

EXTENT



CHINAMANS BRIDGE, NAGAMBIE

OPTIONS ASSESSMENT

Prepared for Strathbogie Shire Council

June 2024 — FINAL



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1. PROJECT OVERVIEW

In late 2022, major flooding occurred within the Strathbogie Shire Council area. The flooding impacted multiple heritage listed bridges located within the municipality, including Chinamans Bridge over the Goulburn River which is included in the Victorian Heritage Register (H1449). In response to the flooding event, Heritage Victoria prepared a comprehensive audit report for the site which outlined the works that are required at the place to assess the future of the bridge. Of specific reference to this report was the recommendation that Strathbogie Shire Council engage a heritage specialist and/or heritage structural engineer to 'undertake an options assessment' including to explore strategies to:

- Conserve the whole or part of the structure for visual interpretation only;
- Conserve the whole or part of the structure for adaptive reuse,
- Manage the decline of the structure, as a ruin, or,
- Record the structure and demolish all or part of the structure.

As further recommended by Heritage Victoria, the options assessment should be broad in scope, be creative yet pragmatic, include community consultation and allow scope for questions such as:

- Should all of the bridge be conserved?
- Should the lift span section be preserved?
- Are there adaptive reuse options for the structure?
- Can the timbers be used in an interpretive way elsewhere?
- Can intangible values associated with community memory of the bridge be collected for an interpretation project?

A Conditions Assessment (prepared by the Heritage Conservancy) and Structural Engineering Advice (prepared by Mark Hodkinson Pty Ltd) were commissioned as part of the broader project and have been considered in the options assessment contained in Section 9.

1.1. Relevant documentation

The following key documents have been considered in the preparation of this report:

- Condition Assessment of Chinamans Bridge, Nagambie, prepared by the Heritage Conservancy, 2023.
- Digital recordings made by Measure Australia, 2023.
- Structural Assessment and measured drawings, prepared by GMR Engineering Services, 2023.
- Structural Engineering Advice, prepared by Mark Hodkinson Pty Ltd., May 2024.

1.2. Limitations

Extent Heritage has not been engaged to assess historical archaeology or Aboriginal cultural heritage places and values.

No community consultation was undertaken for this report. Therefore, observations made concerning the possible social significance of places are based on publicly accessible, published materials.

The site was inspected and photographed by Extent Heritage on 10 November 2023. The inspection was undertaken as a visual study only.

The historical overview contained in this report offers sufficient historical background to provide an understanding of the place and to provide context related to the significance of the site. The historical background is not intended as an exhaustive history of the site.

1.3. Authorship

The following staff members at Extent Heritage have prepared this report:

- Caitlin Mitropoulos, Senior Heritage Advisor
- Benjamin Petkov, Heritage Advisor

The report has been reviewed by Corinne Softley, Senior Associate, for quality assurance purposes. The report has also been reviewed by Mark Hodgkinson (Mark Hodgkinson Pty Ltd) from a structural engineering perspective.

1.4. Terminology

The terminology in this report follows definitions presented in the *Burra Charter* (Australia ICOMOS 2013). Article 1 provides the following definitions:

Place means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups.

Fabric means all the physical material of the place including elements, fixtures, contents and objects.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Maintenance means the continuous protective care of a place, and its setting. Maintenance is to be distinguished from repair which involves restoration or reconstruction.

Preservation means maintaining a place in its existing state and retarding deterioration.

Restoration means returning a place to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material.

Adaptation means changing a place to suit the existing use or a proposed use.

Use means the functions of a place, including the activities and traditional and customary practices that may occur at the place or are dependent on the place.

Compatible use means a use which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Setting means the immediate and extended environment of a place that is part of or contributes to its cultural significance and distinctive character.

Related place means a place that contributes to the cultural significance of another place.

Related object means an object that contributes to the cultural significance of a place but is not at the place.

Associations mean the connections that exist between people and a place.

Meanings denote what a place signifies, indicates, evokes or expresses to people.

Interpretation means all the ways of presenting the cultural significance of a place.

