan
- provide educational opportunities – students, teachers and the community learn through participating in our immersive and tailored educational experiences and programs.

Community

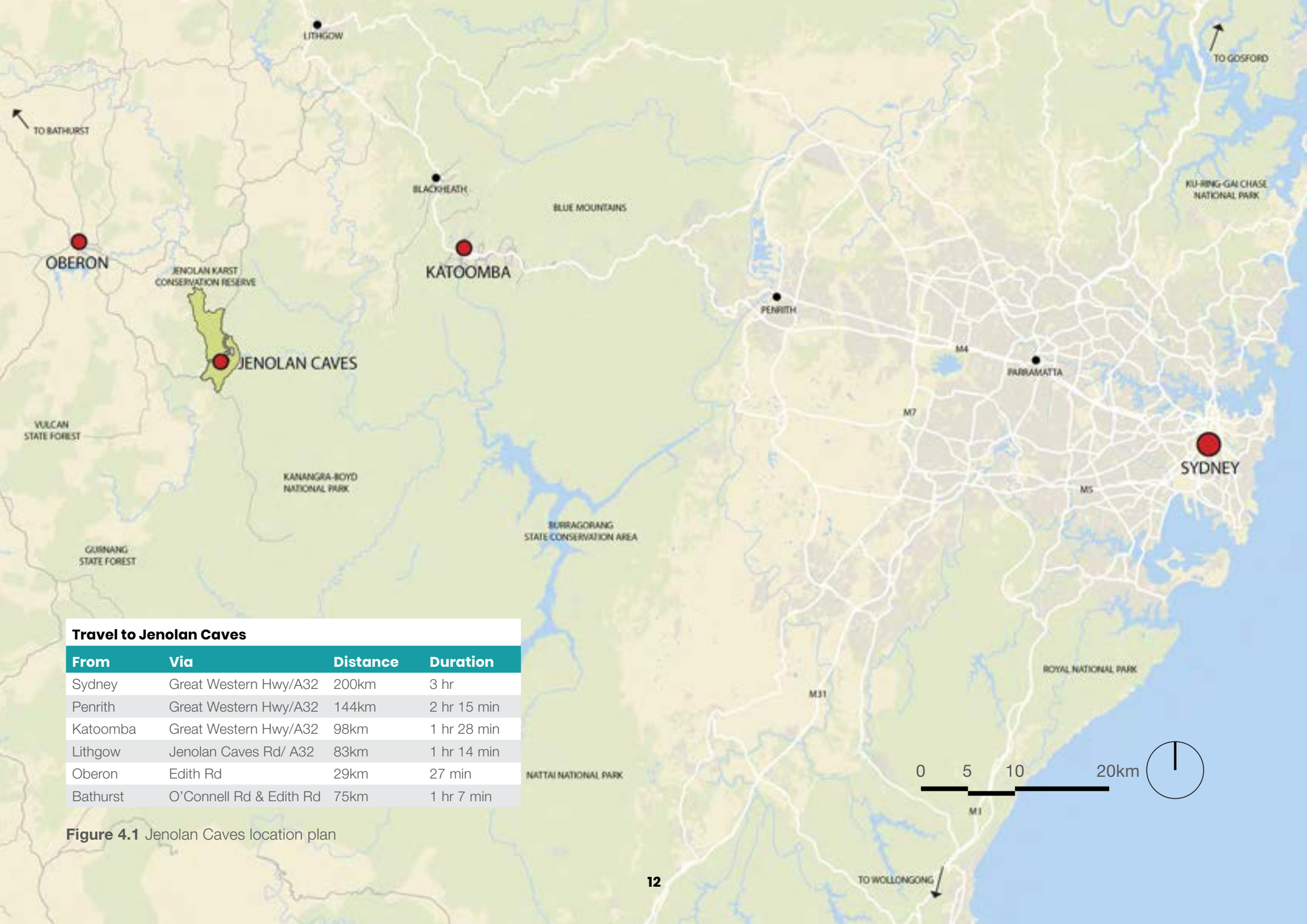
Jenolan Caves is highly valued by the community and makes a significant contribution to regional prosperity.

Our priority focus:

We will contribute to regional prosperity and ensure Jenolan Caves is valued by:

- being actively involved – Jenolan Caves staff are actively involved with community groups, committees and organisations
- instilling community pride and connection – our community has a strong connection to the natural, cultural and Aboriginal heritage of Jenolan Caves
- supporting local suppliers – we prioritise procurement of goods and services from local suppliers who meet the standards we require and we support others to reach those standards
- supporting local jobs – actively promoting opportunities for employment and training for local people at Jenolan Caves.





Travel to Jenolan Caves			
From	Via	Distance	Duration
Sydney	Great Western Hwy/A32	200km	3 hr
Penrith	Great Western Hwy/A32	144km	2 hr 15 min
Katoomba	Great Western Hwy/A32	98km	1 hr 28 min
Lithgow	Jenolan Caves Rd/ A32	83km	1 hr 14 min
Oberon	Edith Rd	29km	27 min
Bathurst	O'Connell Rd & Edith Rd	75km	1 hr 7 min

Figure 4.1 Jenolan Caves location plan

4. Site overview

Site location

The Jenolan Karst Conservation Reserve is situated on the western edge of the Blue Mountains and is located approximately 83km southwest of Lithgow, 98km west of Katoomba and 200km west of the Sydney CBD. The reserve is located in mountainous country, forming a dissected eastern margin of the highland plateau east of the town of Oberon. It includes McKeown's Valley, which is a significant fluvial karst valley.

Natural, cultural and heritage values

- The Jenolan area has long formed an important part of the culture of the local Indigenous people, holding particular significance for the Gundungurra Nation who originally referred to the area as Binomil or Bin-oo-miur among other names. The caves remain a significant part of Indigenous culture.
- The reserve is highly significant as one of the earliest public reserves set aside in New South Wales for the protection of a natural resource (the caves).
- The caves are highly regarded for their aesthetic qualities and cave formation. The range of karst decoration includes remarkably diverse mineral species, equal to the finest in the world. This is the most visited cave system in Australia.
- The reserve is part of the National and World Heritage listing for the Greater Blue Mountains. It is significant for its outstanding examples of ongoing ecological and biological processes that are important in the evolution of Australia's

highly diverse ecosystems and communities of plants and animals, particularly eucalypt-dominated ecosystems. It is host to a number of rare and endangered plants and animals, including stygofauna species.

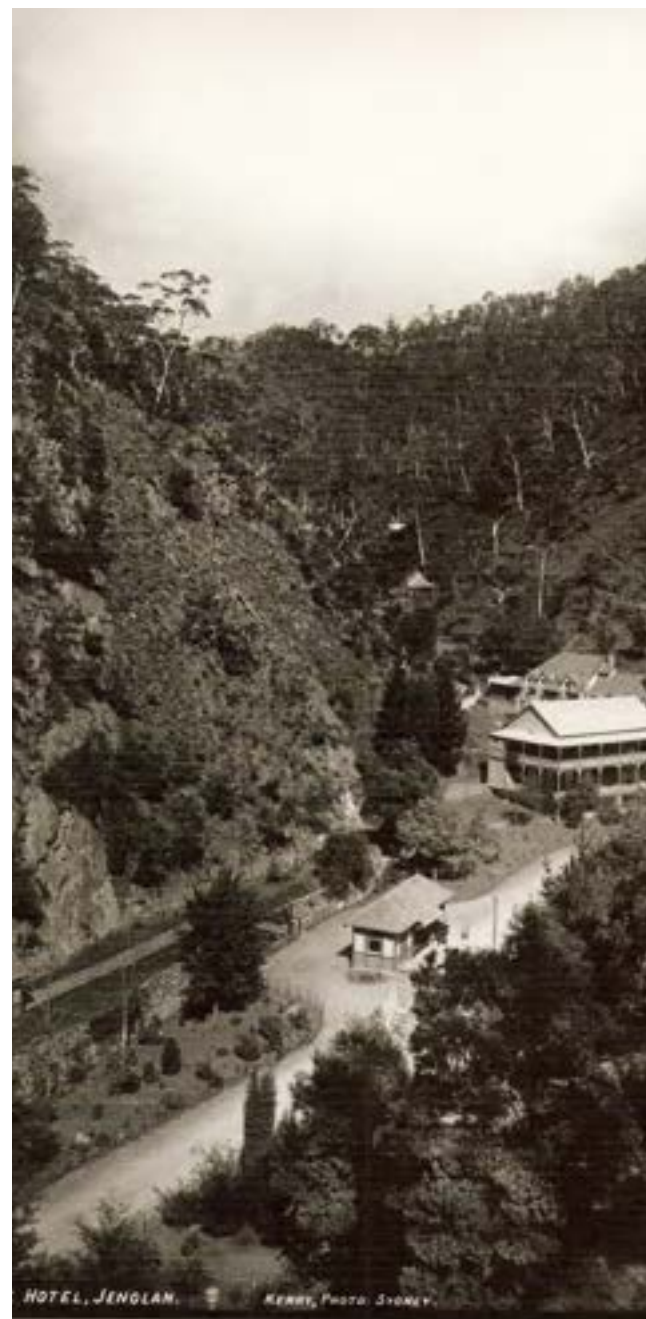
- The reserve is of state significance for its historical values, including the early infrastructure and implementation of innovative design to minimise damage to the karst system. The first use of electric cave lighting in Australia and the early development of hydroelectric power in Australia both occurred at the reserve.
- Caves House is also highly significant as it is the first attempt by a government to promote and regulate tourism at an area of acclaimed heritage value in Australia.
- Jenolan is one of the most important areas of natural and cultural history in Australia.

Topography and landscape features

The reserve contains an extensive network of limestone caves and is an excellent example of karst topography. Jenolan is situated in a deep valley cut by tributaries of the Jenolan River into the Blue Mountains plateau. The caves have formed where the river and its tributaries have dissolved the 150m thick limestone, which dips steeply to the west.

The reserve protects most of the upper catchment of the Jenolan River which is located within the Warragamba catchment and the mid-catchment of the Coxs River.

The most prominent surface karst feature is the wall of limestone 90m high and in excess of 150m wide at the confluence of the Jenolan River and



Caves House, 1900. Photo: JCRT

Surveyors Creek. There are three karst bridges - the Grand Arch, through which the road runs and which is being cut by Surveyors Creek; the Devils Coach House which is the floodwater channel of Jenolan River; and Carlotta Arch, a stone bridge containing stalactites which are part of a collapsed cave system. These features are internationally renowned.

Hydrology

The Jenolan River flows on the surface until it sinks into alluvial flats on the edge of the limestone. Below ground, the river flows through open and flooded cave passages before finally emerging in Blue Lake. The caves were formed by the dissolving action of mildly acidic water on carbonate rock. This includes passages formed under the water table and sculpted by underground streams.

Camp Creek flows north and Surveyors Creek flows north-east towards the Grand Arch Precinct in the southern part of the reserve.

Surveyors Creek flows down a valley to the rear of Cambridge car park. It then enters a below-surface culvert system that extends to the western entry of the Grand Arch. At this point, the culvert disappears before finally emerging at the eastern entry to the Arch, where it flows into the Blue Lake.

Camp Creek sinks into subterranean limestone approximately 2km north of Caves House. In wetter periods, stormwater drains handle overland flows. After passing through a series of caves, the water finally surfaces at Blue Lake.

Blue Lake was created in 1908 by damming the Jenolan River to secure the water supply to the hydroelectric system used to illuminate the caves. The lake is approximately 4000m². The lake's blue colour is the product of the action of sunlight on the lake's waters which have a high concentration of calcium carbonate (CaCO₃).

There are also two smaller dams in the reserve including one along Surveyors Creek and the hydro dam adjacent to the Jenolan River Trail.

The quality and composition of water entering subterranean karst environments has direct impacts on cave biota and cave forming processes.

The Jenolan River is affected by:

- water storage, treatment and extraction for domestic water consumption
- changes in vegetation and an increase in impervious areas altering run-off flow patterns
- surface pollution and stormwater run-off from developed precincts.

Water quality and the maintenance of natural hydrological processes are critical to karst development and maintenance. Because it is vital to protect water quality and local hydrology during and after development within the precinct, future development will incorporate ongoing consultation with karst specialists during detailed design, planning and assessment stages.

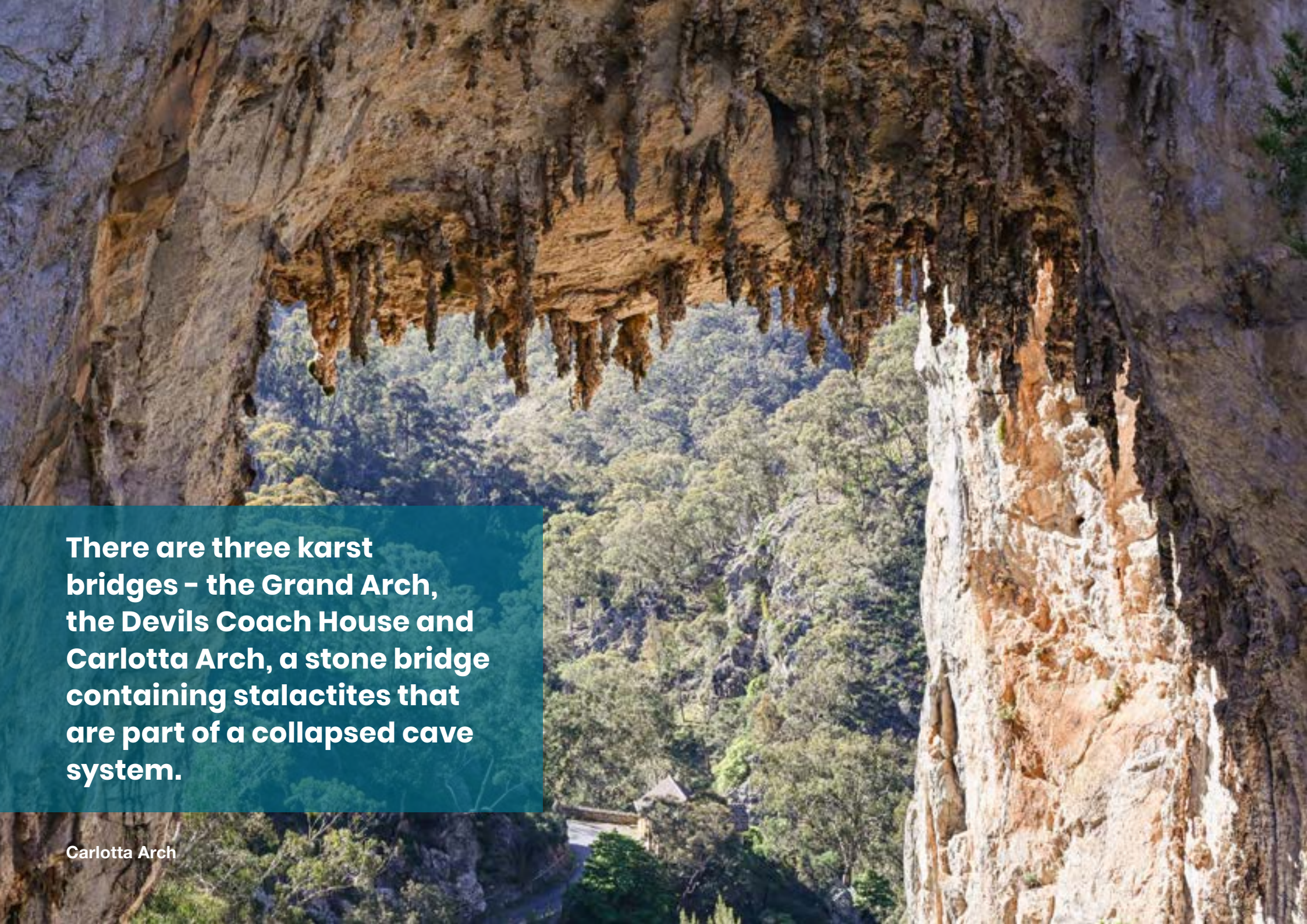
Caves

There are over 300 cave entrances within the reserve. A significant percentage of the discovered cave passages are linked, forming one large system within three catchments. The caves contain rich cave-dwelling (troglobitic) fauna of outstanding aesthetic qualities and a diverse range of speleothems and minerals.

A large number of invertebrate fossils have been discovered in the limestone of the Jenolan Caves. These include corals, stromatoporoids, algae, brachiopods, gastropods and straight nautiloids. Subfossil remains of many vertebrates are also found in the caves including important megafauna and small mammal remains.

Highly decorated passages and chambers are found in a number of the caves. Combined with the spectacular arches and underground river systems, these provide the primary visitor experience.

The construction of elevated walkways, viewing platforms and metal stairways within several developed or semi-developed caves has enhanced this experience, providing visitors with the opportunity to view speleothems of contrasting shape, form and decoration. Visitor infrastructure in the show caves also includes lights, artificial cave openings, ladders and railings.



There are three karst bridges – the Grand Arch, the Devils Coach House and Carlotta Arch, a stone bridge containing stalactites that are part of a collapsed cave system.

Carlotta Arch

Key views

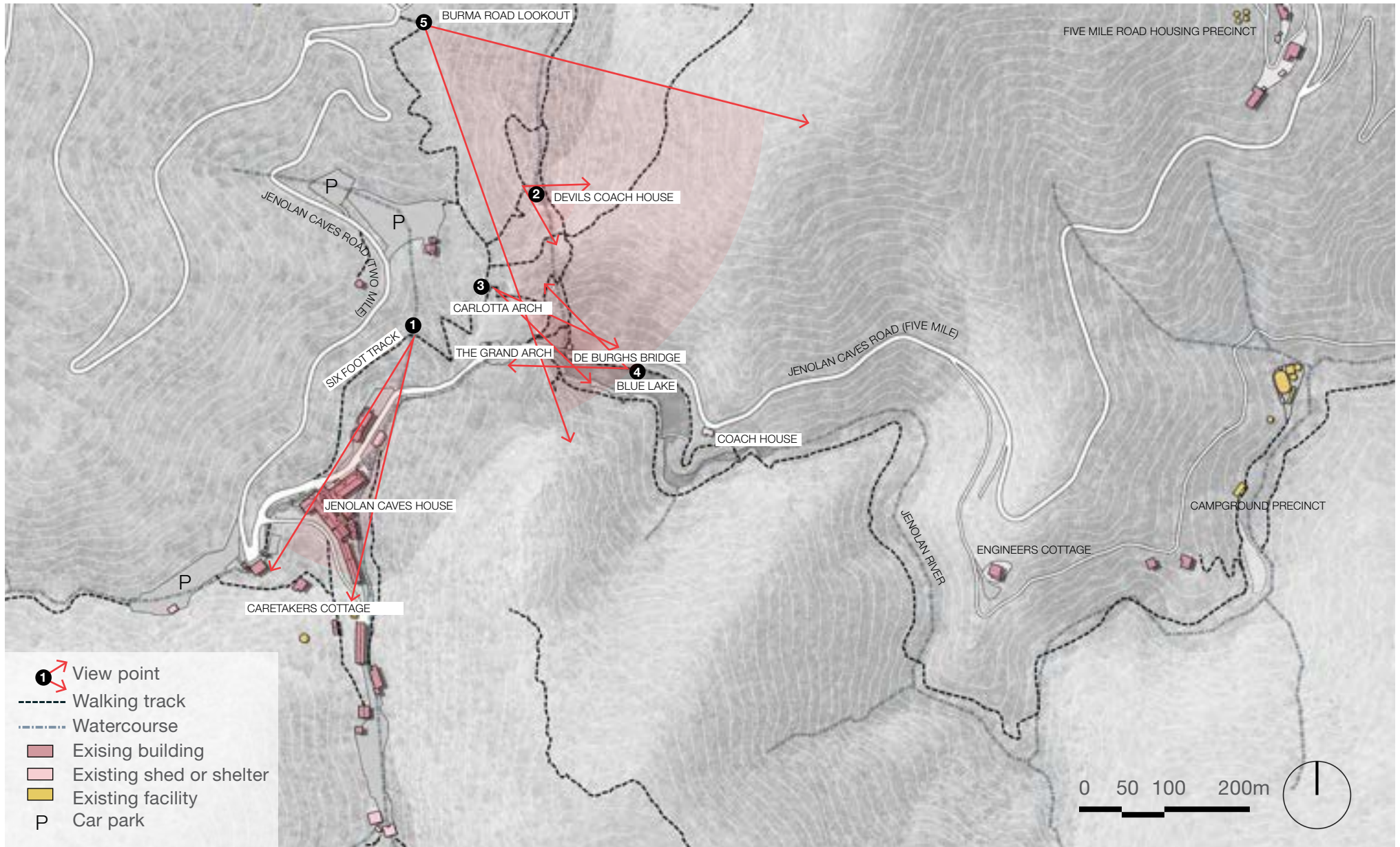
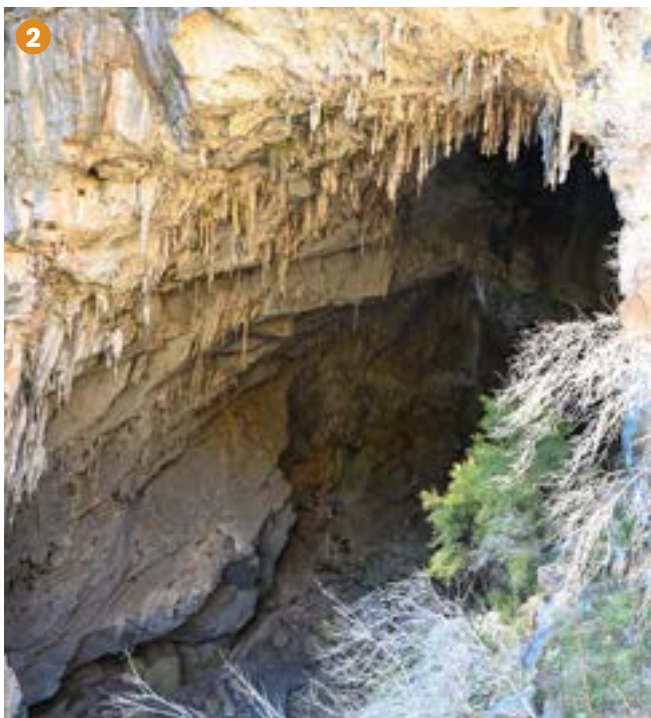


Figure 4.2 Key viewpoints plan



1. View towards Caves House and the Caretakers Cottage from Six Foot Track.
2. View towards Devils Coach House.



3. View towards Carlotta Arch and the Blue Lake from the walking track looking over Carlotta Arch.



4. View to The Grand Arch, Carlotta Arch, Blue Lake and De Burghs Bridge, from Blue Lake Walk.
5. View over McKeown's Valley and towards the Devils Coach House from the Burma Road lookout.



1. Ticket and guides offices and public toilets
2. Old Post Office
3. Hill Flats

Site buildings

Refer to Figure 4.3 for building locations. Buildings included in this site analysis are only those affected by this master plan.

Caves House is part of a separate upgrade project.

CMP definitions

High significance = demonstrates a key aspect of the place's overall heritage significance. Should be retained and conserved. Retention should be considered in-situ.

Moderate significance = contributes to the place's overall heritage significance. Change is allowed as long as it does not adversely affect the overall significance of the place or fabric of exceptional or high significance.

Little significance = may have been substantially altered or modified which detracts from the significance, or demonstrates utilitarian use that has no particular significance for the site.

Neutral significance = fabric or elements that neither contribute to nor detract from the overall significance of the place.

Intrusive = damaging to the place's overall heritage significance. These can be considered for removal or alteration.

1. Ticket office, guides office and toilets

The ticket office originally abutted the waiting shelter and was used as a kiosk. More recently, structures have been added to either side for the guides office and toilets. Surrounding public spaces are tight, with potential conflicts between pedestrians and vehicles.

Significance: ticket and guides offices, moderate (local); male and female toilets, little.

2. Old Post Office

The Old Post Office is currently located next to Hill Flats on the Two Mile section of Jenolan Caves Road. It houses the Jenolan Caves Historical & Preservation Society's museum.

The CMP recommends the Old Post Office building be relocated within the Grand Arch Precinct and interpreted. In addition, it also recommends external repainting and repairs as required to roof tiles, flashings and guttering.

Significance: high.

3. Hill Flats

Hill Flats is located behind the Old Post Office on the Two Mile section of Jenolan Caves Road. The flats are currently unused as the structural slab is inadequate for the building and needs replacement. The building is also located directly over Surveyors Creek culvert which needs repair work, requiring the demolition of the building.

Significance: low.



4. Gatehouse Lodge
5. Binoomea Cottage
6. Caretakers Cottage

4. Gatehouse Lodge

Gatehouse Lodge is a three-storey building catering for school groups and backpackers. Each of the 14 rooms have two bunk beds and each level has a kitchen. Although functional, the lodge is dated and in need of upgrades.

The CMP states that modifications to allow the original verandah configuration to be more discernible should be considered to recover the significance. Original roughcast external finishes should be retained.

The external and internal form of the building should be retained and conserved, including a representative sample of 1950/60s bathrooms.

Significance: high (local).

5. Binoomea Cottage

Binoomea Cottage is self-catered accommodation for families and larger groups, offering two self-contained apartments.

Parking is available directly outside the cottage. Views from the cottage overlook the workshop area and car park.

Significance: little.

6. Caretakers Cottage

Caretakers Cottage is a picturesque two-storey self-contained cottage set in the hills behind Caves House and is dominant in early photos of the precinct. It is a vacant but significant building and is currently undergoing maintenance works.

Access to the Caretakers Cottage is via a steep dirt track and the building needs significant conservation work to ensure re-use (as recommended in the CMP).

Significance: high (state).

7. Boiler Makers Cottage

Boiler Makers Cottage is a self-contained cottage in the same hillside location as Caretakers Cottage. Boiler Makers Cottage is unused and access is difficult. The CMP recommends re-use or management in a 'mothball' state.

Significance: high (local).

8. Wallaby Hall

Wallaby Hall is located opposite Gatehouse Lodge on Boiler House Road. It has traditionally been used as a space for school groups, with a barbecue and picnic shelter attached to the southern end.

The hall is in need of maintenance and has extensive damage to the rear of the building. Camp Creek culvert runs under the building and needs significant repair work, which will require the building to be demolished.

Although located close to Gatehouse Lodge (which is used for school group accommodation), the area feels rundown and dated.

Significance: little.



7. Boiler Makers Cottage
8. Wallaby Hall
9. Camp Creek car park public toilets



10. Tour marshalling shelter
11. Gardeners store
12. Public toilets next to gardeners store

9. Camp Creek car park public toilets

A small building with male and female public toilets is located adjacent to Binoomea Cottage. The building is rundown and in need of significant renovation work.

The location of the toilets is useful for staff working in the depot, but is not in a useful location for visitors.

Significance: little.

10. Tour marshalling shelter

The shelter was added to the site in 2000, opposite the ticket office. It is used as all-weather protection for tour marshalling and outdoor dining. The architectural style is unsympathetic to the site and the form is bulky and intrusive.