2. SITE IDENTIFICATION

The site known as Chinamans Bridge is located adjacent to Heathcote-Nagambie Road over the Goulburn River in Nagambie, Victoria (see Figure 1).

The structure is wholly situated within the Strathbogie Shire Council municipality area.



Figure 1. Location of Chinamans Bridge over the Goulburn River. *Source:* Extent Heritage, 2024.

3. HERITAGE DESIGNATIONS AND CONTROLS

3.1. Statutory controls

The site is identified in the following statutory registers:

- Strathbogie Shire Planning Scheme Heritage Overlay (HO), HO8 Chinamans Bridge.
- Victorian Heritage Register (VHR), H1449 Chinamans Bridge.

The site is not identified in the following statutory registers:

- Victorian Heritage Inventory (VHI);
- National Heritage List (NHL)/Commonwealth Heritage List (CHL).

3.1.1. Heritage Act 2017 (Victoria)

Noted above, the subject site is listed as a heritage place (category – transport, road) on the Victorian Heritage Register (VHR) as Chinamans Bridge, place number H1449. It is of architectural and historical significance to the State of Victoria. As such the place is subject to the requirements of the Heritage Act 2017, as administered by the Executive Director, Heritage Victoria.

The extent of registration includes all the structure known as Chinamans Bridge including all of the structure, its approach spans, and abutments marked B1 in Diagram 600859 held by the Executive Director (Figure 2).

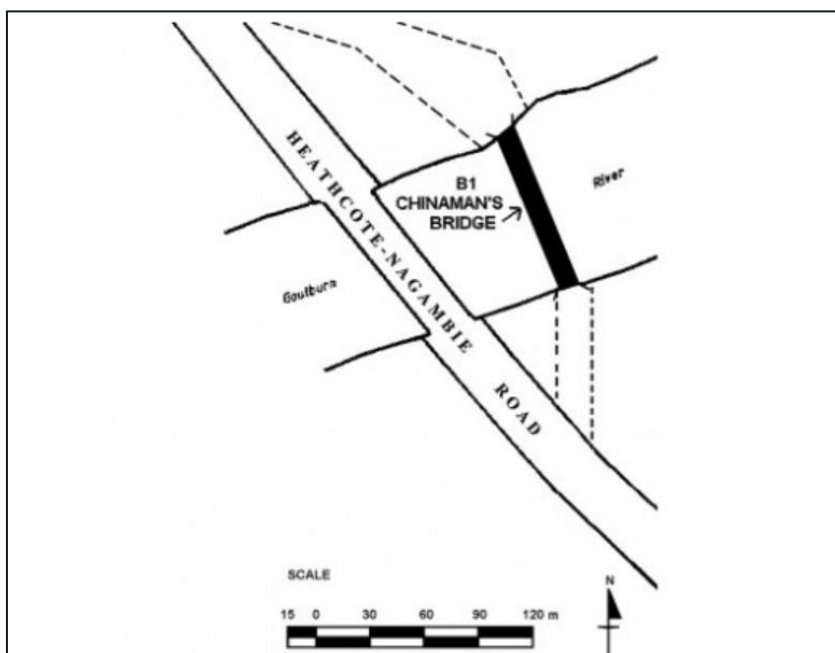


Figure 2. Extent of registration diagram for Chinamans Bridge, indicated as B1. *Source:* Victorian Heritage Database.

The following site-specific permit exemptions relate to the place:

- No permit required for routine maintenance of the Chinamans Bridge.
- No permit required to replace like with like on the Chinamans Bridge.

3.1.2. Planning and Environment Act (1987)

Noted above, the subject site is included within the City of Strathbogie Heritage Overlay as Chinamans Bridge across the Goulburn River, Nagambie (HO8) with a grading of individually significant.

As per Clause 43.01 no planning permit is required under the Heritage Overlay to develop places included in the VHR, with the exception for applications for subdivision.

3.1.3. Other relevant statutory considerations

The subject is also included in an area of cultural sensitivity. Areas of 'cultural heritage sensitivity' include registered Aboriginal cultural heritage places, as well as landforms and land categories that are generally regarded as more likely to contain Aboriginal cultural heritage.