The shelter sits directly over the Surveyors Creek culvert.

Significance: little.

11 & 12. Gardeners store and public toilets

The gardeners store and public toilets are located next to the Hill Flats building and over the Surveyors Creek culvert.

Significance: little.

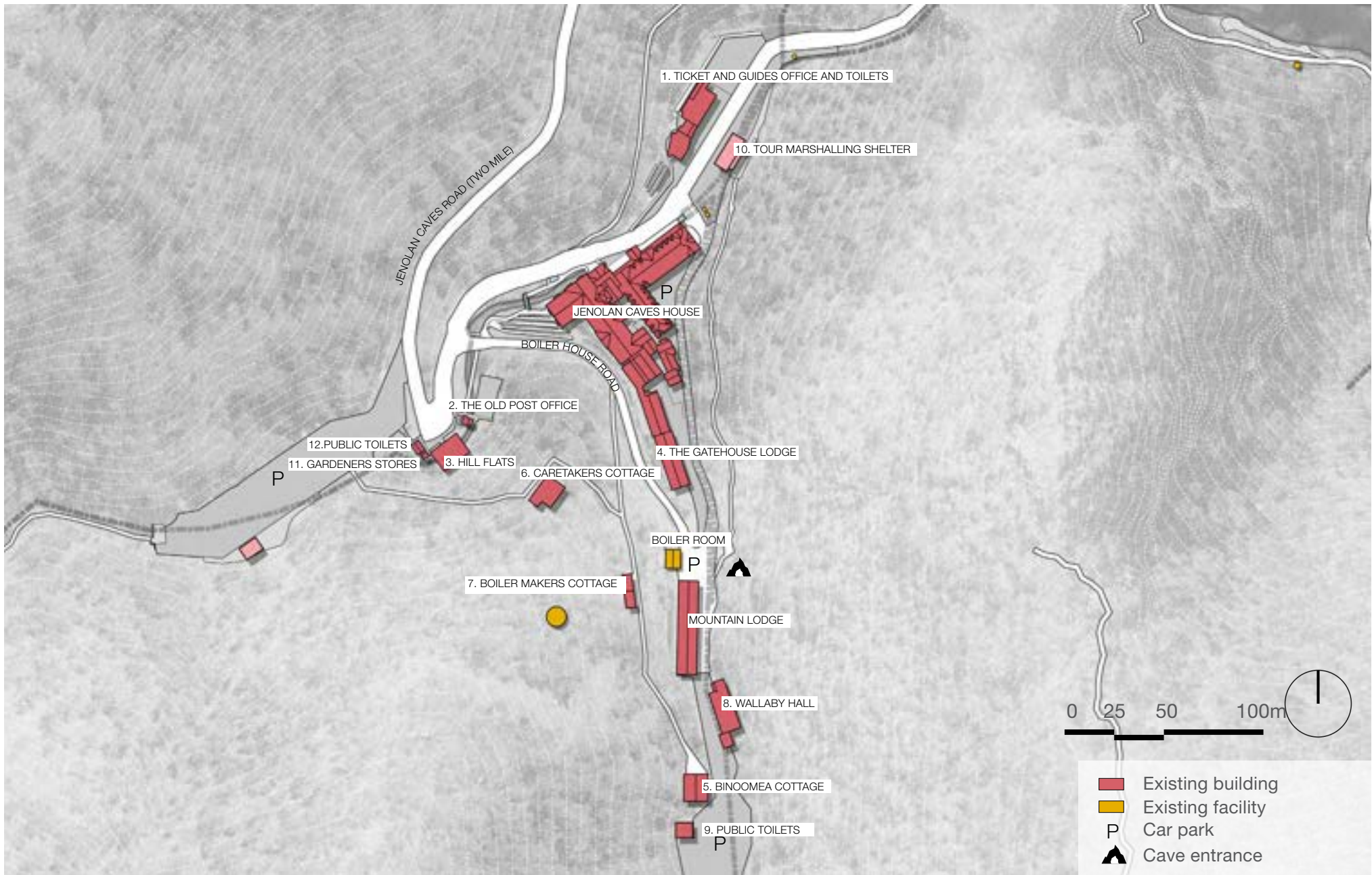


Figure 4.3 Existing building plan

5. Site analysis and key issues

The reserve is an iconic place. It is important to Aboriginal people, protects outstanding flora and fauna, contains heritage places of national, state and local significance and is a major tourist attraction catering to more than 200,000 visitors each year.

The reserve is managed for:

- conservation of the karst environment, including the protection of catchment values
- conservation of cultural values
- protection of natural water and air movement regimes and processes within the karst environment
- conservation of biodiversity, maintenance of ecosystem function, protection of the geological and geomorphological features and natural phenomena and maintenance of natural landscapes, cave formations and fossil deposits
- provision for research and monitoring
- promotion of public appreciation and understanding of the reserve
- provision for sustainable visitor or tourist use and enjoyment that is compatible with the reserve's values
- provision for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas with regard to the conservation of the reserve's values.

Key issues

The Grand Arch Precinct is a place of outstanding natural beauty and cultural importance. However, the site is overdue for updates to improve the visitor experience while ensuring environmental impacts are low and acceptable.

Upgrades are required to improve site presentation and match visitor expectations.

The precinct sees large rates of increased visitation on long weekends and during school holidays. Due to physical constraints, the capacity of the site is limited, therefore the development proposed in the master plan focuses on improving the visitor experience and maximising yield. The master plan considers how the site can function effectively and sustainably to create a high-quality visitor experience.

Key events over the past two years, including fires, floods and landslide issues, have accelerated the need for a cohesive master plan.

Site issues that have been discussed with JCRT are set out on the following pages.

Key to Figure 5.1

1. Jenolan Caves House
 2. Ticket office, guides office and toilets
 3. Bus and coach parking
 4. Cambridge car park
 5. Camp Creek car park
 6. Carlotta car park
 7. Burma Road Housing
 8. Blue Lake Weir
 9. Engineers Cottage
 10. Hydroelectric station
 11. Weir
 12. Sewage treatment plant
 13. Five Mile Housing
 14. Carlotta Arch
 15. Caves entrances: Orient, Temple of Baal and Ribbon
 16. Caves entrances: Imperial, Chifley and Jubilee
 17. Caves entrances: Nettle and Devils Coach House
 18. Caves entrances: Lucas, River and Pool of Cerberus
 19. Cave entrance: Elder Cave 'plughole'
 20. Coach House
 21. Hydro Cottage
 22. Old School House
- Existing building / cottage
■ Shed
■ Facility
P Car park
↔ Two-way road
- - - - Walking trail
- · - · - Watercourse

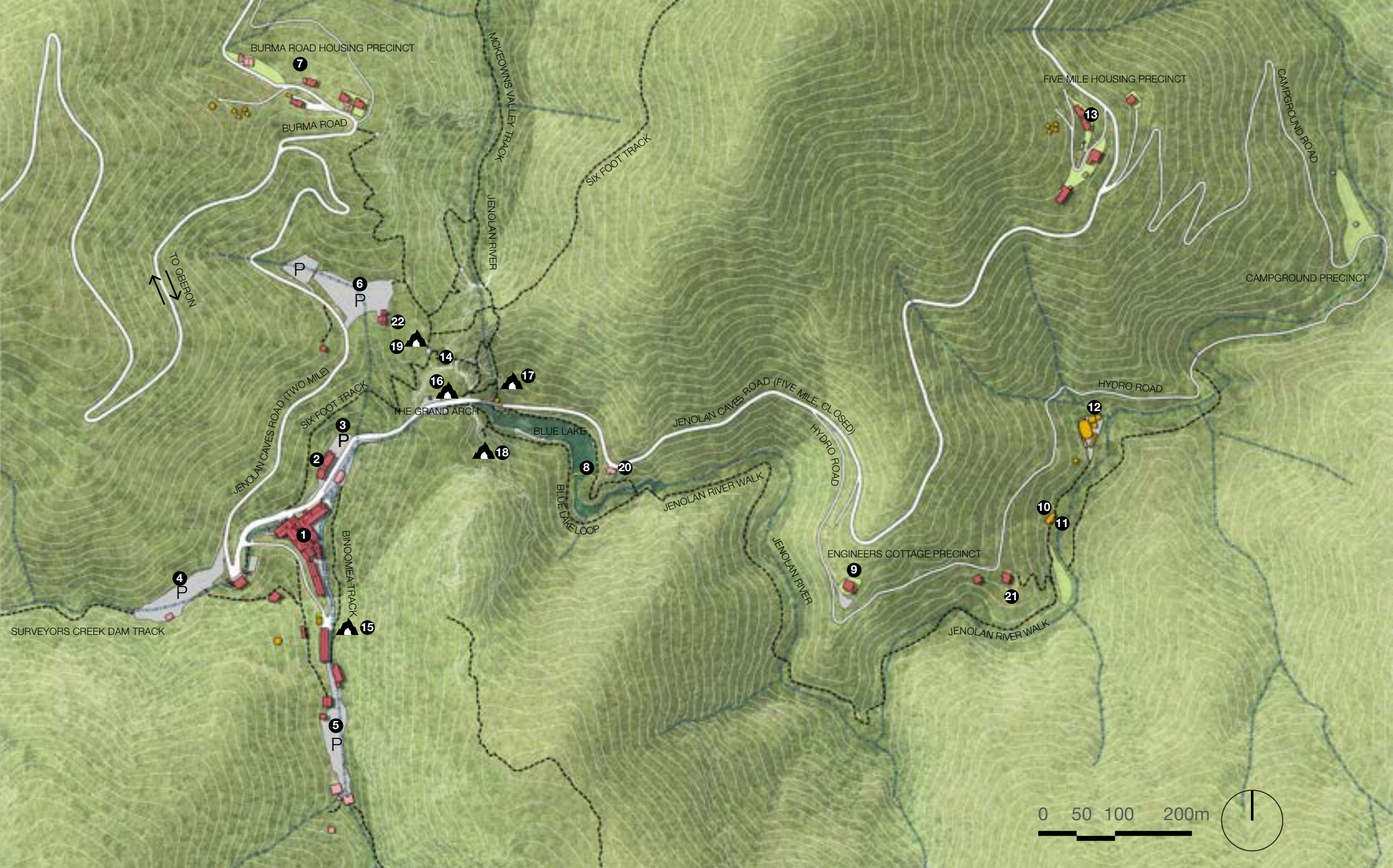
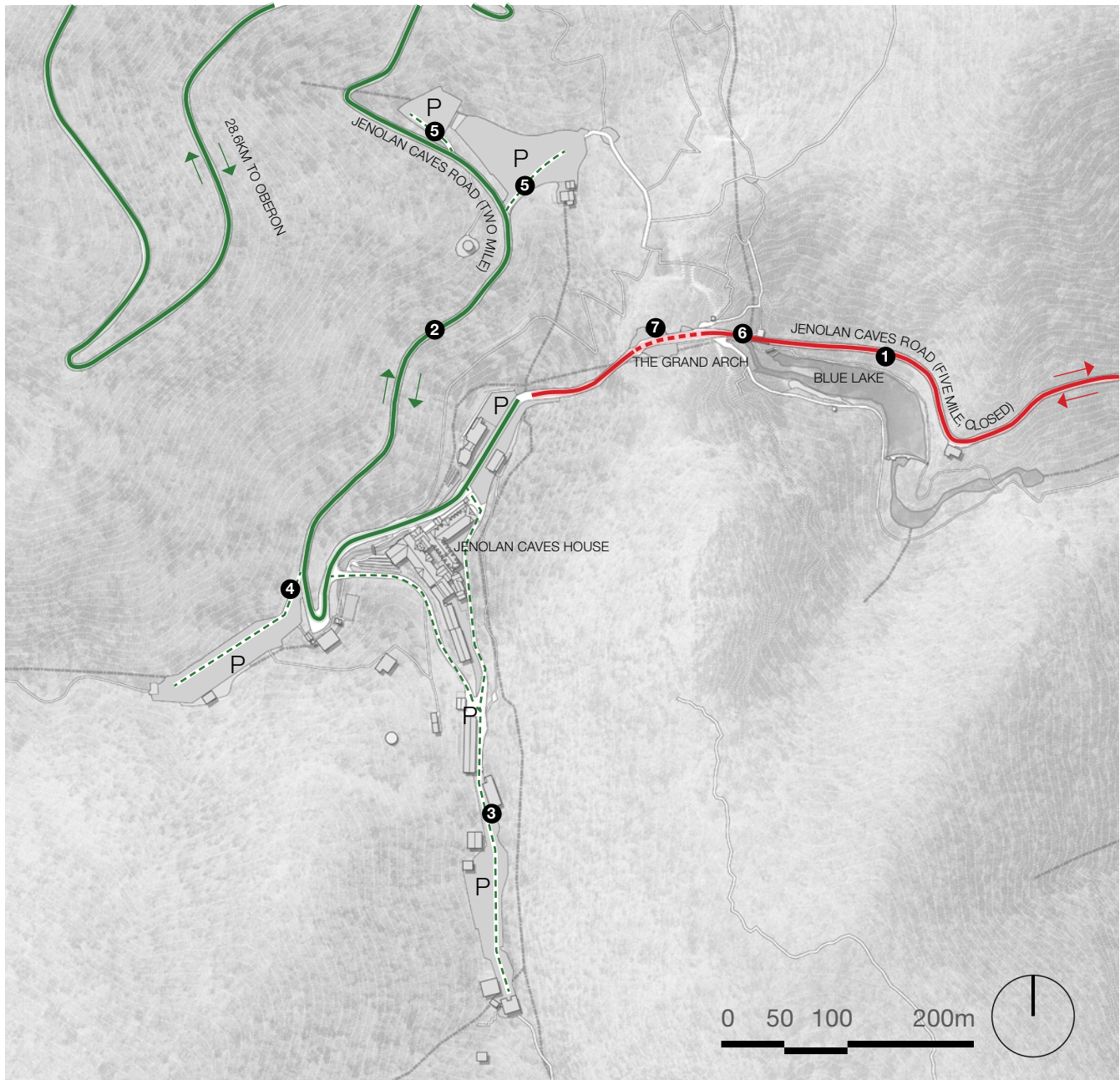


Figure 5.1 Existing site plan showing extent of precincts included in the master plan



Vehicular access

Access to Jenolan Caves is via the Jenolan Caves Road. Jenolan Caves Road is a sealed, all-weather public road managed by Transport for NSW and does not form part of the reserve. It bisects the central part of the reserve (including the Grand Arch Precinct) from north-east to south-west.

Historically, visitors have accessed the precinct via two routes: from the north-east on the section of Jenolan Caves Road known as the Five Mile road and from the west (via Oberon and Edith) on the Two Mile section of Jenolan Caves Road. The terms 'Five Mile' and 'Two Mile' refer to the length of steep, winding road through forested slopes from the edge of the Woronora Plateau.

- 1. Jenolan Caves Road (the Five Mile road) currently closed until at least 2026. Previously two-way for cars, trucks and buses
- 2. Jenolan Caves Road (the Two Mile road) currently open but unable to support buses or heavy transport vehicles
- 3. Boiler House Road to Camp Creek car park
- 4. Park Road to Cambridge car park
- 5. Park Road to Carlotta car park
- 6. De Burghs Bridge
- 7. The Grand Arch
- State road (closed)
- State road
- - - Park road
- P Car park
- ↔ Two-way road (closed)
- ↔ Two-way road

Figure 5.2 Jenolan Caves Grand Arch Precinct existing vehicular access

The drive through the Grand Arch is a unique arrival experience. However, the road creates a largely vehicle-oriented environment and detracts greatly from the overall visitor experience. Additionally, having vehicles enter the precinct through the Grand Arch has adverse environmental effects and creates uncomfortable conflicts with pedestrians, particularly when the road is used by large coaches.

Access via the Five Mile section of Jenolan Caves Road and hence through the Grand Arch is currently closed until at least 2026, following significant damage in the March 2021 storm event. All vehicles are now required to enter through the section of the Jenolan Caves Road known as the Two Mile road.

However, this route is unable to support buses or heavy vehicles due to its narrow and steep configuration. Subsequently, access is limited for both visitors and civil constructions works until the Five Mile road is repaired.

Greater Sydney is the largest source of visitors to Jenolan Caves. By car, the trip is 175km (via the Five Mile road) with a travel time of two hours and 43 minutes (depending on Sydney traffic). The route via Duckmaloi Road, Titania Road, Edith Road and the Two Mile road is 199km and takes two hours and 58 minutes. This equates to an extra 15 minutes driving time.



De Burghs Bridge, Jenolan Caves Road



Jenolan Caves Road in the main visitor precinct



Five Mile road access through the Grand Arch (eastern side)



Jenolan Caves Road looking towards Caves House



Traffic signage at the Grand Arch entry



Views from the Two Mile road into the main visitor precinct

Future access

Future access needs to be sustainable and provide resilience beyond road only means.

Since mid-2019, a series of natural incidents including snow, bushfires, floods, landslips and the COVID-19 pandemic have caused immense disruption in the precinct, restricting visitors' access to the caves and surrounds.

In collaboration with Transport for NSW and NPWS, JCRT is working to identify how access in the future can be sustainable and resilient.

JCRT proposes to improve access to, from and around the Grand Arch Precinct, so many more people can safely visit.

Improved access would support increasing visitor numbers and opening up the experience this unique natural wonder to more people.

The future access vision will draw from customer experience, environment and heritage concerns, the Grand Arch Precinct's resilience and responsiveness, sustainable targets and generating regional benefits.

A Movement and Access Plan is to be developed and is expected to contain proposals to improve movement to, from and within Jenolan Karst Conservation Reserve and the Grand Arch Precinct, expand accessibility for all users, be universally well-connected and continue facilitating unique experiences.

Future Movement and Access Plan purpose

With delivery of the master plan and increased visitation in response to the substantial investment, it is clear that the current road only access is inadequate and cannot satisfy guest volumes and safe access and egress in the event of an emergency evacuation or isolation event.

The purpose of a future Movement and Access Plan is therefore to provide infrastructure as an alternative to road only access. An aerial access option may include, but not be limited to, a funicular railway or gondola or similar.

While Transport for NSW is planning to address remediation of the Two and Five Mile roads over the course of several years, it is clear that JCRT cannot rely solely on this and that including an aerial transport solution for improved access is required.

Two Mile is currently undergoing emergency repairs to restore access and enable Jenolan Caves to re-open after sustained road closures amounting to greater than 230 days in 2022.

Five Mile will remain closed for several years while repairs continue (damage illustrated below).



Artist impression of Five Mile road repair. Photo: Transport for NSW



Landslip at Five Mile Photo: WSP

Shared vision for the precinct

A workshop has been held involving representatives from Transport for NSW, JCRT and NPWS, where the objectives behind a vision for the Grand Arch Precinct were explored.

The precinct's overarching objective is to provide all customers with the highest-quality visitor experience.

The proposed improvements that will enable this objective and vision are:

- **Seamless** – intuitive, offering vehicles and pedestrians natural movement flow, ensuring useability and ease-of-access to all touch points on the visitor journey.
- **Accessible for all mobility needs** – accessible, well connected and safe for all customers.
- **Experiential** – access to/from and within the precinct that enhances customers' experience and provides opportunities for visitors to connect with the unique natural and cultural heritage of Jenolan Caves.
- **Connected** – incorporates real-time information connectivity that enhances customers' experience. The Grand Arch Precinct can be accessed by safe, affordable, accessible, efficient and reliable transport options that contribute to a positive customer experience.

Access issues

Both Five Mile and Two Mile roads are characterised by their winding, narrow alignments.

Before the landslips, Five Mile road was accessible by cars and larger vehicles (coaches and service vehicles), with a period of controlled access allocated during the day whereby the road towards Katoomba (northbound) was closed between 11.45am and 1.15pm to allow coaches to safely arrive.

However, in places, the road was too narrow for vehicles to pass, meaning vehicles had to yield for oncoming vehicles. Five Mile road is also the shortest access route to the precinct from the largest visitor markets (Greater Sydney and other areas east).

Two Mile road is restricted for use by smaller vehicles having narrow lanes and tight turns, such that tourist coaches are currently unable to visit the precinct.

The difficult driving environment is regularly identified as negatively impacting customer experience during precinct visits.

For safety reasons, Jenolan Caves requires at least two reliable access routes into the Grand Arch Precinct to facilitate emergency egress in the event of a natural incident.

Current visitor numbers are restricted by the precinct's ability to sustain a limited number of people if another natural incident cuts the precinct off from the outside.

Funding for an aerial option, including both capital and operating expenditure, is not currently available, however JCRT recognises that before this can be secured, a NSW Government business case will need to be prepared.

In order that this may be pursued, JCRT is committed to undertake a feasibility and design study of future aerial access options.

The future access vision would therefore be likely to consider and include:

- Upgraded Two Mile and Five Mile roads providing multiple resilient access routes in the long term which can be managed to provide a combination of access for different transport modes and users (visitors, shuttle buses, coaches, service vehicles, etc.).
- Enhanced function of the precinct by separating pedestrians and traffic through provision of an external car park and shuttle bus operation in the shorter term, aerial option in the longer term. Shuttle buses can act as a proxy aerial option in the event of maintenance or significant weather events.
- Aerial option in the long term providing resilient and customer focused access.

Providing more resilient access routes to the Grand Arch Precinct and an unforgettable experience through a proposed aerial option, will allow for sustained access through severe weather events and provide driving comfort and safety for all authorised users, limiting conflicts between vulnerable users and transport modes, while allowing visitors in the precinct to enjoy the full Jenolan Caves experience.

Car parking

Currently, there are 323 parking spaces within the precinct, including two electric vehicle charging stations opposite Mountain Lodge.

On a regular day, most visitors will park in Cambridge car park, which is in close vicinity to Caves House and the main visitor services including ticket offices, visitor information and toilets. Parking is available here for both day and night guests, with a current capacity of 110 spaces.

On busier days, visitors are required to park at Carlotta car park (A and B). These car parks provide a combined capacity of 169 spaces. From here, visitors have a steep walk down to the main visitor services. Visitors currently walk along the Two Mile road or via the Carlotta Arch Track and Six Foot Track, with shuttle bus services also provided.

Parking for overnight guests staying at Mountain Lodge and Binoomea Cottage is available in Camp Creek car park behind Binoomea Cottage, with 35 spaces available. Accessible parking is limited and is located next to Mountain Lodge and at the back of Caves House.

There is limited bus parking for minibuses adjacent to the ticket office.

1. Cambridge car park, currently closed
2. Carlotta car park A
3. Carlotta car park B
4. Bus and coach parking
5. Accessible parking
6. Camp Creek car park
7. Carlotta Arch Track
8. Six Foot Track

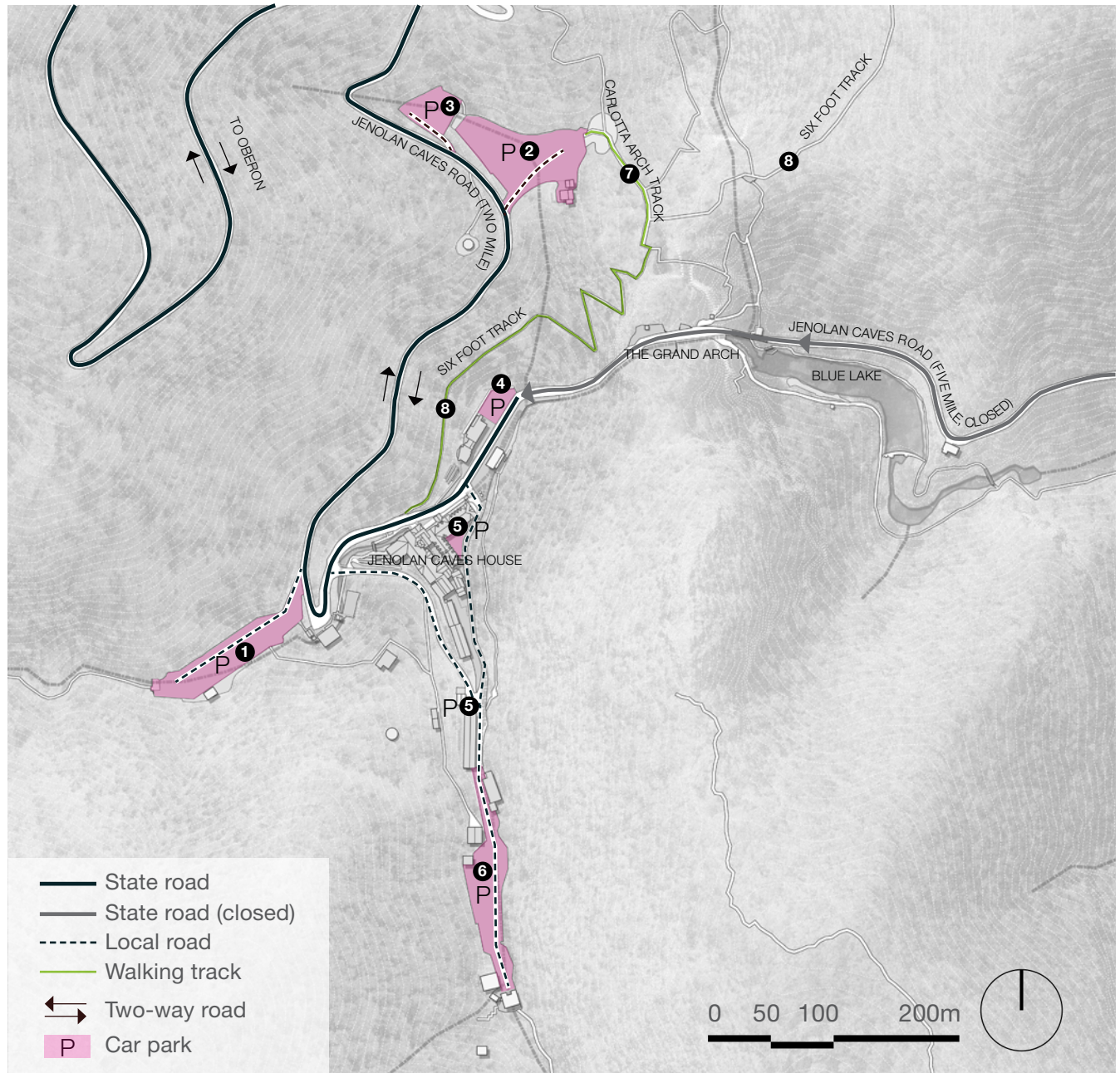


Figure 5.3 Jenolan Caves Grand Arch Precinct existing parking

Pedestrian movement, wayfinding and interpretative signage

Wayfinding signage throughout the site is inconsistent, poorly maintained and insufficient.

Layers of signs have been added over many years, without a holistic vision for how visitors navigate their journey. These multiple layers of signage result in confusing visual clutter across the site, with many redundant signs still in place.

Various warning signs also add to the visual clutter due to their ad hoc placement. A program is in place to remove redundant signs.

The main information board for cave tours is out of date and is not of a type that can be updated easily with current information on bookings, tour options, prices and availability.

Similarly, the main village directory sign includes outdated information and does not reflect a high quality of visitor experiences.

The interpretive signage celebrates the culture and heritage of the place, with a focus on European heritage centred around the architecture of Caves House and early visitation to the caves.

There is little interpretation acknowledging or offering education about the Traditional Custodians of the land.

The tight and steep nature of the site means footpath access is limited and visitors use the road for movement. Accessible footpaths are limited.



Cave tour information signage



Interpretative signage



Cave signage in the Grand Arch



Aboriginal mural display in the main village area



Layers of parking and directional signage



Cave entrance signage

Walking tracks

The main walking tracks in the precinct include:

- The Six Foot Track: the final 5.5km of the 3-day hike between Katoomba and Jenolan Caves
- Jenolan River Walk: easy bush walk along the river, 2.6km return
- McKeowns Valley Track: gentle hills with many steps, 6.4km return
- Carlotta Arch Track
- Devils Coach House Lookout Track.

See Figure 5.4.

A new Blue Lake Walk (to replace the closed Blue Lake Loop Track) is being developed and is included in this master plan for completion within the first year of implementation.

Guided walks in the show caves are the reserve's main attractions. There are 3.5km of pathways and associated infrastructure in the caves. Currently, fees are charged for cave tours, however, free public access is provided to the Devils Coach House.

Guided adventure caving tours also operate in several of the undeveloped 'wild' caves. Recreational caving is limited to speleological societies with an authorising permit from NPWS and in accordance with the NPWS cave access policy. Recreational caving pursuits, when not conducted by JCRT staff, are done through registered caving clubs and the Australian Speleological Federation (ASF).

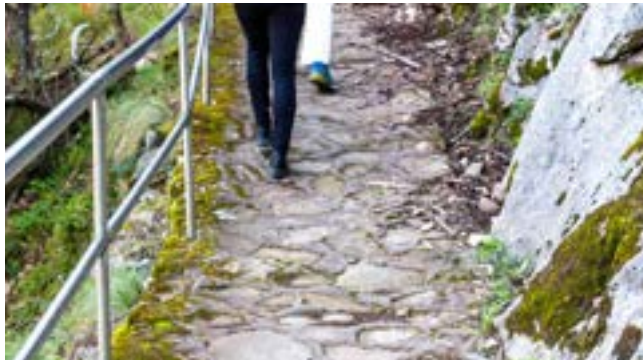
Caves are well-lit and infrastructure is excellent in below-ground walks, but JCRT is looking at upgrading underground lighting infrastructure.



Carlotta Arch Track



Damaged handrails from rockfall near Devils Coach House entrance



Stone footpath along the Six Foot Track



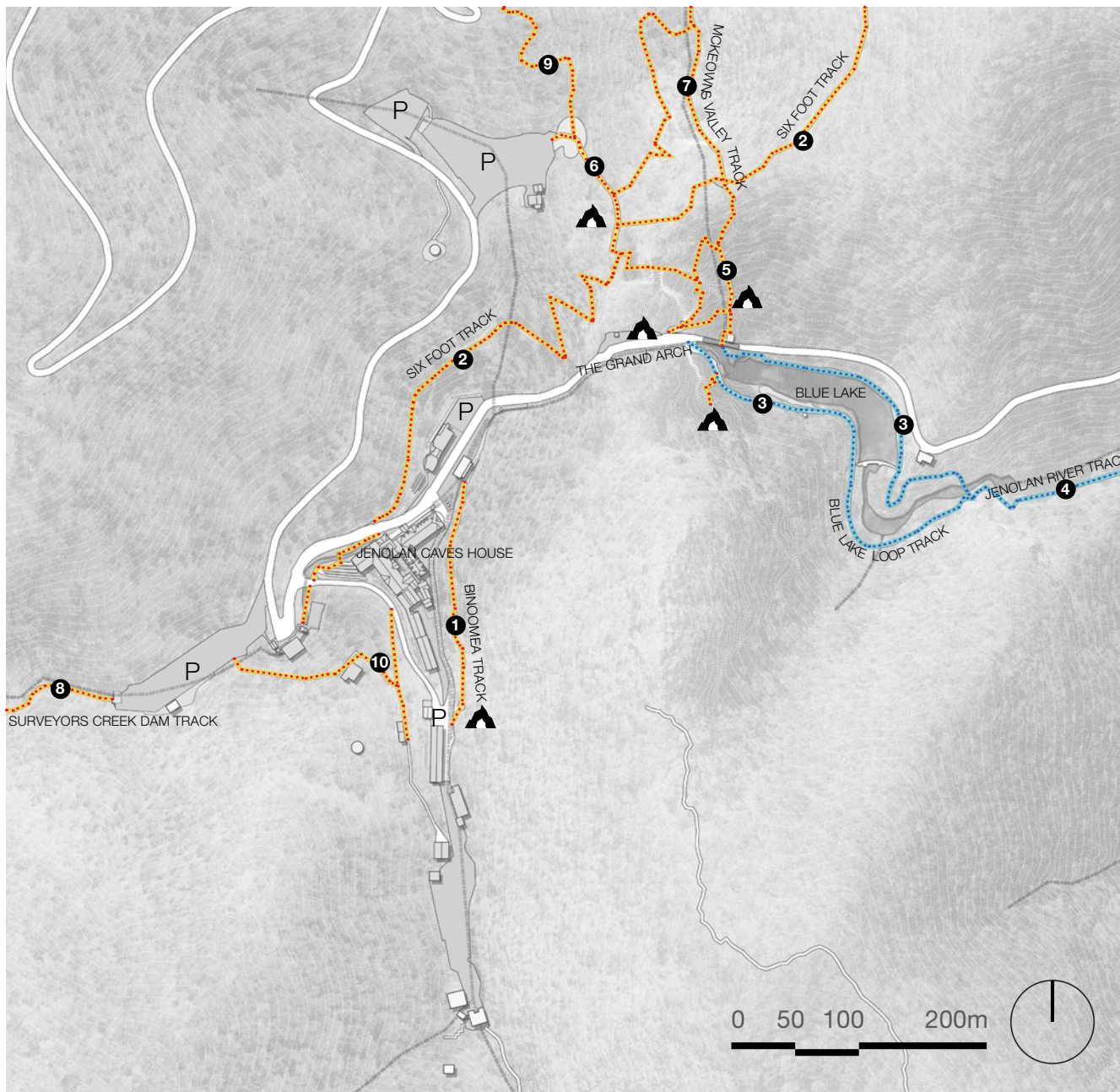
Devils Coach House access track



Dirt track leading to Caretakers Cottage



Six Foot Track between Carlotta car park and Caves House



Accessible walking tracks are limited due to the steep nature of the site and walking tracks are frequently closed due to rockfall. Weeds and vegetation can overgrow footpaths, particularly in areas far away from the main visitor area.

Historic tracks lead to potential accommodation options such as Boiler Makers Cottage and Caretakers Cottage but need upgrading.

The stainless steel handrails which have been used along walking tracks are generally not strong enough to withstand rockfall. The use of stainless steel is necessary on karst areas as it is an inert material which does not leach into the caves. A potential transition to a more visually sympathetic material could be possible downstream from the Blue Lake.

1. Binoomea Track
2. Six Foot Track
3. Blue Lake Walk (closed due to rockfall and flood damage)
4. Jenolan River Track (closed due to rockfall)
5. Devils Coach House Track (closed due to rockfall)
6. Carlotta Arch Track
7. McKeowns Valley Track
8. Surveyors Creek Dam Track
9. Burma Road Track
10. Caretakers Cottage Track





-  Walking track
-  Waterfront track
-  Caves entry
-  Car park

Figure 5.4 Jenolan Caves Grand Arch Precinct existing walking tracks



Dam wall at the Hydro Precinct

Site presentation

The Grand Arch Precinct offers a range of visitor services and facilities including food and drink, toilets, ticket office, interpretation, car parks, walking tracks and picnic facilities, in addition to the facilities of Caves House. Most of these facilities are aging and poorly presented.

The main paving surface is asphalt as Jenolan Caves Road passes through the site.

Service access to the workshop and the back of Caves House has created an unfriendly, untidy and potentially unsafe arrival experience for visitors staying in Mountain Lodge or parking in Camp Creek car park.

Recently, a colour-coated steel fence has been constructed around the perimeter of the workshop area. A gradual transition to more visually appealing screening materials would improve the overall aesthetic of the precinct.

Many rooms in Caves House, Mountain Lodge, Gatehouse Lodge and Binoomea Cottage overlook asphalt parking and service areas.

The accommodation buildings have been constructed at different times and reflect a variety of architectural styles of varying heritage and aesthetic significance.

Wallaby Hall needs maintenance and repair work and the surrounding landscape is unappealing. The area requires significant investment to be compliant with current Australian Standards and comfortable for guests to use.



Jenolan Caves Road looking towards Caves House



Ticket office and guides office



Tour marshalling shelter and signage in main visitor service area



Depot workshop area



Entrance to Gatehouse Lodge



Stainless-steel wisteria trellis outside Caves House

Gardens

The historic gardens surrounding Caves House and precinct are unkempt and in need of maintenance. Exotic species are overgrown and affect the surrounding bush. Of particular concern are blue periwinkle (*Vinca major*), English ivy (*Hedera helix*), hemlock (*Conium maculatum*) and tutsan (*Hypericum androsaemum*).

There are remnant original gardens and terraces designed by Joseph Maiden within the Grand Arch Precinct.

The landscape has been progressively modified over time since the early 1900s when the formal gardens were established.

A recently developed garden management plan will focus on maintaining heritage gardens and removing invasive species.

Furniture and lighting

The furniture palette is inconsistent throughout the precinct and similarly to the signage has been added to over time without replacing or refurbishing old furniture. Picnic tables are in poor locations, generally in car parks. The majority of picnic tables are not accessible and do not cater to larger family groups.

The barbecue at the western end of Cambridge car park is intrusive (CMP assessment) and should be considered for removal.

Lighting is inconsistent throughout the site. Redundant light poles have been left in their location, adding to visual clutter throughout the precinct.



Existing picnic table and chairs at Cambridge car park



Existing light pole



Jenolan Caves accommodation complex, 1889. Photo: JCRT

The Blue Lake

The current walking track around the Blue Lake is damaged in areas and needs upgrading.

Handrails are damaged from rockfall in some locations.

The CMP found that the Blue Lake weir is of exceptional significance and the Coach House, which sits on the northern embankment, is of high significance and provides an excellent opportunity for reinterpretation and re-use.

The Grand Arch

When the Five Mile road is open to visitors, the Grand Arch is dominated by cars, posing high potential for interaction between pedestrians and vehicles.

The men's and women's toilets in the Grand Arch are listed in the CMP as intrusive elements, which should be considered for removal.

Rockfall issues pose a danger to visitors and tracks in and around the Grand Arch are currently closed.



Jenolan Caves Road (currently closed to vehicles) through The Grand Arch



Women's toilets in the Grand Arch



Blue Lake



Silt build-up in the Blue Lake



Bench seat along the Six Foot Track



Old, mismatched picnic furniture at Cambridge car park

Campground and Utilities Precinct

With redevelopment, the campground could provide an affordable and unique accommodation offering, but has been closed since 2005. The area is in a suitable condition for being upgraded with minor works.

The camping area can be reached either by a 1km walk along the Jenolan River or via the steep dirt Campground Road which connects to Jenolan Caves Road.

The Campground and Utilities Precinct is of exceptional state significance, as the precinct housed the infrastructure that enabled Caves House to function and be self-sufficient in a remote location. It included the hydroelectric infrastructure and food production sites. It also has historical significance at the state level as one of the earliest sewerage works in Australia.

The precinct is also home to a fish ladder, believed to be one of the earliest in the country, built in 1906. It is a series of steps which allow mature trout to return to the dam to spawn. The fish ladder is due to be repaired after major damage from the 2021 flood. This work will be completed following de-silting of the hydro dam.

The toilet and shower block is intrusive (CMP) and should be considered for removal. It contains asbestos and is in poor condition.

The original slaughterhouse located at the northern end of the campground is of high significance.



Disused toilet and shower facilities in the Campground and Utilities Precinct



Original slaughter house structure in the Campground and Utilities Precinct



Flat area for camping



Old hydroelectric station



Interpretative signage at the Campground and Utilities Precinct with the fish ladder in the background



Dam wall at the Campground and Utilities Precinct

Visitor amenity and safety

The village centre and tour marshalling areas are the key public spaces within the precinct.

The tour marshalling area provides shelter and seating to wait and enjoy the natural atmosphere of Jenolan Caves before and after tours. The Caves House café is adjacent to the tour marshalling area and provides both indoor and outdoor seating.

Historically, tour marshalling occurred in the Grand Arch, although this has been temporarily suspended due to rockfall-related safety issues.

Amenity and safety issues include:

- The guides office and ticket office need replacing. The location is physically tight and limits expansion.
- The main visitor service area lacks any supporting facilities for families with young children, who are a key customer group.
- The area is dominated by asphalt and lacks clear pedestrian separation or walkways.
- The tour marshalling shelter is visually intrusive and in a poor location. It is also built over the Surveyors Creek culvert.
- Seating and waiting furniture is poorly located and visually inconsistent.

This area has previously been considered for a new Gateway Centre. The space available for the new building is very tight and the area is prone to flooding.

Risk management and safety

The Grand Arch Precinct is located at the bottom of a steep-sided valley and is subject to regular rockfall, flooding and occasional wildfire.

Currently, visitors are not able to freely walk around the precinct in the vicinity of the Grand Arch, due to the instability of the adjacent rock face. Temporary fencing and signage has been installed to protect visitors from rockfall risks.

Much of the infrastructure to manage risk is outdated and, in some places, failing.

Risk and safety issues include:

- Walks are regularly closed due to the need for rockfall and mitigation works.
- Slope instability regularly causes damage to buildings and car parks.
- Water management dams are affected by sedimentation.

Culverts and creeks

A structural inspection of the culverts was undertaken by CSU Engineering Consulting in April 2021 and found extensive damage caused by recent floods.

The culverts are an essential part of the infrastructure within the precinct, running alongside or underneath many of the access roads and buildings.



Guides office and ticket office



Tour marshalling shelter



Entrance to the Grand Arch

Visitor arrival sequence

If visitors (including accommodation guests) enter the site via the Two Mile section of Jenolan Caves Road, their first experience of the precinct is Carlotta car park, followed by Cambridge car park and views down to Caves House. This can be confusing, as wayfinding through the precinct is currently not clear.

If visitors are arriving via the Five Mile road and through the Grand Arch, they pass through the main visitor service area with a high level of conflict between pedestrians and vehicles.

- 1 Visitors arrive via the Five Mile road (currently closed) and the Two Mile road
- 2 Vehicles arriving via the Five Mile road drive through the Grand Arch
- 3 Visitors drive through the main visitor service area and potential pedestrian conflict zone
- 4 Vehicles arrive at the main parking area (Cambridge car park)
- 5 If Cambridge car park is full, visitors drive to Carlotta car park A or B
- 6 Visitors walk towards the main visitor service area via Six Foot Track or along the Two Mile road (no footpath)
- 7 Accommodation guests check in at Caves House
- 8 If guests are staying in Mountain Lodge or Binoomea Cottage, they are directed to move their car from Cambridge car park (4) or Carlotta car park (5) to Camp Creek car park (8)

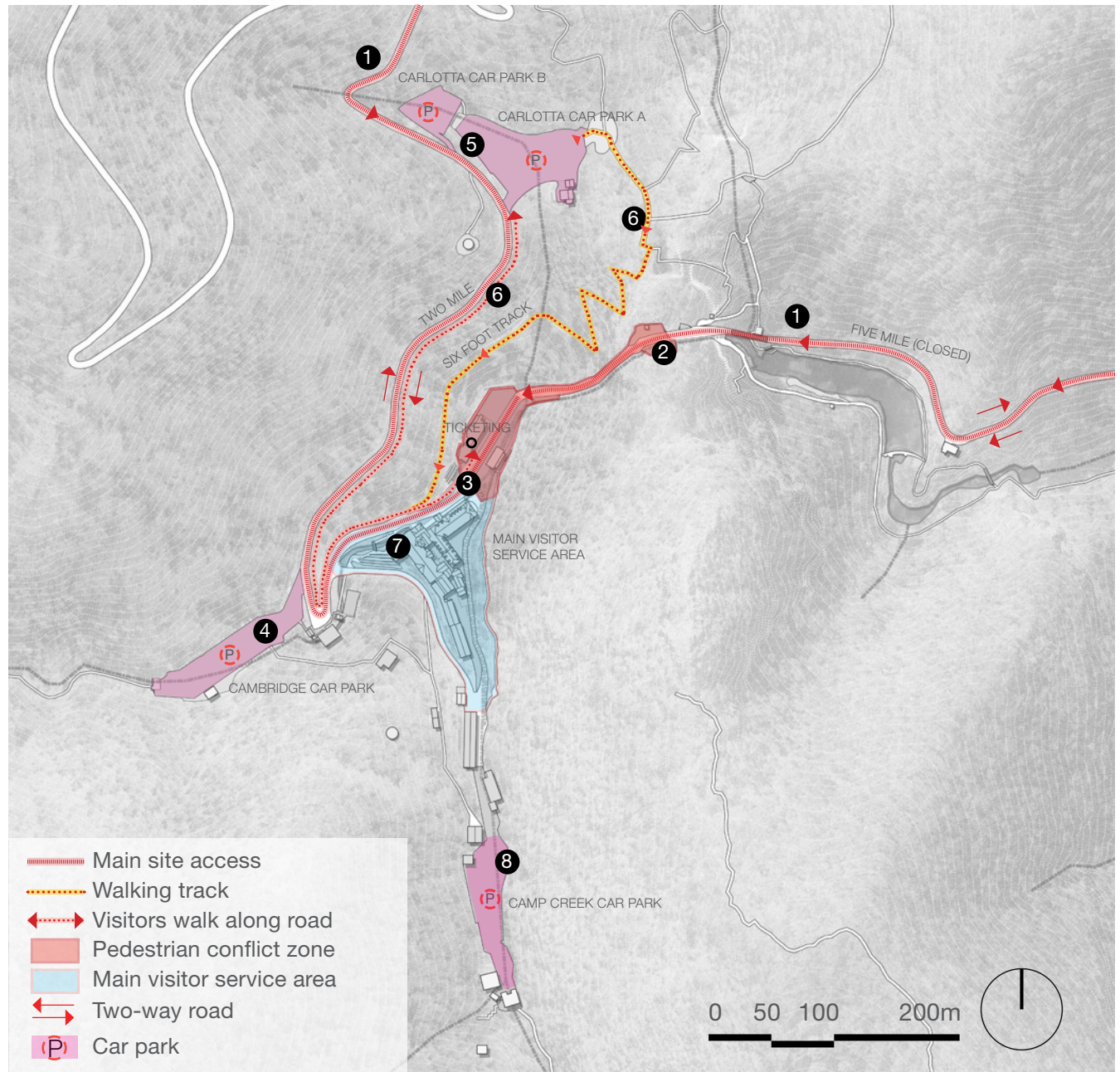
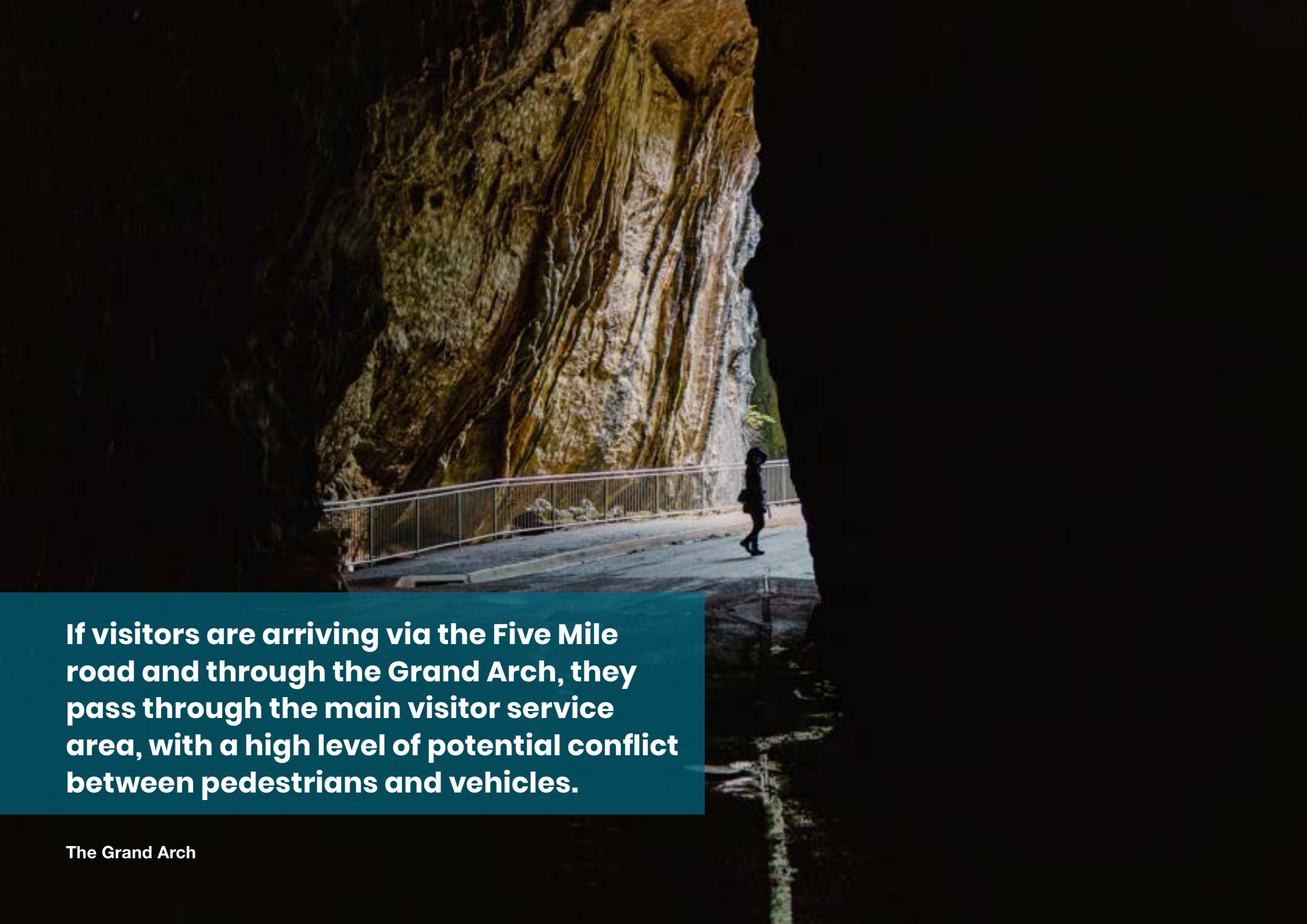


Figure 5.5 Existing pedestrian and vehicle movement

A photograph showing a person walking on a paved path that passes through a large, natural rock archway. The path is bordered by a metal railing on the left side. The rock walls are illuminated by warm, golden light, creating a dramatic scene. The person is silhouetted against the bright light coming from the opening of the arch.

If visitors are arriving via the Five Mile road and through the Grand Arch, they pass through the main visitor service area, with a high level of potential conflict between pedestrians and vehicles.