Large developments and other high impact activities in culturally sensitive landscapes can cause significant harm to Aboriginal cultural heritage if not managed appropriately. In these situations, it may be a requirement under the Aboriginal Heritage Act to prepare a Cultural Heritage Management Plan and the need to get a cultural heritage permit.

3.2. Non-statutory listings

The site is identified by the National Trust of Australia (Victoria). While a non-statutory listing, the National Trust may have an interest in the future conservation of the bridge from a community advocacy perspective.

4. SIGNIFICANCE

The statement of significance for Chinamans Bridge as included in the VHR citation is as follows:

What is significant?

Chinamans Bridge is an extensive timber bridge which spans the Goulburn River 2.7 kilometres west of the Goulburn Valley Highway. It is believed to have been constructed in 1891 and at the time was known as Kerris Bridge. The bridge was funded with a joint grant from the Public Works Department and the Water Supply Department. It was designed by the Goulburn Shire Council Engineer and constructed by the contractor JB Parkinson at a cost of £4188 3s 6d. The bridge included a lift span to enable sawmill and recreation steamers to continue to utilise the Goulburn River. The Nagambie Sawmill steamer passed through the bridge six times a week during the 1890s. Chinamans bridge originally carried the Nagambie-Heathcote Road across the Goulburn River, however the road has now been re-aligned to be carried over the river by a new bridge nearby. Chinamans Bridge was given its name because the Nagambie-Heathcote Road, once known as Chinamans Road, was in an area populated by Chinese market gardeners up until 1916. Chinamans Bridge is a timber girder bridge with hand hewn squared timber stringers strutted to the piers and timber corbels and deck. The arrangement of spans supports the view that the bridge at one time incorporated a lift span to provide for the passage of river traffic, however only the timber fenders remain. The drawbridge span was replaced, around 1940, with a steel span.

How is it significant?

Chinamans Bridge, Nagambie is of architectural and historical importance to the State of Victoria.

Why is it significant?

Chinamans Bridge, Nagambie is of architectural importance as one of the earliest completely timber road bridges in Victoria. It is important for its use of hand-hewn timber in its construction and details. Although it has lost much of its mechanism, the bridge is a rare surviving example of a bridge which included a vertical lift span.

Chinamans Bridge is of historical importance for its associations with the expansion of Victoria's infrastructure in the 1890s and for its role in the development of transport systems. It is especially associated with the growth of the township of Nagambie and is an indication of the district's prosperous sawmilling industry during the 1890s. Chinamans Bridge is of historical importance as a reminder of the steamboat era in Victoria during the 1890s, when rivers were still used in preference to roads for recreational and commercial purposes.

5. HISTORICAL OVERVIEW

The following brief contextual history has been prepared based on the brief history associated with the VHR listing and historical sources provided by the Nagambie Historical Society. It is not an exhaustive history and has not been supplemented by additional archival research.

The Goulburn River was vital to the development of the district, and bridges were eventually built to replace Old Crossing Place punt, as well as Murchison punt. The 1880s and 1890s was an era of steamboats and transport took to the river in preference to bullock teams on unmade roads. If bridges were to be built, it was important that they did not obstruct the river so that river boats could take passengers from Seymour to Nagambie and Chateau Tabilk, thus opening up the area and bringing progress to Nagambie. Steam ships were also used by the local sawmills.

The Kerris Bridge was estimated to have been built c.1865 in Professor Colin O'Connor's study of Historic bridges. This would make it the oldest existing timber bridge in Victoria and the third oldest in Australia. Further research has shown however, that the bridge was more likely to have been built at a much later date, c1891.

Kerris Bridge is also known as Chinamans Bridge. It was so called because of the many Chinese market gardeners established in the area before a great flood in 1916 put an end to this activity.

When river transport ceased the drawbridge function was no longer required and as such, around 1940 the drawbridge span was replaced and the bridge re-decked.

The following historical photographs have been supplied by the Nagambie Historical Society (undated). The photographs show the original lift bridge to allow river travel, which was likely removed in c1940s, as noted above.