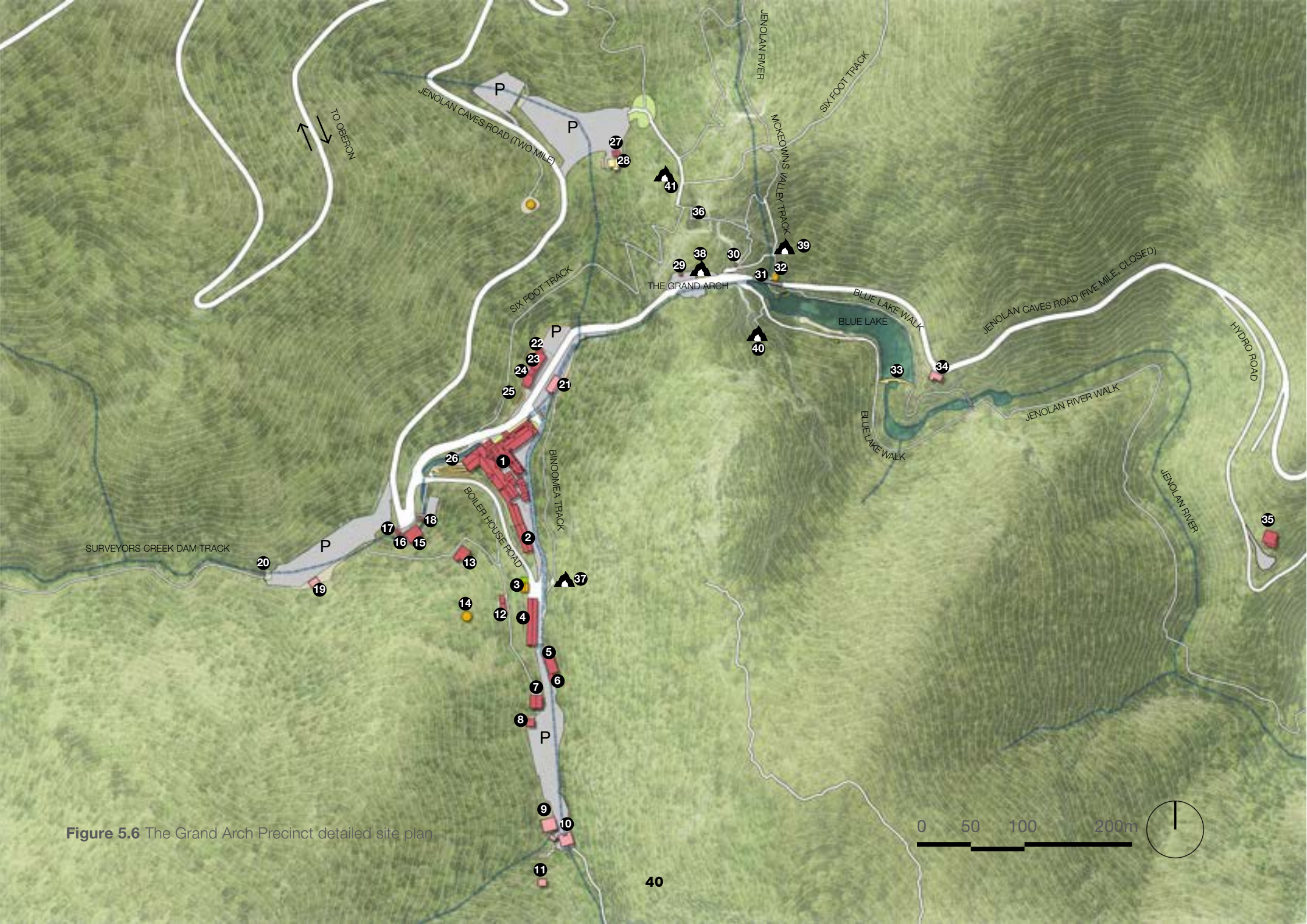


Figure 5.6 The Grand Arch Precinct detailed site plan

Key to Figure 5.6

1. Jenolan Caves House
2. Gatehouse Lodge
3. Boiler Room
4. Mountain Lodge
5. Wallaby Hall
6. Shelter and BBQ
7. Binoomea Cottage
8. Toilet block
9. Workshop
10. Workshop
11. Seismograph station
12. Boiler Makers Cottage
13. Caretakers Cottage
14. Water tank
15. Hill Flats
16. Gardeners store
17. Public toilets
18. Old Post Office
19. BBQ shelter
20. Picnic tables
21. Tour marshalling shelter
22. Womens toilet
23. Guides office and ticket office
24. Mens toilet
25. Terraced garden
26. Footbridge
27. Public toilet
28. Old School House (cafe)
29. Womens toilet
30. Mens toilet
31. De Burghs Bridge
32. Pump House
33. Blue Lake Weir
34. Coach House

35. Engineers Cottage
36. Carlotta Arch
37. Caves entrances: Orient, Temple of Baal and Ribbon
38. Caves entrances: Imperial, Chifley and Jubilee
39. Caves entrance: Nettle Cave
40. Caves entrances: Lucas, River and Pool of Cerberus
41. Cave entrance: Elder Cave 'plughole'

- Cafe
- Truck parking
- Existing building or cottage
- Shed
- Facility
- P Car park
- ↔ Two-way road



Terraced garden



De Burghs Bridge



Blue Lake Weir

Summary of key issues and opportunities

	Current issue	Opportunity	Potential issues
Vehicular access	Significant uncertainty on longer term use of the Five Mile road for visitor vehicles	Direct all visitors to arrive via the Two Mile road. Minimise traffic through the Grand Arch and improve the visitor experience through the main visitor service area	Limited access for both visitors and civil construction work. The Two Mile road is unable to support coaches and buses
	Vehicle-dominated experience through the Grand Arch when the Five Mile road is open	Create a shared zone from the Grand Arch to Cambridge car park	Visitors using the campground facilities will still need managed access through the Grand Arch and the Five Mile road
	Vehicles moving through the Grand Arch have adverse environmental impacts	Use the Grand Arch as an events venue, for example weddings	
	No bus or coach access via the Two Mile road increases reliance on cars		
Visitor arrival and flow	Confusing entry and wayfinding signage on arrival	Improve main precinct entry welcome signage via the Two Mile road	The Old Post Office will need to move to a new location
	Lack of main precinct entry signage and clear parking directions	Relocate visitor information to the location of the Hill Flats (existing building to be demolished)	Potential location over culverts may have flooding impact, this needs assessment
	Visitor information centre and ticketing office in the middle of the main visitor service area, which is tight on space and needs upgrading		Rockfall issues at Hill Flats location need further assessment
	Visitor arrival flow and sequence throughout the site could be improved		
Car parking	Car parking capacity is limited by site constraints	New cantilevered footpath along the Two Mile road to connect Carlotta car park to main visitor services	Staffing to manage car parks
	Limited bus parking areas	Review minibus parking areas in existing car parks	Fewer car parks will be available with revised layout
	Limited accessible parking	Use a shuttle bus for pedestrian movement around the site as set out in <i>Jenolan Caves Precinct Movement and Access Strategy Preliminary Draft</i> (WSP 2021)	JCRT to use administrative controls alongside the infrastructure works to relieve parking pressure on sell-out days (e.g. limiting tickets, scheduling to spread impacts, etc.)
	Steep walk from Carlotta car parks to main visitor services	Shuttle bus guests from Carlotta car park to main visitor services	
		Install electronic signage to direct visitors to available parking	
		Upgrade car parks to improve vehicle movement and better use space	

Table 5.1 Summary of key issues and opportunities

	Current issue	Opportunity	Potential issues
Wayfinding	Inconsistent, poorly maintained and insufficient signage	Prepare and implement a holistic signage strategy for the precinct	
	Visual clutter from old and redundant signage	Remove redundant signage Include a new digital all-weather information sign for tour and information updates Install new digital information displays	
Walking tracks and footpaths	Limited footpaths - the site is dominated by roads and asphalt	Create a shared zone within the main visitor service area by reducing asphalt area and improving the environment for pedestrians	Handrails in karst areas must be made of stainless steel but this material is more expensive and less resilient to rockfall damage
	Steep site means accessible footpaths are limited	Review locations for accessible pathways, particularly from Carlotta car park to Carlotta Arch viewing platform and Cambridge car park to the lower levels of Gateway Centre	
	Rockfall issues close walking tracks frequently	Address rockfall issues to stabilise walking tracks	
	Blue Lake Walk currently closed due to flood damage	Upgrade the Blue Lake Walk	
	Handrails are regularly damaged by rockfalls	Review the pathway material palette	
Site presentation	The only pedestrian access from maintenance areas and Carlotta car park to the main precinct is uneven, has stairs and forces people to use the road. Guests needing to use the accessible rooms in Mountain Lodge only have safe access to the precinct and dining facilities via car or using the roadway	Create new walking tracks and connections between sites, including new self-guided walks	
	Aged and poorly presented facilities in the main visitor service area including the ticket office, guides office, toilets and waiting areas	Resolve the outlook from accommodation and 'back-of-house' experience with landscaping	
	Restricted space within the main visitor service area	Establish a plan for maintenance of heritage terraced gardens and remediation of the weed-dominated areas	
	Site dominated by asphalt	Explore strategies for re-establishing an attractive, non-invasive and historically relevant garden around Caves House. Define the extent of historic gardens to be managed	
	Service areas and 'back of house' areas at Caves House are poorly presented	Where possible remediate and celebrate Jenolan's waterways through water sensitive urban design	
	Exposed facilities detract from overall precinct quality	Resolve rockfall issues with new protection measures	
	Unkempt historic terraced gardens	Increase green spaces where possible to reduce thermal impacts from asphalt and built assets Increase platypus habitat throughout the village	

Table 5.2 Summary of key issues and opportunities continued

	Current issue	Opportunity	Potential issues/ requirements
Buildings	Varying styles of architecture in the accommodation buildings Buildings needing to be demolished due to culvert repair works include Wallaby Hall and Hill Flats	Refurbish Boiler Makers Cottage for interpretation space or manage as a historic building Refurbish Caretakers Cottage for accommodation Demolish Wallaby Hall Relocate Old Post Office Demolish Hill Flats to use the area for new Gateway Centre	Boiler Makers Cottage and Caretakers Cottage will need upgrades to improve access and safety if used for accommodation or interpretation
	Inconsistent and dated furniture palette Picnic tables in a poor location Lack of accessible furniture Lack of picnic furniture catering for larger groups Inconsistent and excessive lighting throughout the site Redundant and broken light poles and exposed services still in place	Remove outdated furniture and furniture in inappropriate locations Create a new day-use picnic area with updated facilities with better connections to the precinct Align new suite of furniture to follow NPWS standards Remove outdated and broken lighting and upgrade to solar and LED lights Develop lighting plan consistent with <i>National Light Pollution Guidelines for Wildlife</i> (Australian Government, 2020)	
Camping	Camping area currently not in use Area needs maintenance and clearing Current toilet and shower block contains asbestos and is not in keeping with the heritage significance of the setting	Open up a new visitor experience through the camping area and target a new audience Connect the camping area to the main precinct via the River Walk Improve site access and provide a new shower and toilet block	Invest in equipment for maintenance Across the precinct, investigate which of the facilities and utilities are still functioning, or in need or repair Upgrade the walking track leading to the campground and river crossing points Resurface Campground Road
	No facilities for families with young children in the main visitor service area The shelter in the village area is visually intrusive and in a poor location Seating and waiting area furniture is poorly located and visually inconsistent	New family facilities to be located in the proposed Gateway Centre Replace furniture with a consistent suite Improve the quality of public facilities including toilets and picnic tables Rationalise waste management with the location of bins and picnic tables Demolish existing shelter to naturalise culvert underneath and improve village centre	Ensure all-weather-protection is available in the new village centre if the existing shelter is removed
Visitor amenities			

Table 5.3 Summary of key issues and opportunities continued



Eucalyptus in front of dam wall

6. Precinct plan

Overview

The proposed precinct plan seeks to address existing issues that have been discussed in this report. The primary changes included in the precinct plan are:

- construction of a new Gateway Centre in the existing Hill Flats building location
- making the primary entrance for visitors to the site via the Two Mile road, with only service vehicle access through the Grand Arch (Five Mile road)
- creating a shared zone from De Burghs Bridge to Carlotta car park
- redefining vehicular circulation through the site
- upgrading car parks with water-sensitive urban design, tree planting and revised parking layout
- rationalising wayfinding signage
- reintroducing camping in the Campground and Utilities Precinct
- improving overall site presentation
- re-imagining Jenolan Village, with a focus on prioritising pedestrians and creating a village atmosphere
- upgrading infrastructure and safety measures across the site
- upgrading walking tracks and self-guided walks.

Each of these upgrades is discussed in detail in the following sections of the master plan.

Key to Figure 6.1

1. New Gateway Centre detailed plan (Figure 6.5)
2. Jenolan Village detailed plan (Figure 6.10)
3. Gatehouse Lodge and back of Caves House upgraded pedestrian zones (Figure 6.14)
4. Lower level detailed plan Grand Arch, Devils Coach House (Figure 6.19)
5. Blue Lake proposed site plan (Figure 6.24)
6. Carlotta Arch accessible path detailed plan (Figure 6.17)
7. Campground A detailed plan (Figure 6.26)
8. Campground B detailed plan (Figure 6.27)
9. Campground C detailed plan (Figure 6.28)
10. Carlotta car park, revised layout
11. New Optus tower
12. Old School House (café)
13. New water treatment plant
14. Burma Road Housing
15. Restored Caretakers Cottage for accommodation
16. Restored Boiler Makers Cottage
17. Re-purposed Boiler Room
18. Gatehouse Lodge
19. Binoomea Cottage
20. Demolish Wallaby Hall and add new parking
21. Camp Creek car park
22. Jenolan Caves House (undergoing restoration)
23. Grand Arch
24. De Burghs Bridge
25. Devils Coach House lookout
26. Burma Road lookout
27. Re-purposed Coach House
28. Engineers Cottage
29. Hydro Cottage, restored for staff accommodation
30. Recommissioning and interpretation of old hydroelectric station
31. Sewage treatment plant
32. Restored campground
33. Weir wall
34. Upgraded River Walk to campground
35. Five Mile Road Housing
36. Caves entrances: Orient, Temple of Baal and Ribbon
37. Caves entrances: Imperial, Chifley and Jubilee
38. Caves entrances: Nettle and Devils Coach House
39. Caves entrances: Lucas, River and Pool of Cerberus
40. Cave entrance: Elder Cave 'plughole'
41. Cambridge car park, revised entrance and layout






-  Existing building
-  Upgraded, re-purposed or re-interpreted building
-  Proposed facility
-  Shared zone
-  Car park



Figure 6.1 Proposed precinct plan - key plan



Figure 6.2 Proposed precinct plan - detailed site plan

Principles

Guiding principles for the precinct plan:

- Design with a focus on respecting ecological and cultural sensitivities.
- Be consistent with the reserve PoM, including the environmental performance standards in PoM Appendix B.
- Design with a focus on constructability, including analysis of any relevant planning or site constraints.
- Design to achieve best practice sustainable development and maximum operating efficiency.
- Use appropriate natural materials, colours and finishes that are sympathetic to the natural surroundings, durable and easy to maintain.
- Design to improve key visitor nodes and visitor experiences.
- Design to improve entry and exit points.
- Design to be cohesive through the application of a consistent design language and approach based on recognisable themes that reflect and enhance the values and environment of the Jenolan experience.
- Consider the design principles set out in the NPWS *Park Facilities Manual* (OEH 2016), ensuring all new or refurbished structures have an overall design language that is consistent, contemporary and constrained, while being sensitive to the natural values of the site.

Key to Figure 6.2

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| <ol style="list-style-type: none"> 1. Jenolan Caves House (to be restored) 2. Gatehouse Lodge (to be restored) 3. Re-purposed Boiler Room 4. Mountain Lodge 5. Accessible parking (existing) 6. Demolish Wallaby Hall 7. New parking spaces 8. Restore embankment with native species 9. Restored Binooomea Cottage 10. Demolish toilet block 11. Camp Creek car park for overnight guests and staff 12. New screening fence 13. New paving in the pedestrian zone 14. New pedestrian footpath along Boiler House Road 15. Workshop 16. Workshop 17. Diesel generator 18. Seismograph station 19. Boiler Makers Cottage, restored (use TBD) 20. Caretakers Cottage, restored for staff accommodation 21. Water tank 22. New Gateway Centre 23. Resurface concrete picnic area, new furniture 24. Shared zone 25. New wisteria trellis 26. Picnic zone 27. Sky-walk to Gateway Centre 28. Upgrade track to Caretakers Cottage and Boiler Makers Cottage 29. Clear existing embankment of weeds, replant with native species 30. Cambridge car park, revised entrance and layout 31. New footpath along the Two Mile road from Carlotta car park | <ol style="list-style-type: none"> 32. Carlotta car park, revised entrance and layout 33. Existing Ticket Office, re-interpreted and restored 34. Relocated Old Post Office (use TBD) 35. Significant Holm Oak 36. New toilet block 37. Naturalised Surveyors Creek culvert 38. Re-vegetated terraced gardens, historic planting 39. Reinterpretation of pump house 40. Area landscaped for guided tour stopping point 41. Upgraded Carlotta Arch lookout 42. Devils Coach House lookout 43. Upgraded accessible walk to Carlotta Arch lookout 44. Upgraded Blue Lake Walk 45. Restored Coach House (use TBD) 46. De Burghs Bridge 47. Upgraded River Walk to Campground Precinct 48. Engineers Cottage 49. Carlotta Arch 50. Devils Coach House 51. New Optus tower 52. New water treatment 53. Caves entrances: Orient, Temple of Baal and Ribbon 54. Caves entrances: Imperial, Chifley and Jubilee 55. Caves entrances: Nettle and Devils Coach House 56. Caves entrances: Lucas, River and Pool of Cerberus 57. Cave entrance: Elder Cave, 'plughole' 58. New all-weather awning over cave entrance 59. Awning over parking |
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- | | |
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| <ul style="list-style-type: none"> Existing building Upgraded, re-purposed or re-interpreted building | <ul style="list-style-type: none"> P Car park Shared zone Proposed facility |
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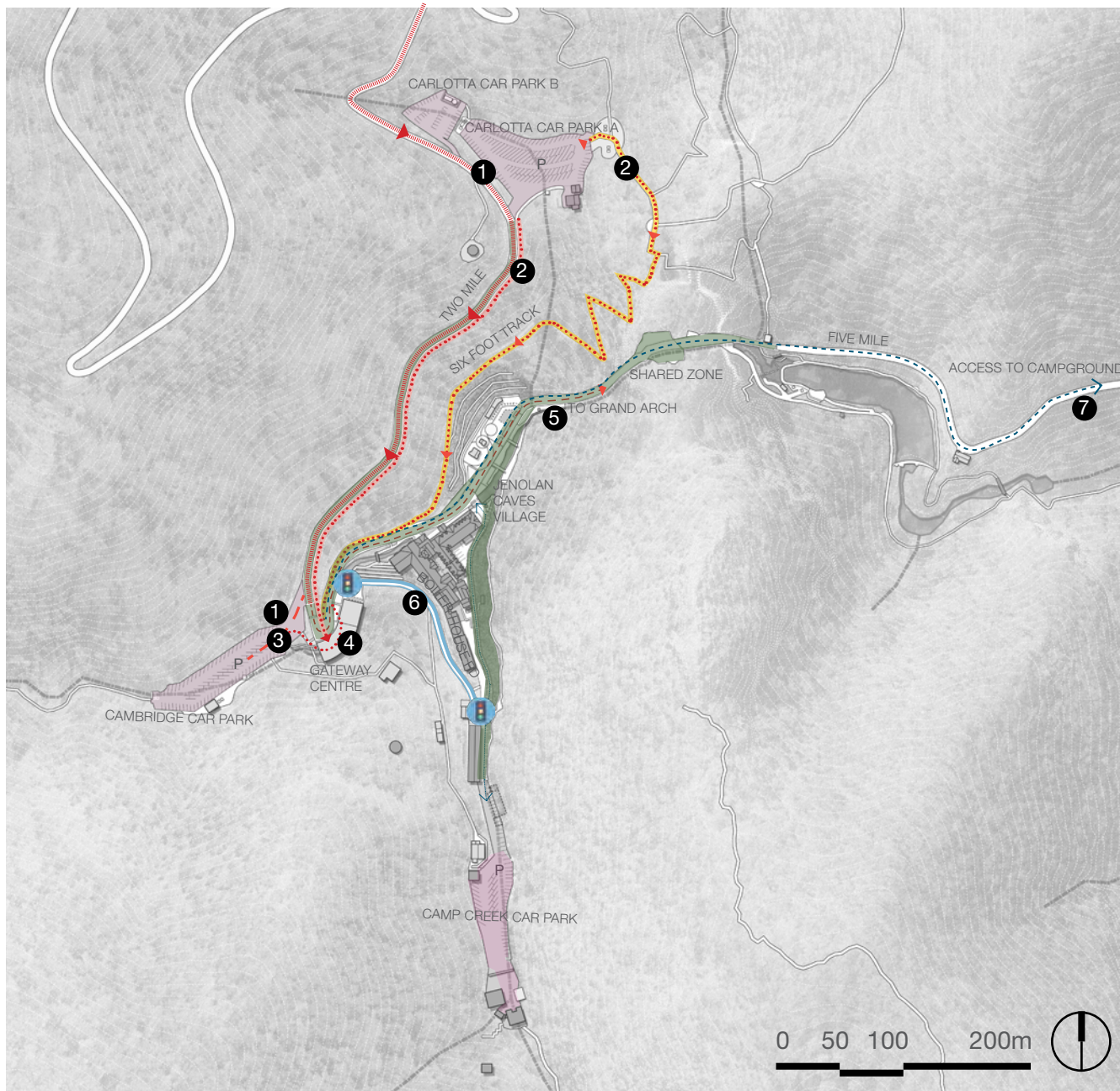


Figure 6.3 Proposed pedestrian and vehicle movement

Proposed visitor flow

As outlined in the site analysis section of this document, the existing visitor flow throughout the site is confusing for visitors.

The proposed location of the new Gateway Centre will help to rationalise this flow and create a more logical arrival sequence for visitors moving through the site.

- 1 Visitor vehicles arrive at Cambridge car park via the Two Mile road, or directed to Carlotta car park
- 2 If parking in Carlotta car park, visitors walk down via Six Foot Track or the Two Mile road footpath towards Gateway Centre
- 3 If parking in Cambridge car park, visitors flow directly into the Gateway Centre, with accessible connection to lower levels
- 4 From the Gateway Centre and ticketing, visitors walk through the shared zone to Jenolan Village
- 5 Visitors depart on cave tours and other activities from the Jenolan Village area
- 6 Accommodation guests drive via one-way traffic (controlled by a signal light) along Boiler House Road to Camp Creek car park
- 7 If camping, guests will have managed access through the Grand Arch, along the Five Mile road to the Campground and Utilities Precinct.

- Shared zone
- P Parking
- Controlled one-way road
- Main site access, the Two Mile road
- Pedestrian access
- Campground access

Proposed parking and vehicle access changes

Site access

Due to the current closure of the Five Mile road and the uncertainty of its re-opening, the precinct plan proposes the primary access for visitors over the next five-year period will be via the Two Mile road. This has a positive impact on the planning of the precinct including:

- reducing the volume of cars through the Grand Arch; this will have a beneficial environmental impact on the cave
- reducing conflict between pedestrians and vehicles in the main visitor service area ('Jenolan Village')
- improving visitor flow through the site (see Figure 6.3).

The Five Mile road will primarily be used for maintenance vehicles and emergency service vehicles when the road is repaired and open again. No allowance for coaches or coach parking has been made within this precinct plan.

Shared zone

Using the Two Mile road as the primary access for visitors creates an opportunity for a shared zone from De Burghs Bridge to Carlotta car park entrance and in the service area behind Caves House extending through to the electric vehicle charging stations.

New paving treatment will define the area as prioritising pedestrians. Vehicle access through this space will be limited to service vehicles, shuttle buses, emergency vehicles and guests who have checked into campground facilities.

Electronically operated bollards or temporary physical restrictions will control access through the shared zone, as approved by Transport for NSW.

Controlled one-way access

Boiler House Road will become a controlled one-way road, allowing vehicles to travel in both directions at separate intervals. This change avoids the need for traffic to loop behind Caves House and through the new shared zone to connect back into the Two Mile road. Access behind Caves House will be for service and emergency vehicles and accessible parking.

Cambridge car park

Cambridge car park will be reduced slightly from 110 spaces to 92, with space for both day-use and overnight guests. Entry to the car park will be controlled with boomgates.

A new undercover parking area will be added for overnight guests. Fifteen of the spaces will be for overnight parking guests, four are EV-charging and two are accessible parking spaces.

Overall parking numbers are reduced to better improve the design of the car park, with additional tree planting and planting beds using water-sensitive urban design.

Service area behind caves house

The service area behind Caves House will be repaved to improve site presentation, with screening added to shield bin and utility areas. The new paving will improve separation between pedestrians and vehicles and enhance the entrance into the Gatehouse Lodge.

Carlotta car park A and B

Carlotta car park will be primarily for day-use visitors and will also have boomgate access.

Five minibus spaces will be added in car park A. With the minibus parking and new planting beds and trees, car parking spaces in Carlotta car park A will be reduced to 102 spaces.

There will be a slight reduction in the number of car parking spaces in Carlotta car park B from 30 to 27 due to the installation of a new water treatment plant.

The entrance to Carlotta car park B will be redesigned to allow entry from both directions on the Two Mile road. Currently, it is only accessible when travelling from the downhill direction.

Camp Creek car park

Camp Creek car park will continue to be used for staff and overnight guests, with a capacity of 35 vehicles.

The removal of Wallaby Hall will allow for seven new guest parking spaces close to Mountain Lodge. Repair work will be done on the Camp Creek culvert running directly under this area and the embankment behind will be stabilised and re-vegetated with native species.

Campground access

After arriving via the Two Mile road, camping guests will check-in at the Gateway Centre. From here, they will be directed to the campground via the Five Mile section of Jenolan Caves Road.

Water-sensitive urban design and tree planting in car parks

Water is not only responsible for the formation of the caves system but also plays a central role in the Jenolan natural environment, visitor experience and ongoing services.

As part of the Sydney Drinking Water Catchment, it is imperative the precinct uses water-sensitive urban design (WSUD) strategies.

WSUD principles including bio-retention and infiltration should be applied to both Cambridge car park and Carlotta car park to clean and filter car park run-off before it enters the creek systems. This additional level of filtration will ensure water is naturally treated to remove pollutants such as engine oil before it enters the caves and drinking catchments.

Minor changes to the parking layout will be required to accommodate WSUD planting beds. Additional tree planting will also be added to both car parks to add shade and reduce visible asphalt areas.



1. New WSUD bioretention beds and trees
2. Bioretention bed planting bed
3. Minibus parking
4. Old School House (café)
5. Existing toilets
6. New water treatment plant
7. Embankment stabilisation
8. New footpath along the Two Mile road
9. New picnic furniture and shelter, relocate barbecue

Figure 6.4 Carlotta car park proposed detailed plan  Pedestrian exit point  Pedestrian circulation

 Vehicle circulation

Name	Existing	Proposed
Cambridge car park	110 spaces	92 spaces including 15 covered, 4 EV charging stations and 2 accessible
Carlotta car park A	130 spaces	102 car spaces 5 minibus spaces
Carlotta car park B	39 spaces	33 spaces
Camp Creek car park	35 spaces, overnight guests and staff parking	No change
Hill Flats	Staff parking	Parking removed
Mountain Lodge	1 disability parking space	No change
Coach/bus parking	5-6 coach and bus parking next to ticket office	5 minibus spaces in Carlotta car park
Back of Caves House	3 service vehicles, 1 emergency service space 1 disability parking space	No change
EV charging station opposite Mountain Lodge	2 spaces	2 existing spaces 4 spaces in Cambridge car park
Wallaby Hall	-	8 new guest parking spaces

Table 6.1 Car parking changes

Overall, there will be a reduction in parking spaces from 323 to 279 (44 spaces). However, the upgrades to the parking areas including additional accessible spaces, electric vehicle charging stations and undercover parking, will contribute to an improved visitor experience.

To accommodate the new WSUD planting beds and trees within the car parks, a reduction of spaces is necessary, but the environmental benefits outweigh the slight loss in spaces to ensure natural resources within the reserve are managed to a high standard.

Although coach parking is not accommodated within the precinct plan, new minibus spaces are provided in Carlotta car park (which also contributes to a loss of standard parking spaces, until a time when roads into the precinct are able to accommodate large vehicles.



1. WSUD planting bed and integrated play areas. Photo: Jane Irwin Landscape Architecture.
2. Bioretention swale in commuter car park at Quakers Hill. Photo: Transport for NSW.
3. Swales in car parks or near other large areas of pavement collect stormwater runoff and remove pollutants. Photo: Sydney Water.



Figure 6.5 New Gateway Centre detailed site plan

New Gateway Centre

The new Gateway Centre will be located in the flat area near the existing Hill Flats and Old Post Office buildings.

The proposed site is not located on karst and is not in a flood zone. The location has been selected for:

- strong visual presence when entering from the Two Mile road, with the visually prominent site creating a landmark welcome point
- logical visitor flow through the site, from parking to information and ticketing, to entering the lower Caves House and Jenolan Village area
- no impact on the size of Cambridge car park
- more space in the village area for new landscaping and a larger pedestrian zone
- future-proofing - the location works well for multiple future options.

The split level of the site allows for a compact two-storey building, which can help with providing accessible connections from Cambridge car park through to the main village area.

Visitors will flow directly from Cambridge car park via a sky-walk bridge, or new footpath down the Two Mile road into the new centre. After collecting tickets and information about the site, visitors will then move through to the main village area via the shared zone along Jenolan Caves Road.

An accessible connection from Cambridge car park to the Boiler House Road shared zone will be provided via a lift within the Gateway Centre.

The Old Post Office will be relocated to the village area next to the existing ticket office.

To enable the construction of the new centre, the Hill Flats, gardeners store and public toilets will be demolished. The Hill Flats building has been condemned due to the structural instability of its slab and also needs to be demolished to repair culvert damage directly underneath the building.

As the proposed building is upstream of a sensitive karst area and directly above Surveyors Creek, all development will be required to strictly comply with *Guidelines for Undertaking Development on Karst in OEH Reserve* (OEH 2013).

The building will include spaces for:

- entry zones including a waiting zone, concierge and information zone
- a ticket counter
- a gift shop and retail storage area
- permanent and temporary exhibitions and interpretative displays
- a visitor services office and work areas
- public and staff toilets, including family rooms
- an education space or multi-purpose room for schools and larger groups
- corporate open work areas and office, lunchroom and conference rooms
- a storeroom.

In addition to being upstream of a sensitive karst area, the proposed location of the Gateway Centre is also in a known platypus transit route.