Figure 3. Chinamans Bridge (Kerris Bridge), John York, Harry McDonald, in Horse and Gig. *Source:* Nagambie Historical Society, pre-1940.



Figure 4. Chinamans Bridge (Kerris Bridge). *Source:* Nagambie Historical Society, pre-1940.

The following photograph housed at the Public Records Office dates to 1914 and specifically notes that the deck is in 'fair order'.



Figure 5. Lift Bridge over Goulburn River, Vickers Road. Caption reads "deck in fair order". *Source:* PROV, VPRS 17684/P0003/212, Negative number 14_00083, 1 April 1914.

The following photograph housed at the State Library of Victoria is dated to 1979. The bridge still appears to be in relatively fair condition at this time, with the balustrade still intact.



Figure 6. Nagambie. Trestle Bridge over Goulburn River and branch [picture]. John T Collins, August 14, 1979.
Source: JT. Collins Collection, La Trobe Picture Collection, State Library of Victoria Accession no. H98.250/1032.

The following photographs taken by the National Trust of Australia (Victoria) in the 1980s and 1990s detail the level of decline at this time.



Figure 7. Chinamans Bridge. *Source:* National Trust of Australia (Victoria), 1987.



Figure 8. Chinamans Bridge. *Source:* National Trust of Australia (Victoria), 1998.

6. PHYSICAL DESCRIPTION AND CONDITION

6.1. Physical description

Chinamans Bridge is an extensive timber trestle bridge approximately 100 metres long and 8 metres wide on the deck. The bridge is constructed of hand sewn timbers with metal ties. The main piles comprise whole turned trees supporting chamfered cross beams with chamfered ends. The bridge contains 15 spans between abutments, with the fourth to seventh bents from the southern end constructed to facilitate the sixth span to lift up to provide the passage of river traffic (no longer operational – only the timber fenders remain). Both embankments are constructed of rammed mounded earth held by a timber beam retaining wall.

The deck is constructed from long linear planks fixed to underlying cross beams. A later addition to the bridge is bitumen, which was used to resurface the deck. Evidence of the original balustrade rails are present in part, though much of the railing has collapsed into the water

The northern end of the bridge is situated in a low-lying partial bushland context, used predominately by locals as a camping and fishing location. The northern embankment is contextualised by substantial mature native trees, and the original road alignment has been partially repurposed for access to this small reserve. The southern embankment has no road access and is only accessible on foot from Vickers Road. Similar to the northern embankment, evidence of former camping is evident onsite, however the context is informed by a larger grassed paddock, establishing an agricultural context. On both banks, the Goulburn River has substantial mature Eucalyptus plantings. To the south of Chinamans Bridge is a new concrete road bridge which was constructed following the decommissioning of Chinamans Bridge.



Figure 9. Chinamans Bridge, looking north. *Source:* Extent Heritage, November 2023.



Figure 10. View of the bridge decking looking southeast. *Source: Extent Heritage, 2023.*



Figure 11. View of the bridge decking looking northwest. *Source: Extent Heritage, 2023.*



Figure 12. View of the southern abutment, looking north. *Source: Extent Heritage, 2023.*



Figure 13. Oblique view of the northern elevation of the bridge, looking west. *Source: Extent Heritage, 2023.*

6.2. Condition Assessment

A condition assessment was prepared by Mim Butcher (The Heritage Conservancy) in 2023 in collaboration with Extent Heritage. Overall, it is considered that the structure is in extremely poor condition, noting that the bridge has collapsed at the southern end and the majority of structural timbers have deteriorated beyond repair and no longer provide structural support. There is also evidence of termite damage at the northern end. The following is summarised:

- Approximately 80% of piles are deteriorated at the base from continual wetting and drying causing accelerated deterioration. Of these at least half are completely rotten through at the base and provide no structural support to the above structure. In addition, approximately 10% of piles are completely missing. It is estimated that only 10% of piles are structurally sound.
- Sills have rotten through at most ends resulting in the outer connections to the batter-posts coming loose. The sills have collapsed at the southern end.
- The structural timbers that support the underside of the deck, the bracing timbers and the girders and corbels appear to be in reasonable condition, however inspection was undertaken

from ground level only and the condition may be worse than visually obvious. Many of the girders and corbels show evidence of cracking and some termite damage (northern end).