Measures will need to be taken through the demolition and construction phases to minimise any disruption to platypus habitat and protect them from any potential threats.

Key to Figure 6.5

1. Two Mile road (Jenolan Caves Road)
2. New footpath along the Two Mile road from Carlotta car park
3. Boom gates access to car park
4. 17 undercover parking spaces
5. Sky-walk bridge to Gateway Centre
6. Existing steps
7. Demolish gardeners store and public toilets
8. New Gateway Centre
9. Boom gate access for guests parking in Camp Creek car park, service and emergency vehicles and shuttle buses
10. Shared zone
11. Traffic light to control alternating one-way traffic along Boiler House Road
12. Electronically controlled bollards for service vehicle and shuttle bus access in shared zone
13. Native garden beds
14. Wisteria trellis
15. Western red cedar retained and protected
16. Picnic zone
17. Remove existing fence
18. Relocate the Old Post Office to Jenolan Village
19. Demolish Hill Flats
20. Clear existing embankment of weeds, replant with native species, upgrade existing fence with new balustrade
21. Slope stabilisation integrated into building design
22. Track to Caretakers Cottage to be upgraded: resurfacing, widening and handrails and balustrades where required for safety
23. Electric vehicle charging station
24. WSUD planting and trees
25. Disability car parking spaces

A plan will be developed to minimise impact on platypus and monitoring will occur throughout construction.

Additional options for the location of the Gateway Centre were explored, including the location of the existing ticket office in the main village area. However, this space is too limited and construction around the heritage oak tree would be difficult. The area is also prone to flooding, as evident with the 2020 and 2021 floods and is located on karst.



1. Trail House. Architect: Gluckman Tang Architects.
2. Cradle Mountain Visitor Centre. Architect: Cumulus Studio.
3. Echo Point Visitor Information Centre. Architect: CHROFI.
4. Interpretative display at Carlton Marshes Visitor Centre. Architect: Cowper Griffith Architects.
5. Welcome signage at Cradle Mountain Visitor Centre. Architect: Cumulus Studio.

Gundungurra interpretative opportunities in the Gateway Centre

- Welcome to Country at the main entrance of the Gateway Centre
- Telling of the original creation story of Jenolan Caves as visitors walk along the sky-walk bridge towards the entrance of the Gateway Centre
- Endemic planting with Indigenous and English names in garden beds around the Gateway Centre
- Form and materials used for the building telling the story of place, helping visitors to create a connection with Country.

A water creature was at the heart of the original creation story of the Jenolan area. In the Dreamtime, Gurangatch, part eel, part fish, engaged in a deadly struggle with Mirragan, a native quoll.

They ranged over the lands of the Gundungurra Nation and in their fight gouged out the Cox and Wollondilly Rivers.

Mirragan pursued Gurangatch to both the Whambeyan (Wombeyan) Caves and ultimately to the Jenolan Caves. Here Gurangatch rested and licked his wounds to heal them. His blood can still be seen on the rock walls as you leave the Grand Arch. He lay regaining his strength where the Blue Lake is now located.



Figure 6.6 Sketch view of the proposed new Gateway Centre



Figure 6.7 Indicative diagrams showing likely achievable floor area of new Gateway Centre, including circulation space

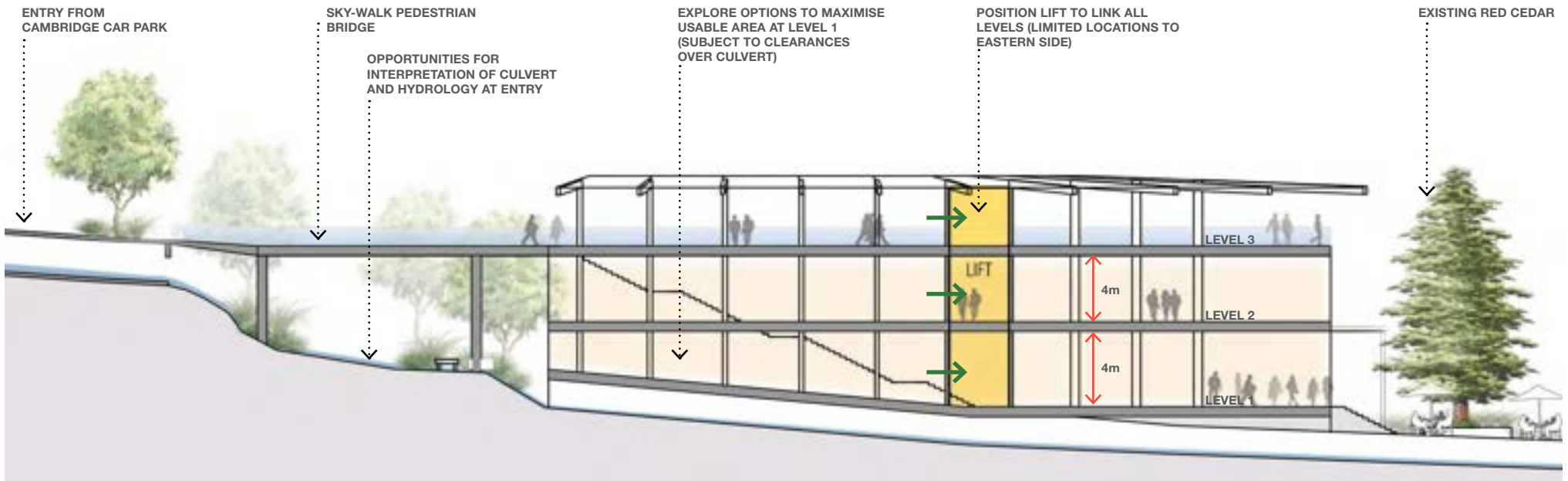


Figure 6.8 Indicative sketch section showing proposed Gateway Centre



Figure 6.9 Sketch view of the proposed new Gateway Centre from the Two Mile section of Jenolan Caves Road, the western end of the new shared zone and Cambridge car park

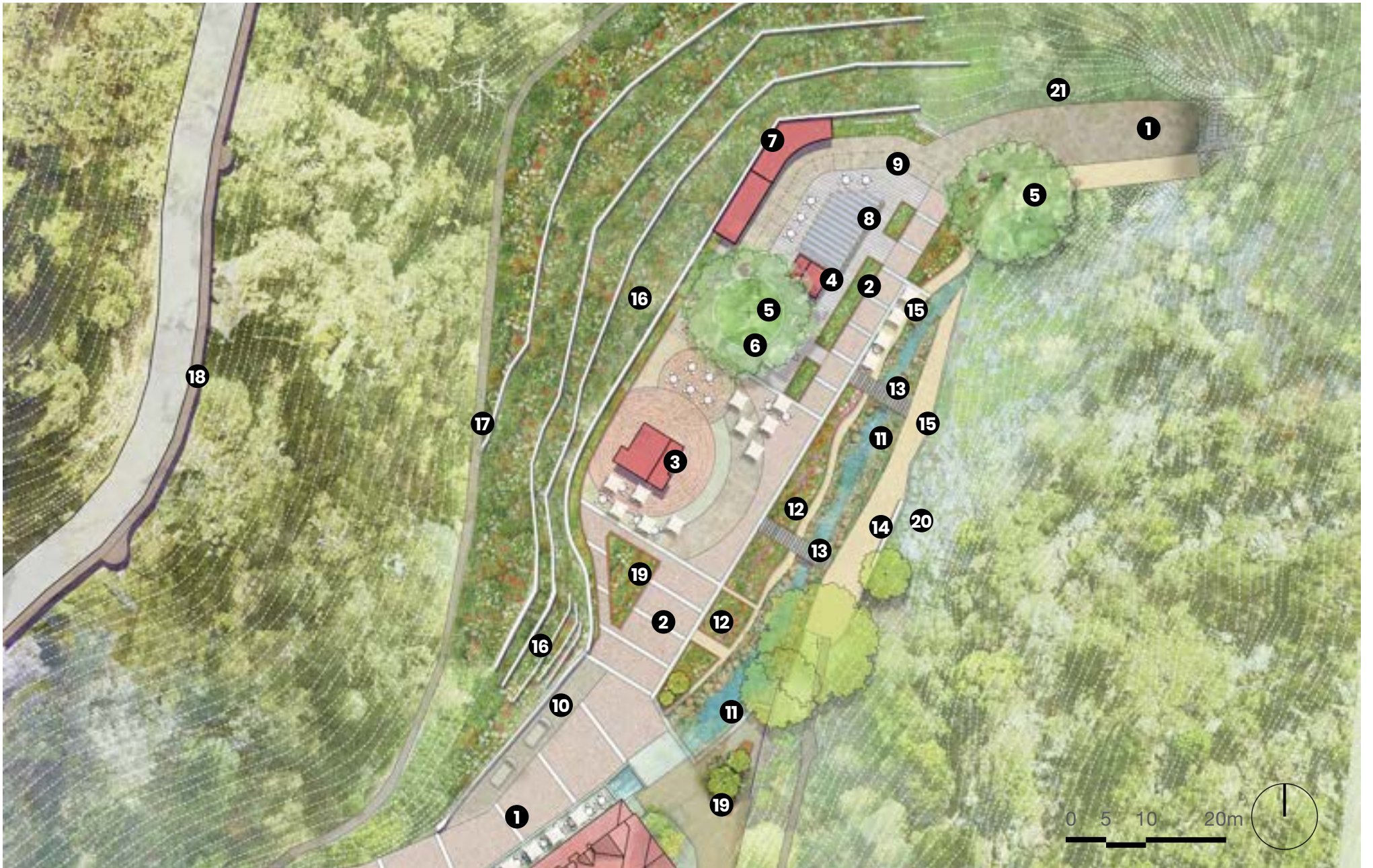


Figure 6.10 Jenolan Village detailed plan

Jenolan Village

Jenolan was once a village of heritage buildings, bridges, creeks and gardens. The precinct plan aims to reinvigorate the heart of Jenolan by recreating a garden village atmosphere from the Grand Arch to Caves House. It focuses on creating a pedestrian-friendly village centre, including the following elements:

Village 'square'

A new village square is proposed for the area around the heritage oak tree, at the location of the existing ticket office. The ticket office extension will be demolished with the historical 'middle office' undergoing restoration works for preservation and reinterpretation as a new visitor offering.

The adjacent guides office and toilet facilities will be demolished to restore the building to its original free-standing form.

The Old Post Office will be relocated into the village square. This location needs to be assessed for flood risk and the building potentially constructed on a pedestal to protect it from flooding.

North of the heritage oak tree will be a new all-weather waiting shelter and flexible space which can accommodate small seasonal markets, outdoor events, small music events or evening entertainment. New toilet facilities will be included, located towards the rear of the space to allow for a more flexible outdoor area.

Lighting should be low level to create an ambient village atmosphere and should follow *National Light Pollution Guidelines for Wildlife* (Australian Government 2020).

Heritage gardens

A reinterpretation of the heritage gardens from the early years of Jenolan Caves will be in contained garden beds, with a selection of exotic species carefully chosen from the original historic gardens. Raised garden beds will be reinstated in the original location along Surveyors Creek.

The raised beds will control weed spread and offer informal seating for visitors. Species used in these garden beds will be selected to minimise any risk of further weed infestation. The exotic planters will help to tell the story of the intimate garden village Jenolan once was, in a controlled and contemporary way.

The precinct plan recommends the larger extents of terraced garden beds be gradually cleared of weeds and re-established with historic planting to provide a botanic backdrop to Jenolan Village and Caves House. Embankments should be stabilised and the existing crib wall repaired and replaced behind the guides and ticket offices.

Endemic gardens will be located on the southern slopes above and around the culvert.

Naturalised Surveyors Creek

The Surveyors Creek box culvert will be opened up and re-vegetated with endemic planting and WSUD strategies.

The existing concrete box culvert will be transformed into a new creek which will clean road and hard surface run-off through biofiltration before entering the caves and Blue Lake.

Platypus are known to swim in the culvert channels and the opening up and re-vegetation of this waterway will extend their habitat and offer visitors a chance to spot them in the heart of Jenolan Village.

Key to Figure 6.10

1. Shared zone paving
2. Feature paving (shared zone)
3. Existing ticket office reinterpreted (use TBD)
4. Relocated Old Post Office
5. Significant holm oak
6. New planting around holm oak
7. New toilet block (five men's, five women's including ambulant and family room)
8. All-weather shelter
9. Flexible market space
10. Shuttle bus drop-off zone
11. Naturalised Surveyors Creek culvert
12. Exotic raised planting beds
13. Pedestrian bridges
14. New Indigenous gathering space
15. New picnic tables and chairs
16. Historic terraced gardens
17. Existing Six Foot Track
18. Two Mile road with new footpath
19. Edible herb gardens for cafe
20. Endemic terraced gardens
21. 'Fossil' gardens (ancient plants)

Detailed design of the culvert should include sheltered places for platypus to seek refuge and aquatic vegetation including reeds to encourage them to inhabit the creek.

A series of pedestrian bridges will link to landscaped gardens, an Indigenous gathering space and picnic tables in intimate settings on the eastern side of the new creek.



Figure 6.11 Sketch view of proposed Jenolan Village with new shelter, relocated Old Post Office and new amenities block



Original gardens with Caves House in the background, 1900. Photo: JCRT.

Interpretative opportunities in Jenolan Village

- Reinterpret the original gardens and terraces as originally established at Jenolan in 1897 by Joseph Maiden.
- Showcase WSUD principles and explain natural water filtration and cleaning in the naturalisation of Surveyors Creek.
- Showcase endemic plants along Surveyors Creek and explain their importance to local Gundungurra peoples.
- Showcase platypus habitat with native reeds and aquatic vegetation.
- Use the Gundungurra gathering place on the eastern side of Surveyors Creek as a welcome and starting point for Indigenous cultural tours.
- Create Fossil Gardens - this is the oldest known cave system in the world and there is an opportunity to reflect this in some of the plantings immediately surrounding the Grand Arch.



Figure 6.12 Sketch view of proposed Jenolan Village and naturalised culvert

Shared zone

The new shared zone running through Jenolan Village will be demarcated with a boom gate to prevent visitors driving into the zone and new paving treatments to slow vehicular traffic and create pedestrian awareness.

As Transport for NSW has advised, the Two Mile road and the Five Mile road will not support large coaches in the future, so coach parking is not necessary in the site.

The closure of the Five Mile road will free up valuable space in the village centre and open up key views towards the Grand Arch. This new arrangement also reduces the need for large vehicles to turn in the busiest part of the precinct.

Shuttle bus services will have a dedicated set-down zone opposite Caves House, leaving more space towards the Grand Arch for pedestrian flow.

Future transport options

Future transport options are being considered in collaboration with Transport for NSW.

The arrival centre for all future transport options would ideally be located in Cambridge car park, meaning the proposed location of the new Gateway Centre does not impact future transport proposals and the visitor arrival sequence through the centre would still provide a logical flow through the site.

Additional future transport options would importantly provide secondary access and egress in case of emergency.



1. Shared zone paving precedent
2. Naturalised culvert
3. Timber bench seating around planters
4. Flexible market spaces
5. Shared zone paving and bollards
6. Shelter with kiosk
7. Stone block wall

Pedestrian movement upgrades

New footpath along the Two Mile road

A new raised mini-mesh footpath is proposed down the Two Mile road section of Jenolan Caves Road, linking Carlotta car park to the new Gateway Centre. The new footpath will give visitors the option to either safely walk down this route to the main visitor service areas or along the Six Foot Track, as they currently do.

Space along the road is limited. The option of attaching the footpath to the existing guard fence will be investigated, as this will give pedestrians additional separation and protection from vehicles.

The approximate gradient along the Two Mile road ranges from 1:6 to 1:7.5. This is compared to a gradient ranging from 1:3.5 to 1:12 (including areas with steps) along the existing Six Foot Track from Carlotta car park down to Caves House. The new route also provides a more direct connection of 300m versus 600m if walking down the Six Foot Track.

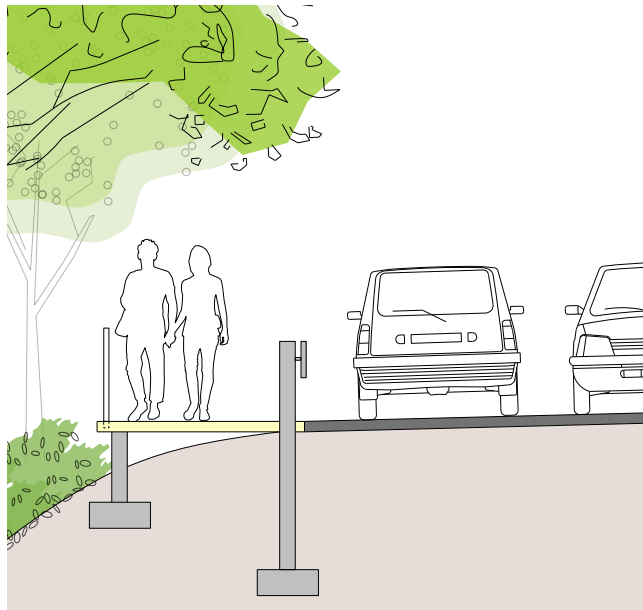
Both options are considered steep to very steep for visitors to traverse, but the additional footpath will provide visitors with an option that links Carlotta car park directly to the new Gateway Centre.



Exposed aggregate concrete footpath with integrated signage. Location: Bar Beach, Newcastle.



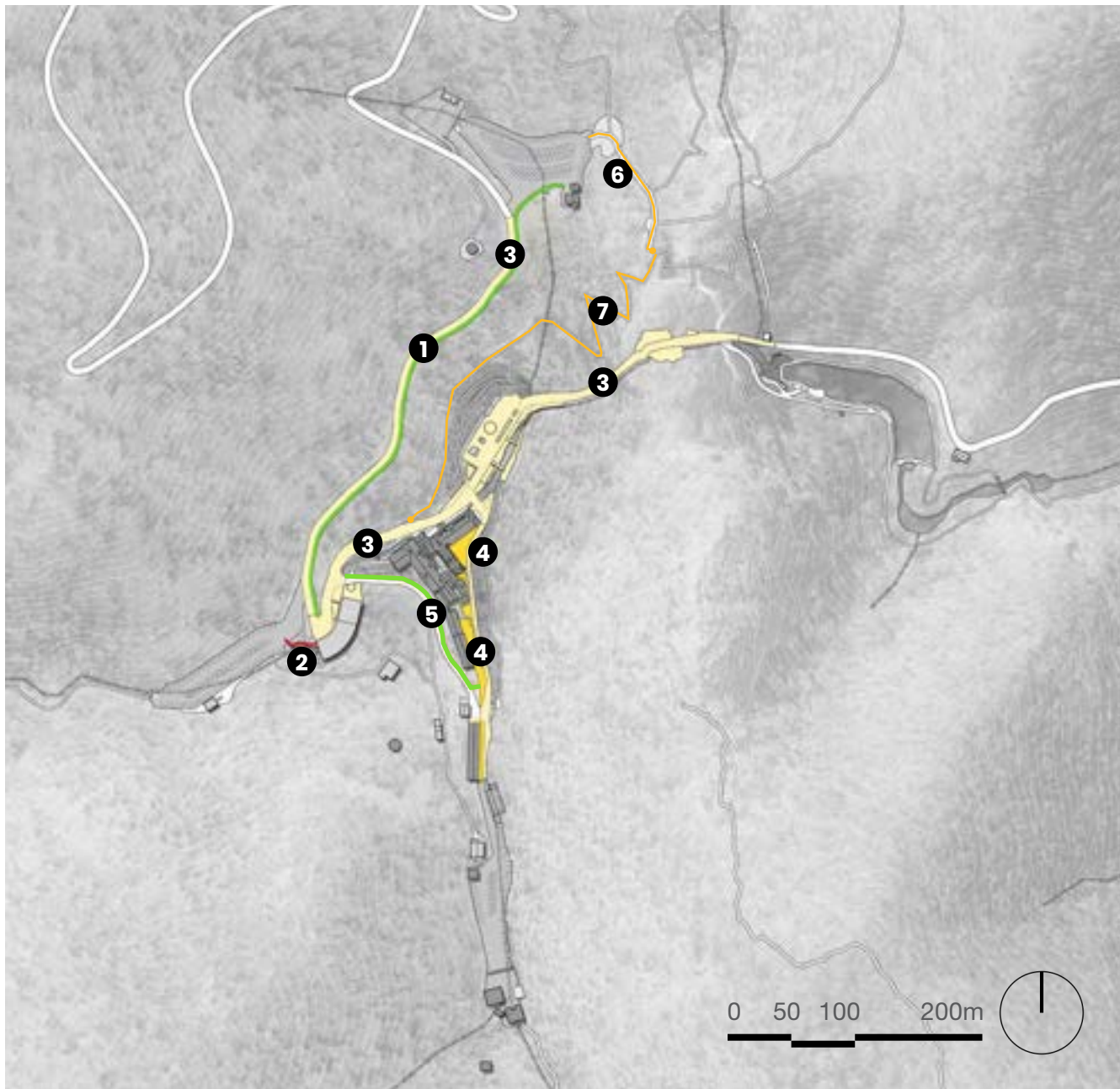
Concrete footpath with broom finish and warm tint. Location: Three Sisters Walk, Katoomba. Photo: NPWS.



Indicative section for new raised footpath along the side of the Two Mile road.



Suspended footpath along Barrenjoey Road, Palm Beach. Photo: Google Maps.



1. New footpath along the Two Mile road
 2. Sky-walk pedestrian bridge from Cambridge car park to new Gateway Centre
 3. Shared zone
 4. New paved footpath areas connecting Mountain Lodge and Gatehouse Lodge to the village area
 5. New footpath and crossing
 6. New accessible walkway to Carlotta Arch lookout
 7. Upgraded section of Six Foot Track
- Shared zone
 - New paved area
 - Upgraded walking track
 - New footpath
 - New raised walkway

Figure 6.13 Key upgrades to pedestrian movement

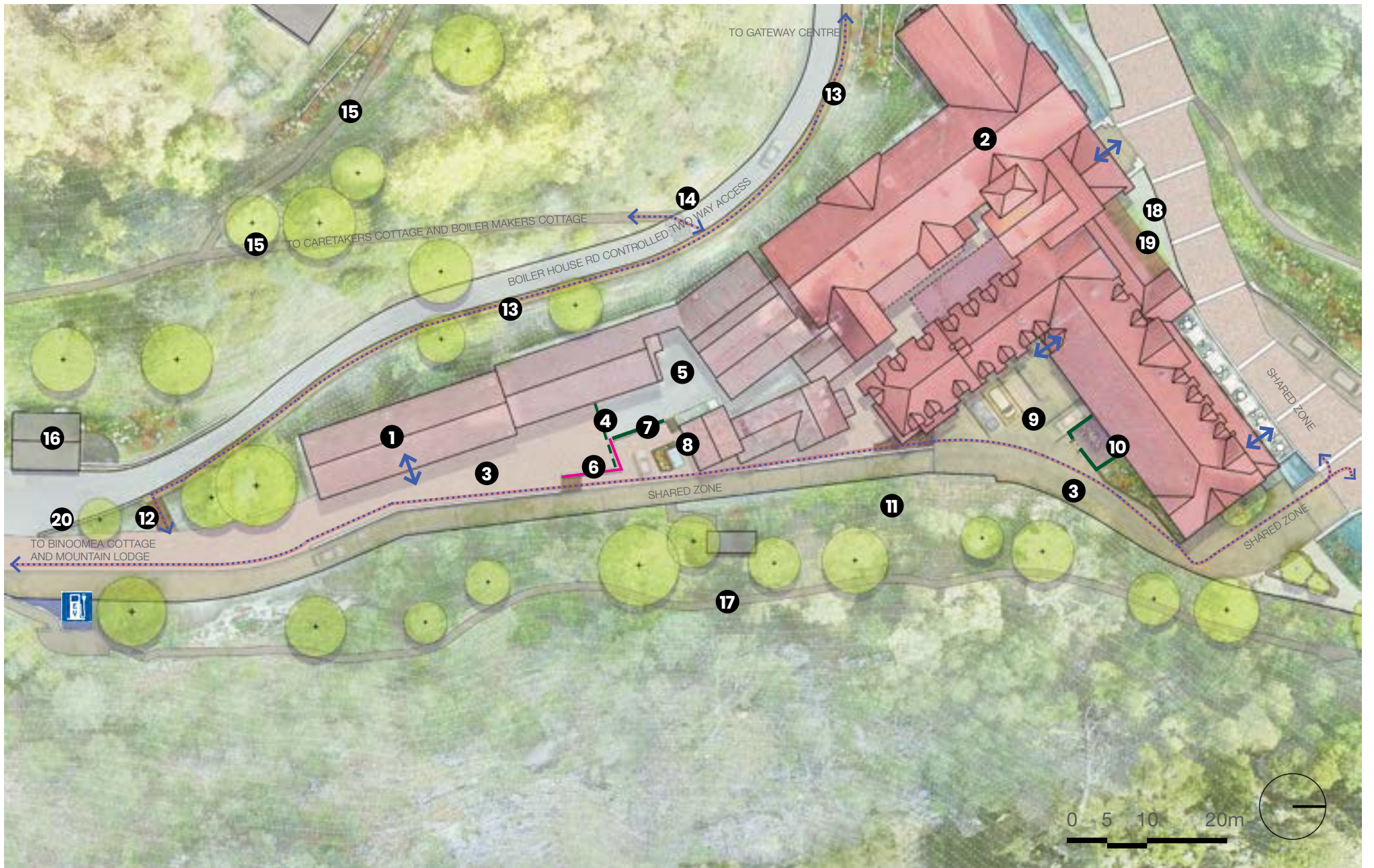


Figure 6.14 Gatehouse Lodge and back of Caves House upgraded pedestrian zones

Upgrades to back of Caves House and Gatehouse Lodge

To provide improved pedestrian connectivity, new paving areas behind Caves House and Gatehouse Lodge will demarcate pedestrian zones from the roadway and connect through to the new shared zone in the village centre.

These paved areas will not only improve the separation between pedestrians and vehicles but will also improve visual appearance.

The new paving treatment will continue to the existing footpath outside Mountain Lodge, providing a seamless connection through to the village centre for guests staying in these areas.

To further provide separation between pedestrian zones and back-of-house areas, new hardwood screening and planting will be used to conceal service areas including bin storage and the electrical substation.

New footpath along Boiler House Road

To complete the pedestrian circulation upgrades, a new footpath is proposed along Boiler House Road, with a crossing at the location of the Caretakers Cottage path.

The new footpath will include a handrail.

This path will allow guests staying in Binoomea Cottage or Mountain Lodge to safely access the Gateway Centre without having to loop around the front of the Caves House.

Day visitors finishing cave tours at the Binoomea Cut will also be able to use this path to return to parking areas and the Gateway Centre at the end of their visit.

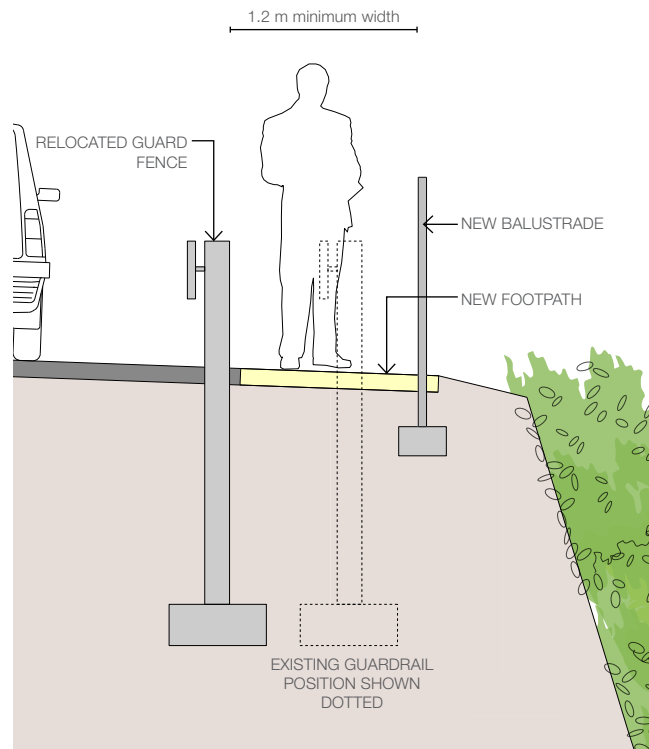


Figure 6.15 Indicative section showing relocated guard fence, new footpath and new balustrade along Boiler House Road

Key to Figure 6.14

1. Gatehouse Lodge
 2. Caves House
 3. Repaved areas prioritising pedestrian access and improving presentation
 4. Sliding gate access to service areas
 5. Service area
 6. New 1.2m hardwood screening fence
 7. New 1.8m hardwood screening fence
 8. New planting to screen electrical substation
 9. Repaved parking area (emergency vehicles)
 10. New hardwood screening around bins
 11. Weed-infested areas cleared and re-vegetated with native planting
 12. New steps
 13. New footpath and balustrade
 14. New crossing
 15. Upgraded tracks to Caretakers Cottage and Boiler Makers Cottage
 16. Boiler room restored as interpretative space
 17. Binoomea track
 18. Culvert under wisteria trellis repaired
 19. Stainless steel trellis with timber frame replaced
 20. Existing retaining wall
- Building entry (guests)
 - Main pedestrian route
 - Existing EV charging station
 - 1.8m screening fence
 - 1.2m screening fence
 - Sliding gate

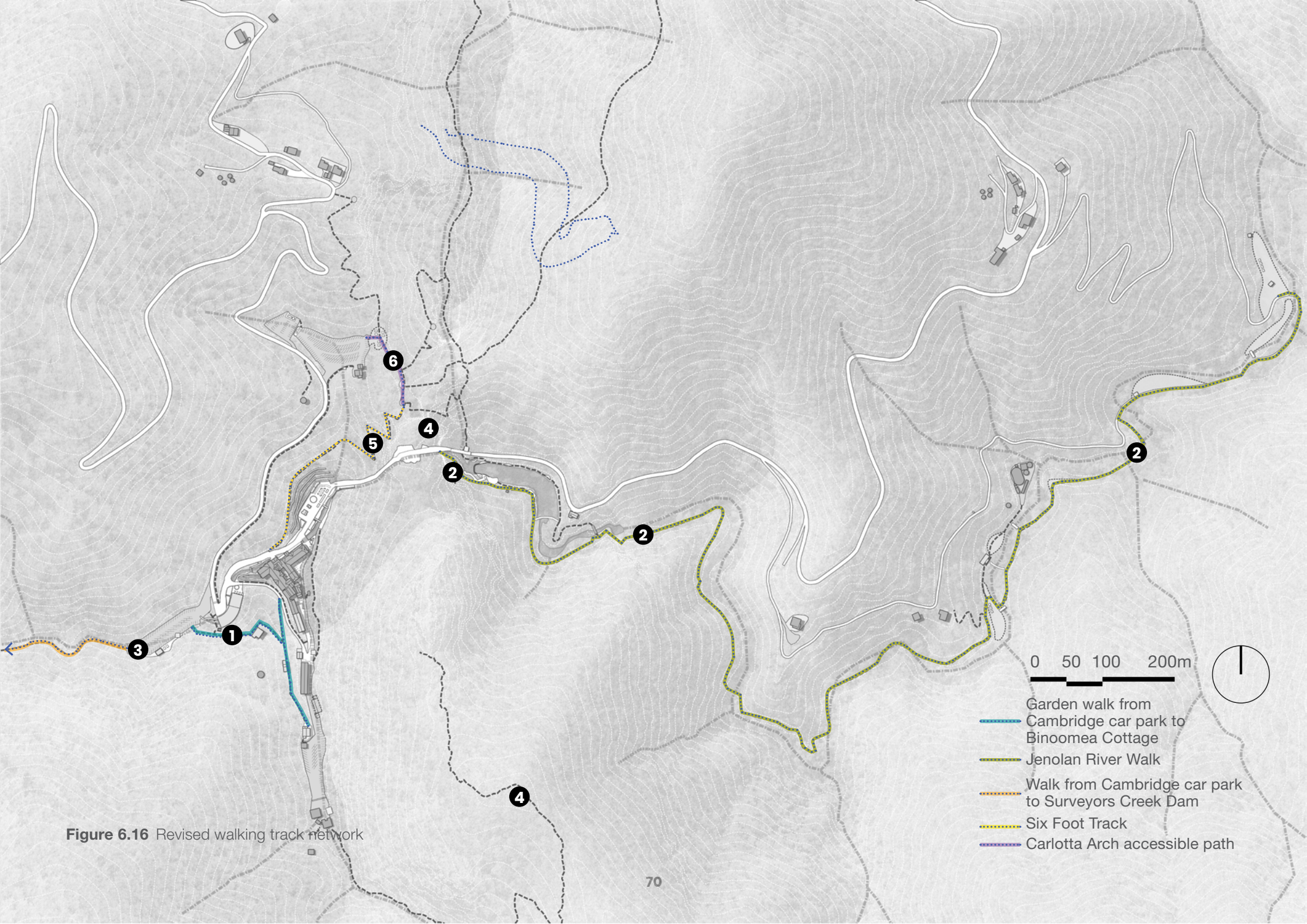


Figure 6.16 Revised walking track network

Revised walking track network

1. Garden walk from Cambridge car park to Binoomea Cottage

The existing track from Binoomea Cottage to Cambridge car park will be upgraded and extended to link to the new Gateway Centre. The walk will take guests through the restored heritage gardens around Boiler Makers Cottage and Caretakers Cottage and improve access to these accommodation and historic interpretation areas.

Upgrades will include:

- widening the path to allow small maintenance vehicles (1.2m)
- installing handrails and balustrades for fall protection where necessary
- stabilising the path.

2. Campground to Blue Lake Walk – Jenolan River Walk

To reconnect the Campground and Utilities Precinct with the Grand Arch Precinct, the walking track requires minor upgrades. Starting at the Blue Lake Walk, the scenic route follows the Jenolan River passing the Hydro Precinct and various swimming holes and platypus burrow locations.

Upgrades will include:

- clearing the path in overgrown locations
- placing stepping stones at creek crossings
- providing interpretation signage along the walk, particularly at the Hydro Precinct, fish ladder and platypus viewing locations
- providing directional signage.

3. Walk from Cambridge car park to Surveyors Creek Dam

An existing walk from Cambridge car park to the dam on Surveyors Creek will be refurbished and will have ongoing maintenance. The walk is approximately 1km return.

Upgrades will include:

- clearing the path
- providing directional signage
- providing new picnic tables and seating around the dam area
- installing a guard rail along the top of the roadway embankment
- removing a wall and replacing it with bollards, tidying up the beginning of the start of the track at Cambridge car park.

4. Tracks closed due to rockfall

To ensure visitor safety, several small sections of tracks around the Grand Arch will be permanently closed due to ongoing rockfall issues.

These include:

- the track leading from the eastern exit of the Grand Arch towards the Devils Coach House (see Note 8, Figure 6.19)
- tracks leading through the centre of the Devils Coach House (see Note 9, Figure 6.19)
- Lucas Rock Track.

Tracks which are closed will be replaced with alternative access using existing infrastructure wherever possible.

Alternative options for access to the Devils Coach House and Nettle Cave are described on page 73.

5. Six Foot Track

The section of the Six Foot Track between Caves House and Carlotta Arch lookout is constructed from irregular stone with large areas of raised grout infill. It poses a trip hazard to guests and can be slippery.

The Six Foot Track is listed as having moderate local significance in the CMP, with change allowed so long as it does not adversely affect the overall significance of the place or fabric of exceptional or high significance.

This plan recommends this section of the track is replaced with a concrete path matching the upgraded Carlotta Arch path, to reduce trip hazards and improve the walking surface.



Section of the Six Foot Track to be upgraded to a concrete path.

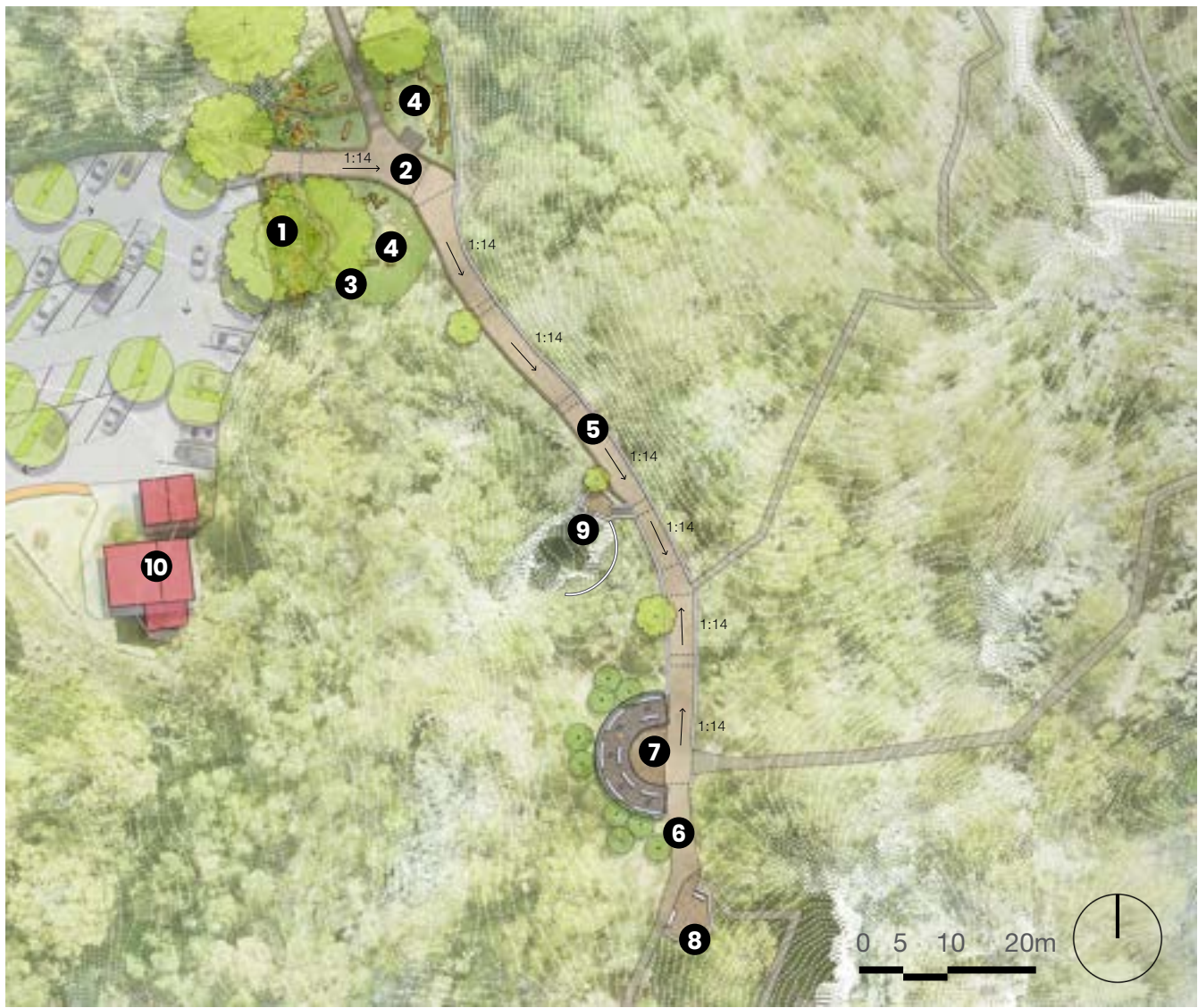


Figure 6.17 Carlotta Arch accessible path, detailed plan

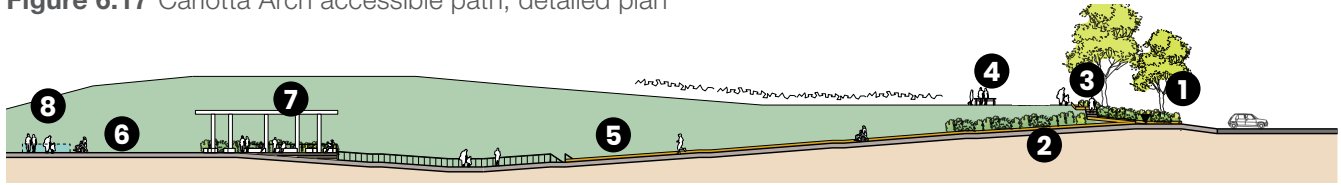


Figure 6.18 Carlotta Arch accessible path, section

6. Carlotta Arch accessible path

A new accessible pathway to Carlotta Arch lookout from the car park is possible with slight modifications to existing levels.

The new pathway will be raised in some areas to achieve a series of 1:14 ramps, landings and handrails that will be compliant with the *Disability Discrimination Act 1992* (DDA Act). Additional upgrades to the area include:

- a new nature play zone for children with shade shelters and seating
- raised ramps to be constructed from material (fill) cut from other areas of path and resurfaced in exposed aggregate concrete, or raised mini-mesh
- a guided tour stopping point with new bench seating
- an upgraded lookout point, seating and interpretative signage
- additional infrastructure required for safety purposes.

1. New native planting bed
2. Existing path levels lowered to achieve 1:14 ramps (concrete path); new retaining walls
3. New steps leading to children’s nature play area
4. Nature play zone and seating
5. Footpath level raised (using existing fill)
6. Concrete path at existing levels
7. Re-landscaped guide stopping point with bench seating and all-weather shelter
8. Lookout platform with bench seating and interpretative signage
9. Elder Cave entrance, new steps and handrails
10. Old School House (café)

The Grand Arch, Devils Coach House, Lucas Cave and Carlotta Arch

Grand Arch

To improve the pedestrian experience, the Grand Arch asphalt and concrete areas will be repaved as a continuation of the new shared zone. Traffic passing through the Grand Arch will be limited to residents, maintenance, service vehicles and camping visitors.

Other improvements include:

- removal of the men's and women's toilets from the Grand Arch
- replacing galvanized steel railings around garden beds with new sitting walls
- replanting garden beds with native shade-tolerant planting
- updating wayfinding signage.

New connection through Nettle and Arch caves

A new self-guided cave opportunity is possible by connecting the east end of Arch Cave and the old exit out of Nettle Cave and providing a new connection from the Devils Coach House access path to the stepped entrance to the Nettle Cave turnstile (Figure 6.19).

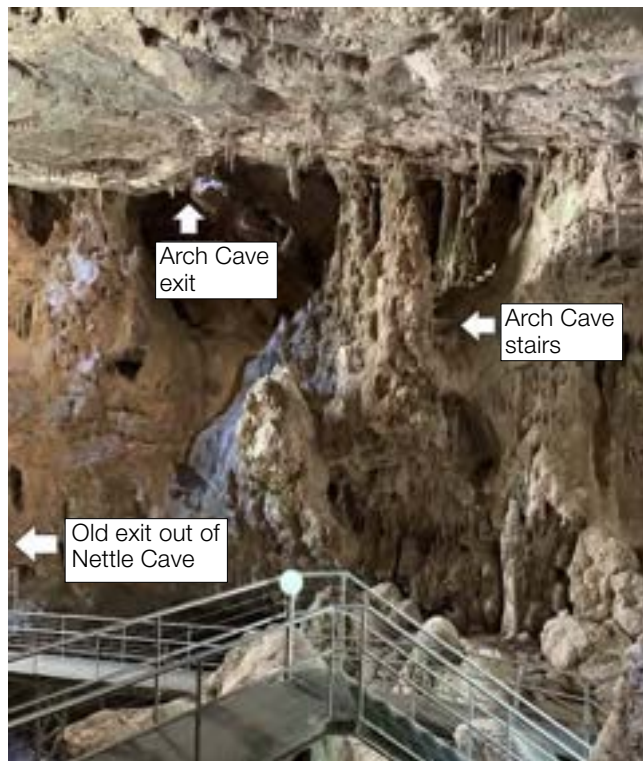
As shown in Figure 6.19, the new bridge connection from Arch Cave to Nettle Cave will allow visitors from Carlotta car park or Caves House to experience a self-guided looped tour through the Devils Coach House, Nettle Cave, Arch Cave and Carlotta Arch.



1. Existing Nettle Cave walkways. Photos: 1-4 by JCRT.



3. Entrance into Arch Cave from Carlotta Arch



2. Potential locations for new connections between Arch Cave and Nettle Cave



4. Potential for Arch Cave connection stairs



5. Existing stairs into Arch Cave. Photos: 5-8 by JCRT.



7. Looking into Nettle Cave from Arch Cave stairs



6. Connection between bottom of Arch Cave stairs



8. Location of new connection from Nettle Cave to Arch Cave, minimising impact by using the existing structure

As set out in the PoM, upgrades to the infrastructure within the caves requires an appropriately detailed environmental assessment.

Devils Coach House

The central steel and mini-mesh viewing platform in the Devils Coach House will be removed, as it is located in a rockfall zone.

Due to rockfall issues, the existing paths through the centre of the cave will be permanently closed and removed. However, access is still possible at either end of the cave.

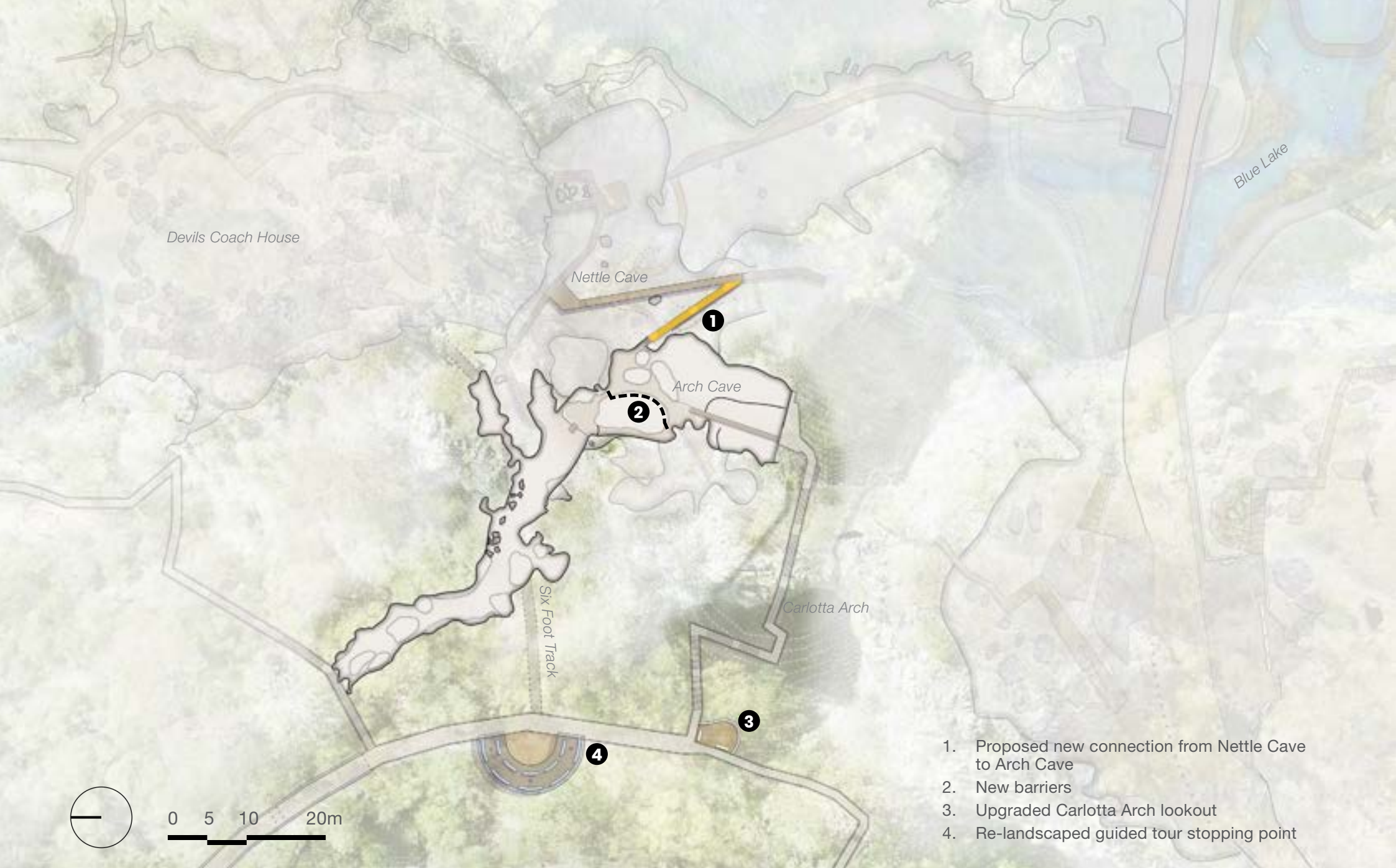
A new connection from the Devils Coach House access path to Nettle Cave will be constructed, avoiding rockfall areas from the daylight hole.

Key to Figure 6.19

1. Shared zone paving
2. New concrete paving
3. Existing toilet blocks removed
4. Existing terrace garden replanted and handrails replaced with sitting walls
5. New Blue Lake Walk
6. Existing pump house to showcase hydro interpretation display
7. Damage along pathway repaired and new handrails installed
8. Existing footpath removed due to rockfall
9. Existing footpaths in the Devils Coach House removed due to rockfall
10. Existing viewing platform in the Devils Coach House removed
11. New connection from the Devils Coach House access path to Nettle Cave
12. Track to Blue Lake upgraded under De Burghs Bridge
13. New barrier at end of path
14. Future access to Lucas Cave via steps is subject to resolving rockfall hazards



Figure 6.19 Lower level detailed plan: Grand Arch and Devils Coach House



- 1. Proposed new connection from Nettle Cave to Arch Cave
- 2. New barriers
- 3. Upgraded Carlotta Arch lookout
- 4. Re-landscaped guided tour stopping point

Figure 6.20 Upper level detailed plan: Arch Cave and Nettle Cave

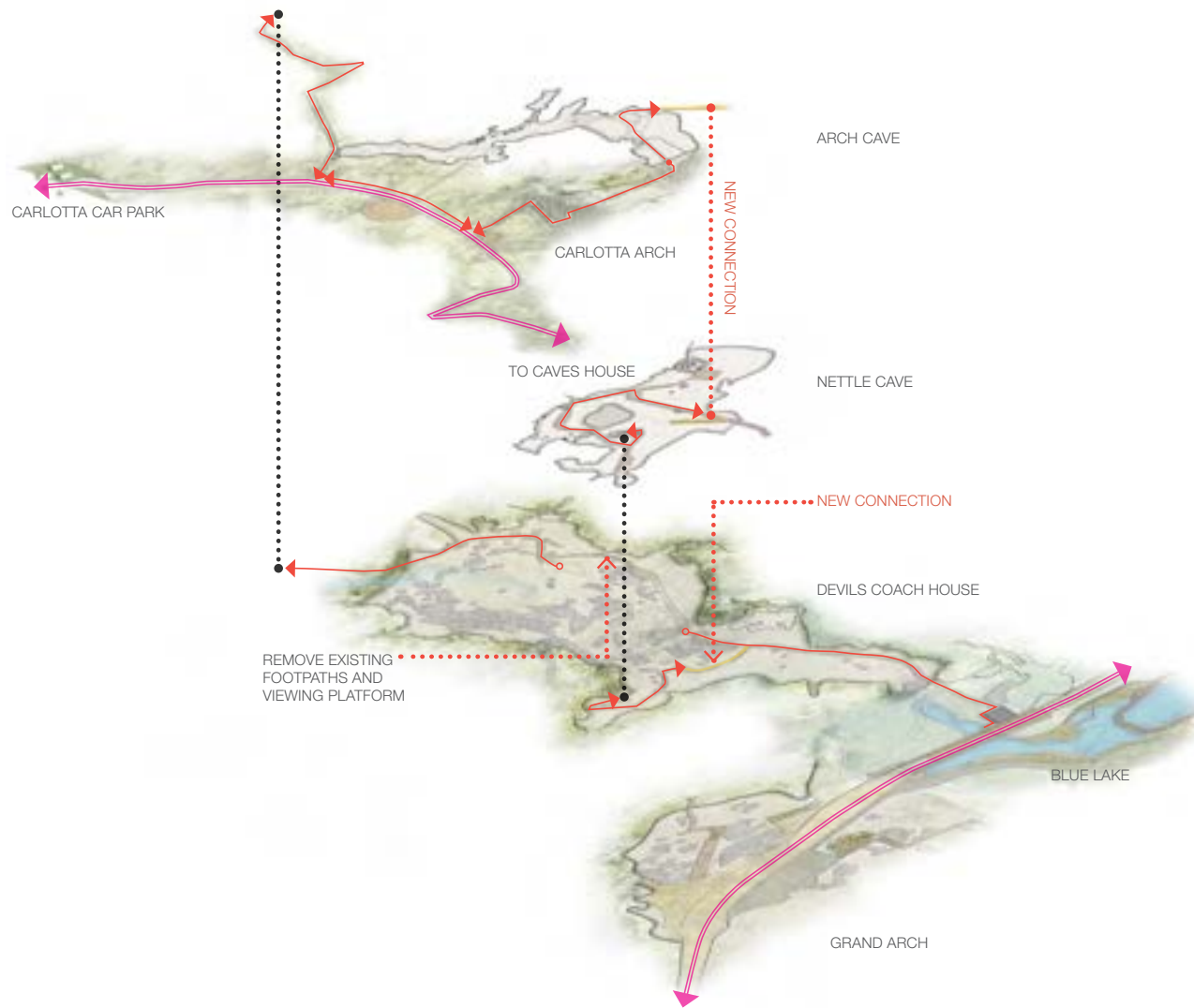


Figure 6.21 Diagram of proposed new connections



Figure 6.22 Nettle Cave detailed plan (numbers relate to photographs on page 73)



Figure 6.23 Arch Cave detailed plan (numbers relate to photographs on page 74)

The Blue Lake Walk

The Blue Lake Walk has been designed to:

- provide a short walk and nature experience opportunities
- upgrade or create new on-ground pathways and boardwalks over Blue Lake
- provide an outdoor deck space
- provide lookout opportunities towards the heritage weir
- provide a range of pause points to sit and enjoy the natural environment
- protect fauna habitats (including platypus) and provide viewing opportunities
- include interpretation embedded into the landscape and using signage
- provide maintenance access to the lake for clearing sediment
- maximise vantage points for viewing opportunities and iconic shareable moments.