- The deck has deteriorated beyond repair. It has caved in at the southern end due to collapse of the timber structure below. Handrails which ran along the perimeter have almost completely fallen off.
- Metal fixings (assumed to be wrought iron) which tie the bridge timbers together have come loose across the length of the bridge as the timber members have deteriorated.

The Heritage Conservancy have recommended the following conservation works based on the above condition assessment:

The bridge is in extremely poor condition and has reached a point where it is beyond repair. It poses an immediate safety risk due to imminent collapse.

No portion of the bridge is secured adequately, and therefore all fabric should be deemed 'loose fabric'.

In addition, it would be unsafe to undertake maintenance or repair works to the structure because of its fragile state.

The appropriate course of action is immediate demolition.

The full report has been provided in Appendix A.

6.3. Structural Engineering Advice

Structural Engineering Advice was prepared by Mark Hodgkinson Pty Ltd in May 2024. The advice includes a condition assessment of the bridge (based on an inspection of the trestle and underside of the bridge superstructure from a kayak and the riverbank), and a discussion regarding remedial and strengthening works that would be required to achieve a live load capacity as specified under the Australian Standard AS1170.1 *Structural Design Actions part 1: Permanent, imposed and other actions*, noting that the bridge would need to be capable of supporting these loadings if it were to be re-opened.

Based on the above considerations, the following conclusion has been drawn:

In its present state the live load capacity of the timber structure is somewhat between zero and negligible and as such significant and extensive remedial works will need to be implemented to reinstate the bridge's structural capacity.

The full report has been provided in Appendix B.

7. KEY ISSUES

7.1. Heritage considerations

Chinamans Bridge is of cultural heritage value to the State of Victoria, and this is reflected by the listing of the bridge in the VHR. The statement of significance for the bridge, as included above, details what is significant about the bridge and what elements should be retained to ensure that the cultural heritage significance of the bridge is conserved.

In managing the future of the bridge, the Heritage Act requires consideration of the cultural heritage significance of the place, with a focus on avoiding adverse impact to the identified values.

In the case of Chinamans Bridge, key heritage considerations include:

- the conservation of significant fabric;
- the conservation of the significance form and layout of the bridge;
- the conservation of significant sight lines to and from the bridge; and
- the conservation of the significant setting of the bridge.

7.2. Use, maintenance, and structural considerations

The ongoing maintenance of the fabric of the bridge presents a significant challenge for the managers of the bridge, Strathbogie Shire Council. Public access to the bridge has been closed for several years due to the partial collapse of the bridge decking and side railing. As the existing fabric has aged considerably, the long-term structural capacity of the bridge has continued to decline, and the current situation is that the bridge has negligible live load capacity to sustain pedestrian or vehicle traffic in any form.

Conservation advice provided by The Heritage Conservancy has concluded that due to the extremely poor condition the bridge has reached a point where it is beyond repair. Further, structural engineer advice provided by Mark Hodkinson Pty Ltd has concluded that significant and extensive remedial works would be required to reinstate the bridge's structural capacity. Additionally, a separate bridge has been constructed directly south of Chinamans Bridge, making the heritage bridge redundant. In this context, it is accepted that the existing bridge requires substantial structural upgrade/reconstruction or full/partial demolition.

In considering the required structural upgrades to the bridge, the following key issues would need to be considered:

- The bridge would need to be capable of supporting the live load capacities as established under the Australian Standard AS1170.1 *Structural Design Actions part 1: Permanent, imposed and other actions* if it were to be re-opened, including for low-scale pedestrian access. This

would inform what is required in terms of repair of existing fabric vs. construction of a new timber bridge vs a new concrete bridge;

- Access to timber in the appropriate species, size and volume for reconstruction or repair activities to align with best practice restoration methods. Supply of equivalent structural timber is very constrained (near impossible) and will likely not be dissimilar in cost to a concrete bridge (discounting the environmental impacts of sourcing such timber);
- There are likely to be issues with the reuse of any salvaged timber from the original bridge in any structural capacity as there would likely be significant concerns regarding certification from a structural engineering perspective. Further, upon inspection of much of the structural timber, there is little fabric remaining which could be considered sound for reuse.