Materials

The main walkway materials proposed for the Blue Lake Walk are mini-mesh boardwalk and concrete. Limestone paving, steps and walls are proposed for feature nodes alongside timber decks.

Planting areas will feature native plants, with areas categorised as native aquatic, native re-vegetation or native ornamental.

Native plants will also be used for bank stabilisation in selected areas.



Blue Lake dam wall

Interpretative opportunities on the Blue Lake Walk

The Blue Lake Walk will provide many opportunities for visitors to learn about the area's history, culture and environment. Interpretation can be in the form of signage information panels or may be embedded into the design and experience of the walk.

History and culture

- Tell the creation story of the struggle of Gurangatch and Mirragan.
- Talk about the Gundungurra people's belief that the cave water has healing properties.
- Showcase the lake's history as a scenic destination and hydro scheme.

Environment

- Explain the impacts of floods and dredging and clearing to maintain the lake.
- Explain the flow of water through the cave system and how minerals create the blue colour.

Flora and fauna

- Showcase endemic water plants and offer opportunities for learning about their use by the Traditional Custodians of the land.
- Provide opportunities for visitors to learn about platypus and other animals living in the Blue Lake.

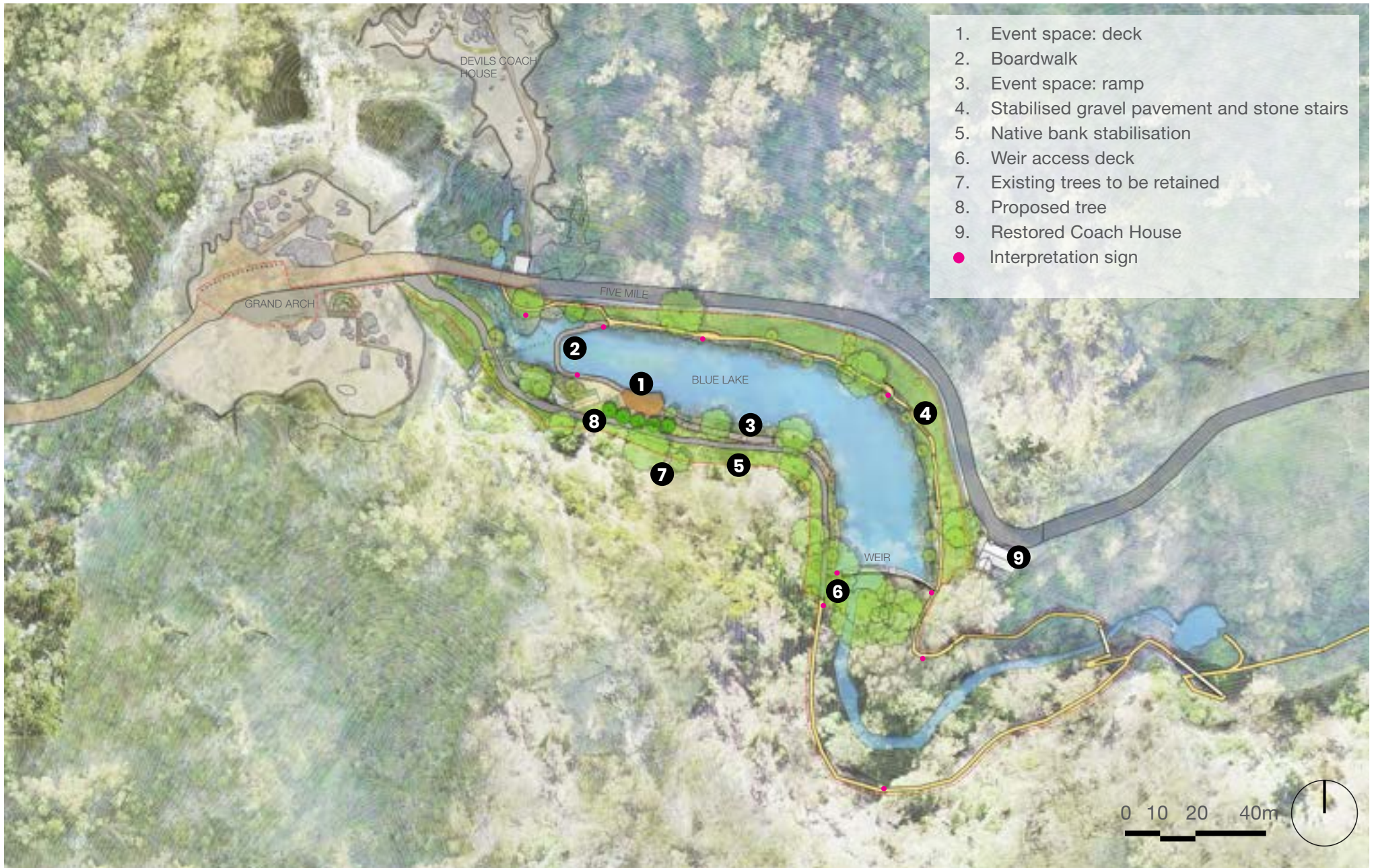


Figure 6.24 Blue Lake proposed site plan (design by NewScape)

Building use

New and upgraded accommodation opportunities

The Caretakers Cottage provides an excellent opportunity for self-catered accommodation in the precinct, for guests or staff. With upgrades to modernise the building, the cottage will be an appealing option for those wishing to experience Jenolan from a more secluded space. The cottage's heritage elements should be retained as much as possible.

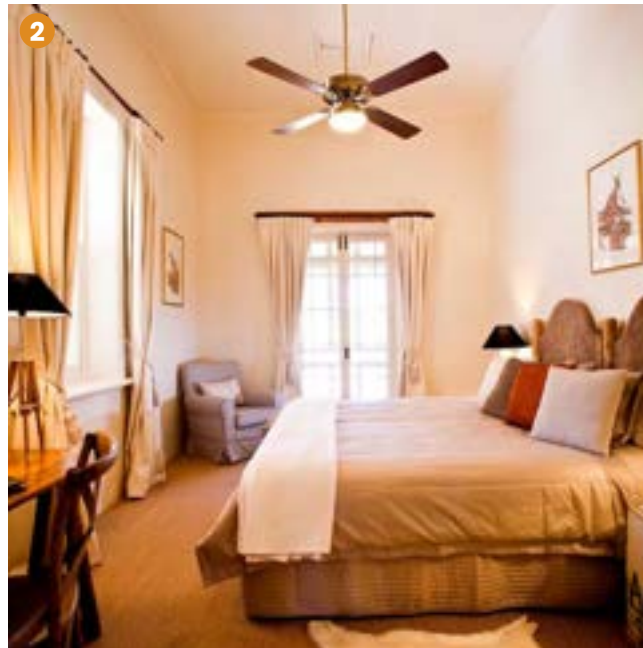
As the cottage is located on a steep hillside, improvements should be made to the track leading to the cottage to allow a small vehicle to access the site for maintenance and transporting guest luggage. New fencing and balustrades should also be installed sensitively for safety along the track.

Other accommodation upgrades will include repainting and restoring Gatehouse Lodge, Mountain Lodge and Binoomea Cottage and providing staff accommodation at Hydro Cottage.

New interpretative and educational spaces

Boiler Makers Cottage, the hydroelectric station and Coach House are currently unused, but of a high heritage significance to the site.

The buildings present an opportunity for restoration and reinterpretation for interpretative educational spaces. The rich history of Jenolan can be showcased through these historic buildings, adding a new immersive experience for visitors and particularly school groups.



1. Middle Head Officers Quarters guest kitchen. Photo: NPWS.
2. Arkaba Homestead restored guest bedroom. Photo: Google.
3. Artefact display and interpretation space at Hyde Park Barracks. Photo: Christine Knight.
4. Immersive interpretation display at Hyde Park Barracks. Photo: Brett Boardman Photography.

Figure 6.25 Accommodation and interpretative space precedent images

Building	Existing use	CMP value/ notes	Proposed use	Target audience	Requirements/ notes
Caves House	Accommodation, guest reception, grand dining room, café, staff rooms, event space	Exceptional significance (state)	No change	Adult couple, single travellers, friends and family groups, retreats, events	Currently tendered for restoration. Subject to a separate planning process.
Ticket and Guides Office and toilets	Ticket purchase and information, guides staff rooms, public toilets	Ticket and Guides Office, moderate local significance. Toilets, little significance.	TBD		Demolish Guides Office and toilets. Restore original Ticket Office and refurbish for retention in Jenolan Village.
Old Post Office	JCH&PS Museum	High significance	TBD		Relocate from the Hills Flats to Jenolan Village.
Hill Flats	Unused	Low significance	Demolish	-	Demolish for repair of culvert and construction of new Gateway Centre.
Gatehouse Lodge	Accommodation	High significance (local)	TBD	School groups, large organisations, backpackers	Repaint, restore, upgrade facilities.
Binoomea Cottage	Accommodation	Little significance	TBD	Families, small groups	Repaint, restore, upgrade facilities.
Caretakers Cottage	Staff accommodation	High significance (state)	Staff accommodation or guest accommodation	-	Restore building for accommodation use. Upgrade walking tracks leading to the cottage to allow small vehicle access for maintenance. Install fencing and handrails where required for safety along the track. Restore to original condition with modern fittings and appliances.
Boiler Makers Cottage	Unused	High significance (local)	TBD		Demolish non-original sections of building. Restore building to original condition for use as an interpretation space. Upgrade walking tracks leading to the cottage to allow small buggy or mower to access for maintenance. Install fencing and handrails where required for safety along the track.
Wallaby Hall	Currently used for storage. Previously used as a space for school groups	Little significance	Demolish, repair culvert underneath	-	New space for school groups in new Gateway Centre or within Caves House to replace current Wallaby Hall space.
Hydroelectric station	Unused	Exceptional significance	Interpretative space	All visitors including school groups	Restore the building for recommissioning and interpretation purposes pending re-establishment of hydroelectricity generation.

Table 6.2 Summary of proposed building uses and upgrades

Building	Existing use	CMP value/ notes	Proposed use	Target audience	Requirements/ notes
Old School House	Café and welcome area	Moderate significance (local)	Continue use as café and welcome area for guests	All guests	Repaint, restore, provide historic interpretation signage.
Mountain Lodge	Guest accommodation	Little significance	Guest accommodation	Adult couple, single travellers, friends and family groups, retreats, events	Inspection, monitoring and cleaning of the area behind the building, ongoing maintenance.
Boiler Room	Houses generator	Moderate significance (local)	Historic interpretation site		Remove generator, restore building to original condition for use as an interpretation space.
Coach House	Electrical workshop	High significance (local)	TBD	All guests	Repaint, restore, do remediation work to stabilise the slope, underpin the southern and western walls, repair the internal cracks, Consider public access to enhance significance, provide historic interpretation signage, upgrade facilities.
Hydro Cottage	Unused	High significance (state)	Staff accommodation		Repaint, restore.



Caretakers Cottage

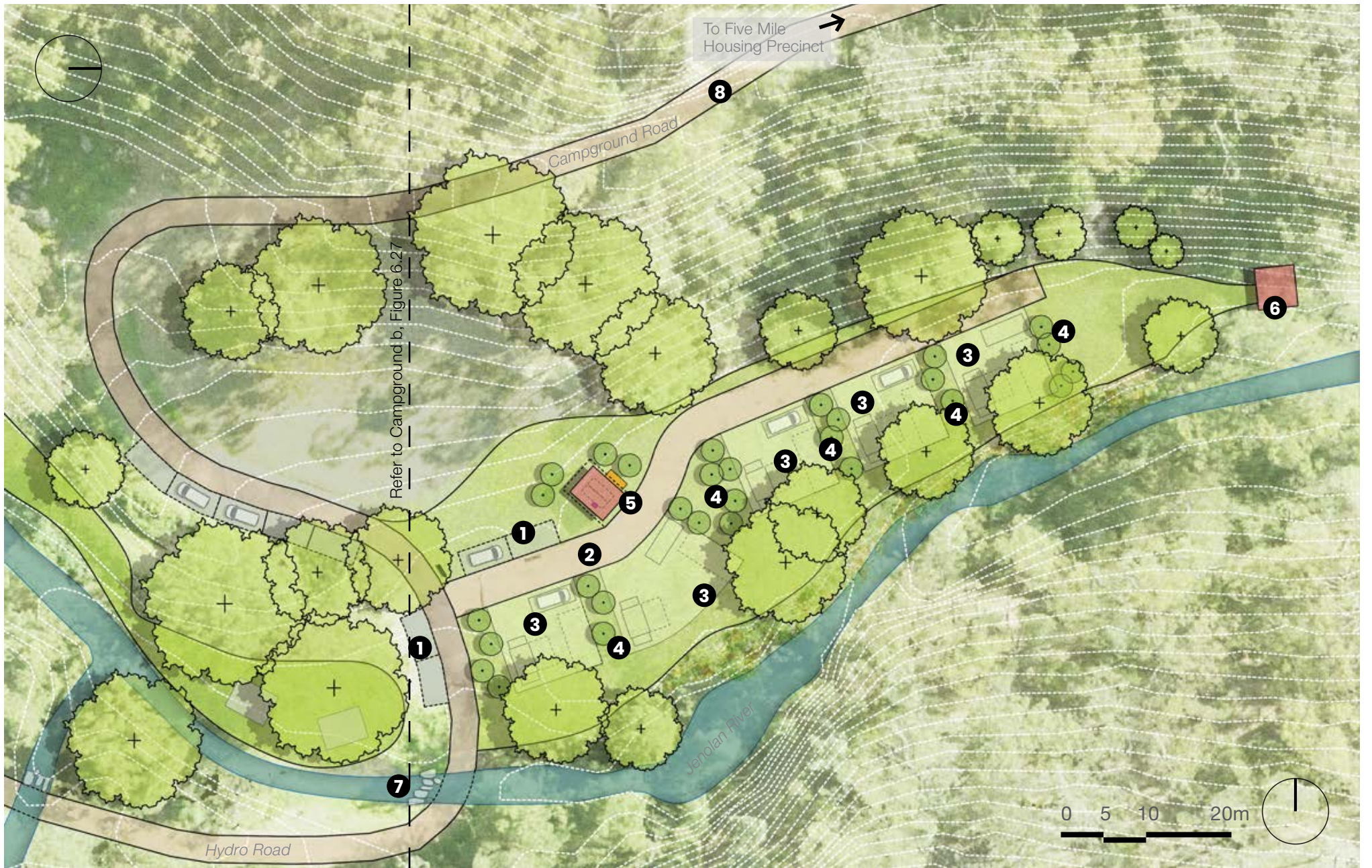


Figure 6.26 Detailed plan, Campground A

Restored Campground and Utilities Precinct

The Campground and Utilities Precinct will be restored to a camping area, providing sites for both drive-in and walk-in camping.

The restoration of this area (unused since 2005) will provide a new experience for those wishing to be more self-sufficient. The camping area will offer basic facilities for nature-based camping, based on guidelines set out in the NPWS *Park Facilities Manual* (OEH 2016).

Guests staying in the Campground and Utilities Precinct will access the area via the Five Mile section of Jenolan Caves Road after arriving at Jenolan Village via the Two Mile section. Limited access will be granted to these vehicles to pass through the Grand Arch and continue to the Campground and Utilities Precinct. To allow access for two-wheel drive vehicles throughout the year, Campground Road will be sealed.

Detailed planning will be required for each area to meet NPWS guidelines for campgrounds.

Options will be considered for connecting to the sewage treatment plant or installing an on-site

septic system.

Alternative options considered for a new campground included McKeowns Valley and the Five Mile Cottages. McKeowns Valley was deemed inappropriate as it is located on karst and the Five Mile Cottages are not currently feasible due to road failures and the need to resolve long-term transport issues.

The development of the camping area should follow the values outlined in the NPWS *Park Facilities Manual* (OEH 2016), including:

- ensure natural and cultural values are protected
- minimise the environmental impact of the site and surrounding area
- minimise impact on other park users
- be appropriately low key and suitable for the location
- meet sustainability standards.

Campground A

Campground A provides approximately five drive-in camping sites. The existing toilet and shower block are to be replaced with a new toilet block.

Each site is a minimum of 10 x 10m.

Campground B

Campground B is for walk-in camping only, with space for approximately eight camping sites. Guests will be required to park along the road in spaces provided, before walking a short distance to the camping area.

Campground C

Campground C is located further along the Jenolan River and provides five camping sites with drive-in access. Campground C will have a new toilet block.

Key to Figure 6.26

1. Parking spaces for walk-in camping
2. New gravel road for drive-in camping
3. 10 x 10m (min) car-based camping spaces
4. New planting for separation and screening of camping spaces
5. New toilet block
6. The Slaughterhouse (heritage building)
7. Stepping stones
8. Sealed Campground Road



Figure 6.27 Detailed plan, Campground B

1. 10 x 10m (min) car-based camping spaces
2. New planting for separation and screening of camping spaces
3. New toilet block and bin storage
4. Stepping stones river crossing



Figure 6.28 Detailed plan, Campground C

Walking tracks and footpaths



Integrated Interpretation and signage



Shared zone



1. Informal forest path
2. Concrete path - exposed aggregate with warm tint
3. Stone paving - limestone or granite setts, bush-hammered or rough-sawn finish
4. Stone paving - granite or limestone flags
5. Integrated shared zone signage, Sydney Park
6. Interpretative elements in concrete path with varying levels of exposed aggregate, Bar Beach
7. Interpretative inlay in concrete path, Bar Beach
8. Shared zone asphalt road with painted wildlife interpretative elements, Sydney Park
9. Shared zone paving - granite flagstone and setts
10. Shared zone paving - granite flagstones with contrasting colours, Marrickville Library.

Design guidelines for new built form

New built form should follow the seven key design principles and the supporting design principles outlined in the NPWS *Park Facilities Manual* (OEH 2016).

However, the materiality and visual outcome should also reflect the objectives outlined in the manual. Built projects should at all times prioritise sustainable practice outlined by NPWS including (but not limited to) the following guidelines:

Planning and design

- Use site planning to reduce environmental impact and enhance environmental performance.
- Reduce or eliminate reliance on the energy required to light, heat and ventilate structures.
- Conserve valuable resources and avoid waste.
- Use recovered or recycled content materials where practical.
- Minimise or eliminate water usage and reduce reliance on mains supplies (e.g. use rainwater or greywater).
- Use low-toxicity or non-toxic materials to reduce impact on human health and the environment
- Maximise the recovery of components and materials at end of life.

Materials

- Reuse demolition materials and components, or use recycled-content materials that meet engineering specifications.
- Source materials locally to reduce transport impact and support the local community.
- Use materials adequate for a job and not of an excessive standard.
- Use materials that have a lower environmental footprint.

Fabrication

- Use prefabricated structures or fabricate components off-site where possible.
- Build bulk quantities of structures and components if practical.
- Use techniques that maximise recovery at end of life (e.g. bolting not nailing).
- Use contractors with an environmental management system in place to minimise environmental impact.

Construction

- Keep each construction site as small as possible and manage it carefully.
- Use environmentally friendly construction techniques.
- Minimise material and vehicle movements on and off the site.
- Use contractors with an environmental management system in place to minimise environmental impact.

Maintenance

- Undertake maintenance to maximise a structure's service life.
- Fix things before they break or as soon as a problem is identified.
- Use long-life and low-toxicity materials where possible.
- Repair vandalism and graffiti immediately to deter further attacks.

Disposal at end of life

- Maximise the number of materials recovered at end of life, with landfill as the last option.
- Reuse and recycle components and materials where possible.

Raised walkways and balustrades



Walls



1. Raised walkway - dark grey mini-mesh
2. Balustrade - hardwood timber uprights with stainless-steel handrail
3. Stainless-steel handrail, Barangaroo Public Domain
4. Stainless-steel handrail. Photo: NewScape Design
5. Dry stone wall (limestone or granite)
6. Stone block free-standing wall
7. Precast concrete wall
8. Concrete sleeper rockfall protection wall, limestone colour
9. Sandstone solid walling block
10. In-situ concrete wall and steps, Barangaroo Headland Park

Seating and picnic furniture

Picnic areas should be consolidated into several main areas to reduce scattered furniture locations throughout the precinct.

Two suites of furniture can be used with similar characteristics, one for the village centre and one for the other picnic areas in the precinct.

A Jenolan-specific heritage style should be developed for all furniture used within the main areas of the precinct.

Seating located along tracks should take advantage of viewpoints and provide regular rest stops.

Furniture should integrate with landform where possible and be located against a visual backdrop to reduce visual prominence.

All seats and furniture should be installed with a hard-wearing surface underneath.

Generally, throughout the Grand Arch Precinct, furniture should use the NPWS standard suite including shelters, benches and picnic tables (except within the Jenolan Village and the Gateway Centre).

Lighting

Above-ground lighting

- Position lights in conjunction with existing tall elements such as trees and buildings that can act as a backdrop.
- Locate lighting on buildings or facilities where possible.

In addition to following the NPWS *Park Facilities Manual* (OEH 2016) and Australian Standard AS/NZS 1158.3.1.2020 *Lighting for roads and public spaces, Part 3.1: Pedestrian area (Category P) lighting - Performance and design requirements*, lighting should follow guidelines outlined in the *National Light Pollution Guidelines for Wildlife* (Australian Government 2020), including:

- Start with natural darkness and only add light for specific purposes.
- Use adaptive light controls to manage light timing, intensity and colour.
- Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill and glare.
- Use the lowest intensity lighting appropriate for the task.
- Use non-reflective, dark-coloured surfaces.
- Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.

Paving

Feature paving and shared zone

Limestone or granite cobble paving can be used in feature areas of the shared zone to indicate to drivers they are in a primarily pedestrian and calm traffic zone. The use of cobble paving will also help to create a village atmosphere.

To complement the cobble areas, flagstone granite or limestone paving can also be used in feature areas of the shared zone.

Concrete paving with exposed aggregate and colour tint can be used in non-feature areas of the shared zone and incorporated with in situ signage and interpretative elements.

Walking tracks

Natural paths should maximise the use of natural materials such as timber, stone and soil where possible.

Concrete paths should use a local aggregate, exposed with a light wash and include a warm-colored oxide to visually soften the material.

Raised walkways and ramps are to be constructed from dark grey mini-mesh.

Lighting



Seating and picnic furniture



Fencing and Screening



1. Low-level lighting at Taronga Zoo Wildlife Retreat. Photo: Lucian Lighting
2. Directional shielded bollard light - IF Round. Photo: Lucian Lighting
3. Directional shielded wall mounted light - Erco Kubus Light. Photo: Erco
4. Lighting with reduced or filtered blue light from *Outdoor Lighting in National Parks* (NPS 2015)
5. Informal bench seating on in-situ concrete wall, Marrickville Library. Photo: JPW
6. Classic 'Galleria' table and benches, village area. Photo: Street Furniture Australia
7. NPWS hardwood timber bench. Photo: NewScape Design
8. NPWS hardwood timber picnic table and benches. Photo: NewScape Design
9. Timber screening, Marrickville Library. Photo: JPW
10. Traditional picket fence for cottage areas. Photo: Google

Screening

Screening around back-of-house areas and the depot should be made from locally-sourced hardwood (recycled or from plantations or native forests that are sustainably managed).

The use of timber should follow the guidelines set out in the NPWS *Park Facilities Manual* (OEH 2016).

Steps and walls

Freestanding and retaining walls should be cut-stone block walls of granite, sandstone or limestone - sourced as locally as possible and within a colour range to match existing stonework.

Stone walls should complement existing heritage walls. With the addition of timber they can be used to provide informal sitting areas. Dry-stone retaining walls for terracing can be used where walls are required to match existing.

To contrast with stone walls and provide a modern aesthetic in selected areas such as the Gateway Centre, walls can be off-form concrete Class 2 finish. Where possible, concrete should be low-carbon concrete.

The use of stone and concrete should follow the guidelines set out in the NPWS *Park Facilities Manual* (OEH 2016).

Steps should be finished with stone cladding to match paved areas or using an off-form concrete Class 2 finish.

Rockfall protection retaining walls

In areas where retaining walls are needed for rockfall protection, new walls should be easy to install and clear rockfall from behind them.

Three options can be used for these more functional elements:

- limestone or sandstone (or other locally available) solid walling blocks, Grade A selection
- gabion walls with local stone
- concrete sleeper walls, colour to match the local stone.

Handrails and balustrades

Above-ground areas

Handrails and balustrades should comply with:

- *National Construction Code* for handrails in relation to buildings
- *AS 2156.2-2001 Walking Tracks Part 2: Infrastructure design*
- *AS 2156.2* for handrail loadings for track Classes 3, 4 and 5
- *AS/NZ 1170.1:2002 Structural design actions Part 1: Permanent, imposed and other actions* for handrail loadings for track Classes 1 and 2
- *AS 1926.1-2012 Swimming pool safety, Part 1: Safety barriers for swimming pools* for guidance on non-climbing zones.

Handrail design should primarily follow the NPWS *Park Facilities Manual* (OEH 2016) and on karst areas handrails should be constructed from stainless steel.

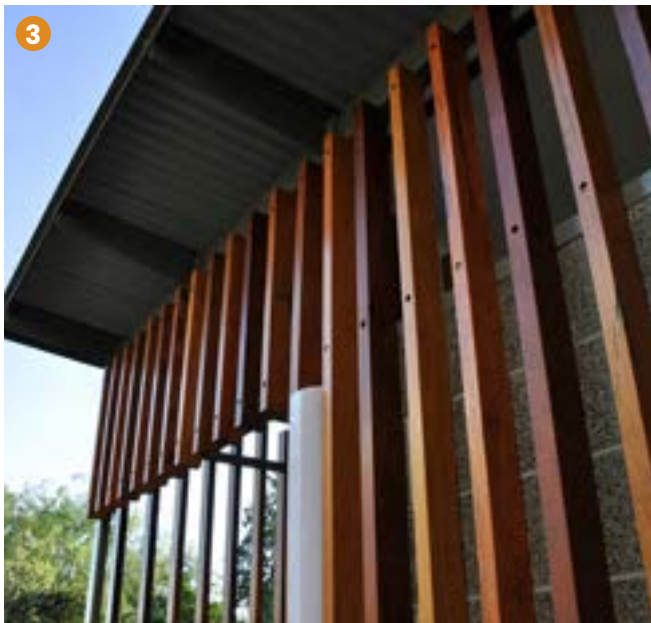
For feature areas (for example viewing platforms), using timber for posts and rails can help to create a more sympathetic aesthetic.

Cave areas

Current research suggests stainless steel is the most appropriate material to use in karst environments and any new handrails should continue to be constructed from stainless steel.

Any new installations will take into account future scientific research and regulatory policies.

Amenities block



Shelters



Barbecues



1. Lizard Log amenities block. Photo: CHROFI
2. Centennial Park amenities block. Photo: Lahz Nimmo Architects
3. Surfers Oceanway Public Amenities. Photo: Complete
4. Sydney Park Cafe Shelter. Photo: Stanic Harding
5. Lizard Log picnic shelter. Photo: CHROFI
6. Timber skillion at Murramarang National Park. Photo: NewScape Design
7. Standard NPWS timber gable shelter, Audley, Royal National Park
8. Skillion barbecue shelter, Burragorang State Conservation Area

Bins



1. Powder-coated stainless steel bin. Photo: Street Furniture Australia
2. Powder-coated stainless steel bin with timber front. Photo: Street Furniture Australia

Picnic shelters and amenities block

New picnic shelters should follow the standard guidelines set out in the NPWS *Park Facilities Manual* (OEH 2016).

Custom design should be used for the new shelters and amenities blocks in the village area and Gateway Centre to develop a modern, cohesive identity for the new built forms.

Sustainable low-carbon or recycled materials should be used where possible.

Bins

Bins should be easily identifiable by users as garbage or recycling receptacles.

- Locate bins in positions that are visible and allow easy access, but not visually dominant, such as at entry or exit points to visitor precincts.
- Group bins for maintenance effectiveness. For example, bin stations should be accessible by vehicle.
- Ensure bin openings:
 - prevent rain and water entering the bin
 - prevent access by wildlife and vermin
 - are smooth and free of sharp edges
 - are large enough to accept most common garbage items and small enough to deter dumping of commercial or household garbage
 - incorporate a smaller round shape for recycling, sized to suit soft drink bottles
 - are positioned and configured to allow easy access for all users.

Barbecues

New barbecues should be located at least 5m away from picnic tables to encourage shared use.

- Ensure they can be operated easily with minimal risk of burning or injury.
- Incorporate a grill or plate for barbecuing.
- Consider providing wheelchair access.
- Facilitate free, timed operation that can be shut off after hours to minimise energy wastage.
- Incorporate hygienic benchtop preparation surfaces – stainless steel is preferred.
- Install barbecues under a shelter to reduce maintenance requirements (e.g. prevent rainwater entering the fat collection vessel). Locate them 500mm from shelter posts to minimise vermin access.
- Make sure the barbecue and enclosure design deter vermin access.
- Consider the potential for use of the enclosure roof for solar panels to charge the battery for barbecue ignition.
- Consider integrating barbecue cladding design themes with other shelter structures and furniture.

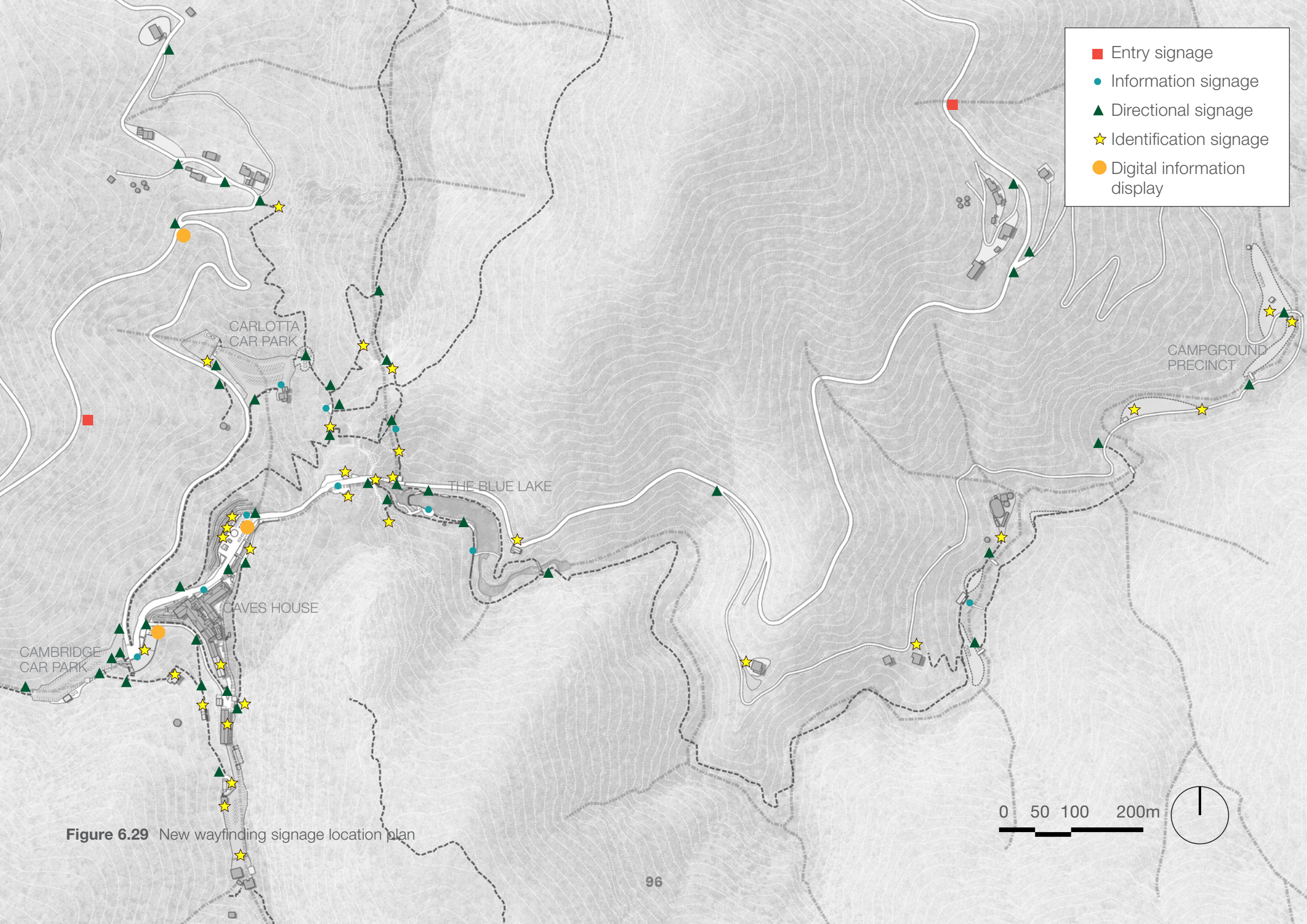


Figure 6.29 New wayfinding signage location plan

Wayfinding signage

New wayfinding signage throughout the precinct should follow the NPWS *Park Signage Manual* (OEH 2017).

Since 1997, Jenolan Caves has been part of the NPWS estate. Adoption of NPWS signage standards and facilities will provide a consistent look and feel with the rest of the Jenolan Karst Conservation Reserve and adjacent national parks. Jenolan Caves colours and branding will be applied to the standard NPWS signage family.

Old layers of signage throughout the precinct should be removed to ensure a fresh and cohesive strategy throughout the precinct.

Any signs identified as having significant heritage value will be managed appropriately once removed.

Digital information displays will be installed in the main visitor service area near the Gateway Centre and at car park entries, to provide quick and regular updates for visitors and ensure the information displayed is current.

1. Park entry sign
2. Information bay
3. Information and map
4. Primary directional sign
5. Directional blade
6. Track junction
7. Minor directional sign
8. Standard totem
9. Walking track marker
10. Place identification sign
11. Fence or gate-mounted place identification
12. Toilet sign

● Digital information displays



■ Entry signage

1



● Information signage

2



3



▲ Directional signage

4



5



6



7



8



9



★ Identification signage

10



11



12



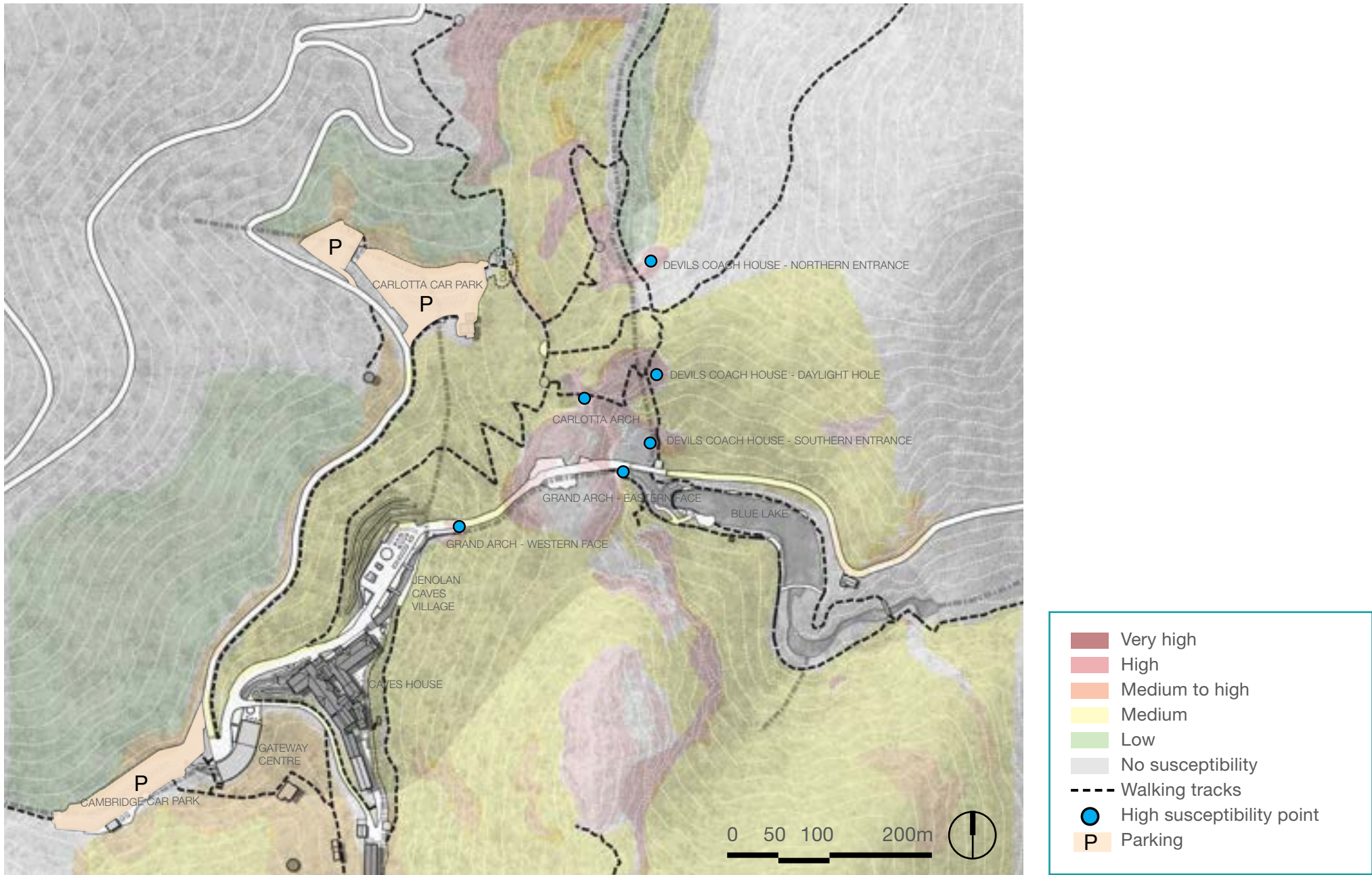


Figure 6.30 Rockfall susceptibility zones - JPW plan based on data supplied by geotechnical consultants Pells Sullivan Meynink (PSM)

Rockfall risk and slope stability

Jenolan Karst Conservation Reserve features a variety of steep cliffs and escarpment slopes which have evolved in response to the dissolution and erosion of limestone.

The limestone rock mass is highly variable, ranging from relatively massive rock mass through to heavily structured, highly fractured rock mass, with zones of dilation leading to some high rockfall susceptibility zones around the Grand Arch, Carlotta Arch, Blue Lake Walk, Carlotta car park and Cambridge car park.

The steep slopes around Jenolan Village, Blue Lake and the car parks are also vulnerable to debris slides during high rainfall events.

A slope stability and landslide risk assessment report has been completed by PSM, specialist geotechnical consultants, on behalf of JCRT.

The landslide, slope stability and rockfall risks were assessed throughout the reserve with a particular focus on the Grand Arch Precinct.

A further risk assessment will be required based on this master plan.

Hazard zones

A series of hazard zones with ‘unacceptable risk’ have been identified by PSM, including:

- Carlotta Arch - access track to Devils Coach House and Nettle Stairs (decommissioned)
- Devils Coach House - lower access tracks
- Blue Lake - access tracks

- The Grand Arch - east slope and eastern and western portals
- Cambridge car park
- Jenolan Village.

Risk management and mitigation

PSM’s general recommendations for risk mitigation are to manage the risk fundamentally through education and monitoring, using behavioural and process controls in favour of hard engineering solutions, where possible.

Recommendations include:

- doing site-specific risk assessments for each area with unacceptable risk to facilitate appropriate mitigation measures
- using bespoke rockfall protection to provide safe access from the eastern portal of the Grand Arch to the Devils Coach House and Blue Lake Walk
- installing a sympathetically designed rockfall protection structure along the Blue Lake access track and Grand Arch eastern portal
- using discrete passive support treatments (e.g. rock bolts) where possible
- doing rock scaling works
- re-introducing vegetation cover or using debris catch fences in Cambridge car park and Carlotta car park to reduce the future susceptibility of slope movements and manage both travel distance and impact forces associated with debris slides.

Sympathetic geo-hazard protection

Each hazard zone identified by PSM is an essential part of Jenolan’s core visitor experience and represents some of Jenolan’s unique geoconservation values.

In some areas where ‘soft’ measures (education and monitoring) are insufficient to manage the risks, engineering solutions will be required.

As shown in Figure 6.32, typical examples of geohazard protection options include:

- rockfall canopy structures with multiple gauge wire mesh protection
- anchored post and mesh rockfall protection barriers
- bespoke rockfall protection structures
- flexible debris flow barriers
- gabion walls for retention purposes
- cut-slope treatments with soil nails, mesh and fiber-reinforced shotcrete
- cut-slope treatments with hydromulched upper benches and lined crest drains.

To maintain and honour the unique heritage value of Jenolan, individual protection elements are likely to need to be refined to suit the environment and this may not be achieved using ‘off-the-shelf’ solutions.

Any rockfall protection work within the precinct should also follow the guidelines set out in *NPWS Landslides and Rockfalls Procedures* (DCCEEW 2023).

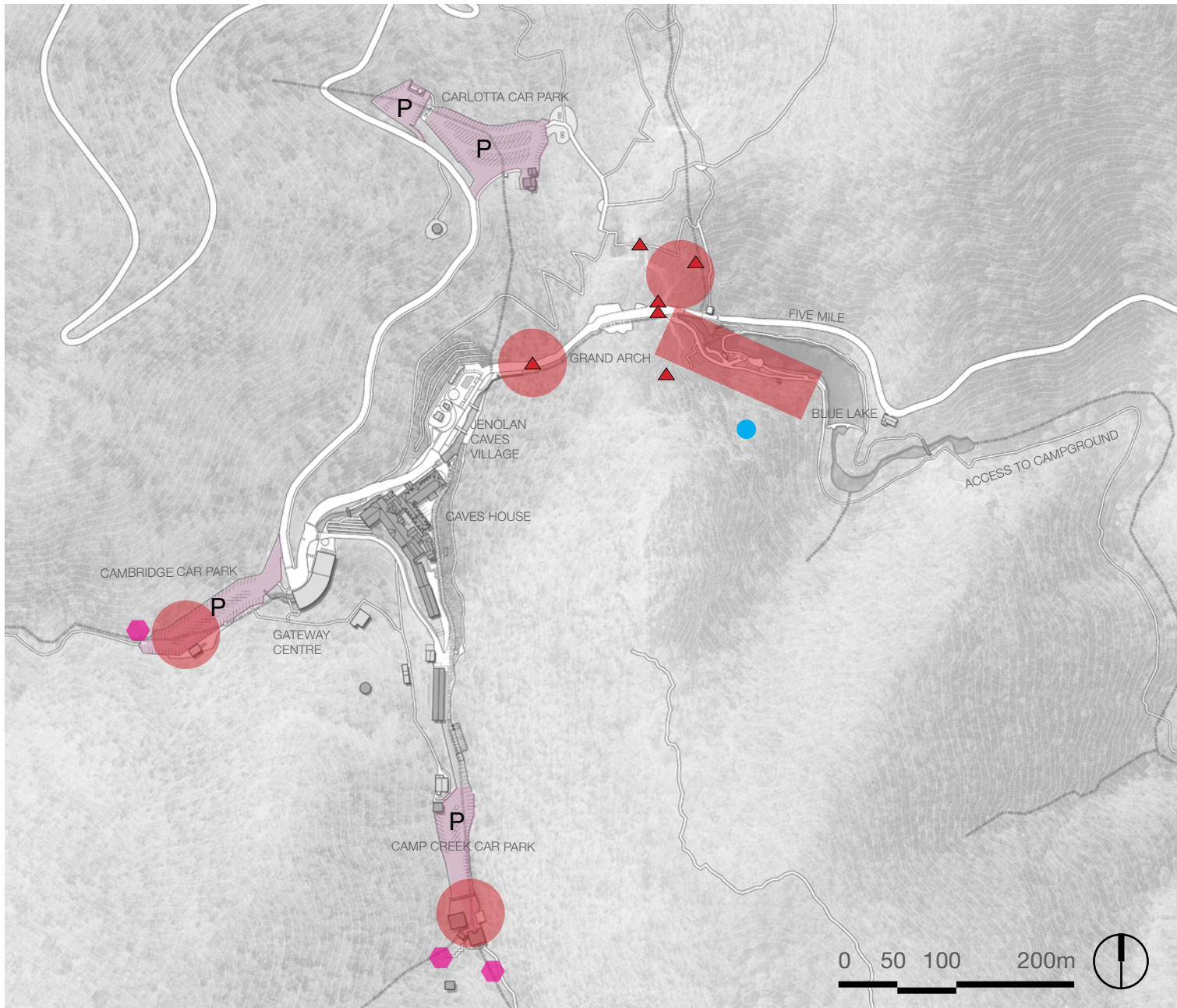
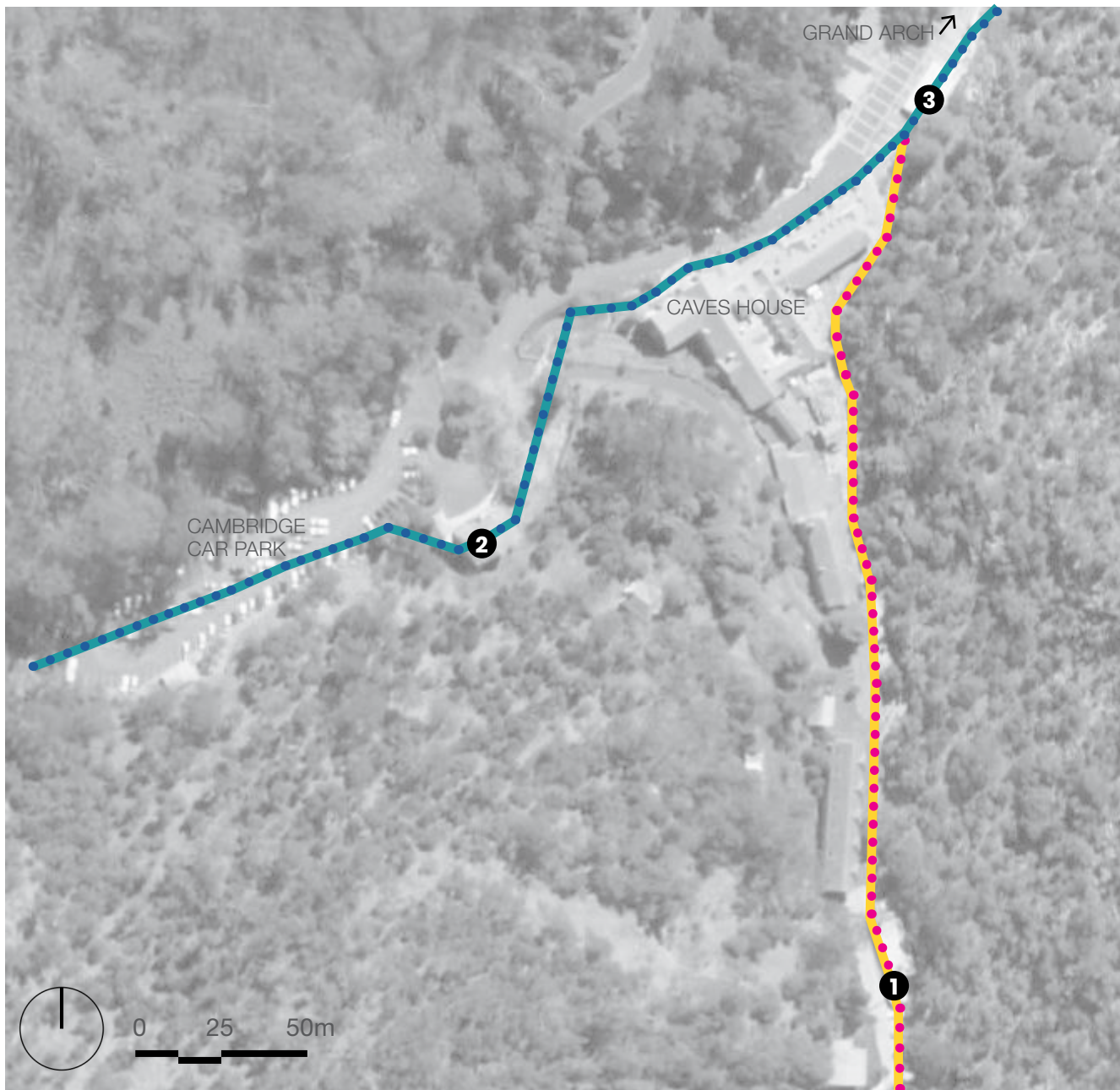


Figure 6.31 Zones of unacceptable risk - JPW plan based on PSM data



1. Rockfall canopy structure with multiple gauge wire mesh protection.
2. Example of a bespoke rockfall protection structure in the Takoro Falls National Park, Taiwan. Note the curved profile and pronounced 'lip' provides additional protection to track users from free falling rocks and limits the potential of blocks travelling further down slope.
3. Example of flexible debris flow barriers installed within a natural stream bed to arrest suspended sediment in periods of high flow. Applicable to McKeown's Valley and Surveyors Creek to reduce bulk sediment transport currently filling Blue Lake in flood events. Photo: Geobrugg
4. Examples of cut-slope treatments with soil nails, mesh and fibre-reinforced shotcrete (under construction)
5. Example of typical rockfall canopy structure with multiple gauge wire mesh protection. Photo: Geobrugg
6. Example of gabion wall to provide retention space for shallow mass movement debris slides. Photo: www.gabionhongda.com
7. Examples of cut-slope treatment with hydromulched upper bench and lined crest drain
8. Example of a typical anchored post and mesh rockfall protection barrier. Photo: Geobrugg

Figure 6.32 Examples of geohazard protection measures



Culvert repairs

Two main culverts run through the Grand Arch Precinct. Recent inspections found that floods have caused considerable damage throughout the culverts, with some areas in need of immediate repair.

Cables, pipes and services are to be removed from the culverts and located elsewhere to prevent future damage to infrastructure.

Three main buildings will be affected by the works: Wallaby Hall, Hill Flats and the shelter in the main Visitor Service Area. All three buildings are to be removed as part of the works described in this precinct plan.

Additional culvert works recommended as part of this precinct plan include the naturalisation of a section of Culvert 3 in the new Jenolan Village.



-  Culvert 1 (Camp Creek) starts at the bottom of the page near the workshop and flows north
 -  Culvert 2 (Surveyors Creek) starts at Cambridge car park and flows towards the Grand Arch
- Buildings over culverts to be removed:
- 1** Wallaby Hall
 - 2** Hill Flats
 - 3** Tour marshalling shelter

Figure 6.33 Plan showing the two culverts running through the Grand Arch Precinct and buildings over culverts to be removed



Orient Cave

7. References

Australian Government 2020, *National Light Pollution Guidelines for Wildlife, Including marine turtles, seabirds and migratory shorebirds*, Department of Environment and Energy, Australian Government, Canberra ACT.

Charles Sturt University 2020, *Jenolan Caves Walkway Structures Asset Condition Report*, Bathurst NSW.

DCCEEW 2023, *NPWS Landslides and Rockfalls Procedures*, Department of Climate Change, Energy, the Environment and Water, Sydney NSW.

Godden Mackay Logan 2007, *Jenolan Caves Reserve Trust Heritage Asset Management Strategy*, Sydney NSW.

JCRT 2012, *The Gundungurra People*, Jenolan Caves website, Jenolan Caves Reserve Trust, Jenolan Caves NSW, <https://www.jenolancaves.org.au/about/aboriginal-culture/>.

JCRT 2012, *Healing Waters*, Jenolan Caves website, Jenolan Caves Reserve Trust, Jenolan Caves NSW, <https://www.jenolancaves.org.au/about/aboriginal-culture/healing-waters/>.

JCRT 2012, *Gundungurra Creation Story of Jenolan Caves*, Jenolan Caves website, Jenolan Caves Reserve Trust, Jenolan Caves NSW, <https://www.jenolancaves.org.au/about/aboriginal-culture/dreamtime-story-of-gurrangatch-mirrigan/>.

National Park Service 2015, *Outdoor Lighting in National Parks*, Colorado USA.

NewScape Design 2019, *Blue Lake Final Detailed Design Report*, Sydney NSW.

OEH 2013, *Guidelines for Undertaking Development on Karst in OEH Reserves*, Office of Environment and Heritage, Sydney NSW.

OEH 2016, *Park Facilities Manual*, NSW National Parks and Wildlife Service, Office of Environment and Heritage, Sydney NSW.

OEH 2017, *Park Signage Manual*, Office of Environment and Heritage, Sydney NSW.

OEH 2019, *Jenolan Caves Strategic Plan*, Office of Environment and Heritage, Sydney NSW.

OEH 2019, *Plan of Management, Jenolan Karst Conservation Reserve*, Office of Environment and Heritage, Sydney NSW.

PSM 2021, *Jenolan Caves – Slope Stability Assessment*, Pells Sullivan Meynink, Sydney NSW.

RMS 2017, *Water sensitive urban design guideline*, Transport, Roads & Maritime Services, Sydney NSW.

Urbis 2017, *Jenolan Karst Conservation Reserve Conservation Management Plan*, Sydney NSW.

WCPA Working Group on Cave and Karst Protection 1997, *Guidelines for Cave and Karst Protection*, World Commission on Protected Areas, IUCN World Conservation Union, Cambridge UK and Gland Switzerland.

WSP 2021, *Jenolan Caves Precinct Movement and Access Strategy Preliminary Draft*, Sydney NSW.



Find out more about Jenolan Caves at:

www.jenolancaves.org.au

nationalparks.nsw.gov.au