Other issues to be considered in the redevelopment of the bridge include:

- Use and navigation of the waterway – whether the existing bridge height is adequate or a greater height is required for navigation.
- Potential requirement to close the river crossing for a prolonged period of time while major works were undertaken to the existing bridge. It is noted that the river is currently closed due to the dilapidated and unsafe nature of the bridge.
- Community expectations for the river crossing in this area, especially considering that the bridge has since been made redundant by the construction of a new two-lane crossing south of Chinamans Bridge.

7.3. Financial considerations

A major consideration with all proposed works to the bridge includes the potentially significant financial investment in both the existing maintenance program for the bridge and any future conservation/reconstruction works. A long-term outcome for Chinamans Bridge would ideally provide a maintenance solution that can be serviced by the local council within a constrained budgetary environment. Financial considerations will be further considered by council as the feasibility of the potential management options are developed.

7.4. Safety considerations

The ongoing dilapidation and gradual collapse of Chinamans Bridge poses an extreme risk to public safety. Efforts have been made to close the Goulburn River in immediate proximity to the bridge, however the general public continue to travel beneath the bridge on jet skis and boats. The chain link fencing at either abutment installed to prevent members of the public from crossing the bridge has been cut multiple times by those wanting to cross. The risk of collapse caused by waves thrown by passing watercraft is a constant, and the gradual dropping of bridge fabric into the water poses a risk downstream where floating submerged pieces could be hit by watercraft outside of the closed portion of the river.

A major flash flooding event in late 2022 posed an immediate safety risk to the structural stability of the bridge and public safety. The following is summarised in a flood audit undertaken by Heritage Victoria in late 2022:

- *Event information:* After heavy rain on 13 and 14 October, the Goulburn River was at a major flood level. It is unclear how high exactly the water reached at Chinamans Bridge, but an [aerial photograph] (see Figure 14) taken near the peak and shows the flood waters almost reaching the stringers at the top of the crossheads.
- *Impact to heritage:* The bridge withstood the effects of the flood remarkably well for its vulnerable state of preservation prior to the event. However, it is likely that the flood debris has inflicted some damage, and the timber platforms and handrails which have started to detach and are in poor condition, and flood waters may have contributed to their deterioration.

From a risk perspective, based on the existing extremely poor condition of the bridge and possible future threats arising due to the effects of climate change, all future conservation options must endeavour to prioritise public safety.



Figure 14. Chinamans Bridge, Nagambie, with current road bridge in middle-ground. *Source:* Heritage Victoria, October 2020.



Figure 15. Overview of the structure. *Source:* Jo Lyngcoln, Heritage Victoria, November 2022.

Safety considerations as perceived by Strathbogie Shire Council are summarised as follows:

The post flood engineering assessment that was completed by GMR Engineering submitted to Council in January 2023 indicated significant damage that poses a substantial risk to community and any contractors near the structure and using the waterway. This report indicates that:

The supporting structural elements have now deteriorated to such an extent, that sections of the bridge may collapse at any time. That collapse may be triggered by any relative minor disturbance including an earth tremor, a boat or debris impact, strong winds, fallen limbs, debris impact or further flooding.

A collapse may also be triggered by the continued degradation and failure of the structural elements. This structure is particularly a hazard to the following persons;

- Persons who access the deck. The structure can no longer be relied upon to support any access to the deck.
- Persons near to or under the structure (particularly anglers). Sections of this structure may collapse at any time.

Despite efforts to reduce access to the structure and the gazetted exclusion zone, waterway users and people on foot are still accessing the structure. Measures to limit and prohibit access currently include:

- An exclusion zone
- VMS and boat ramp signage indicating the exclusion zone
- Floating closure buoys on both sides
- Fencing
- Information and FAQ's

In addition to the significant risk to life the structure poses to the community and waterways users, any works that may be required pose a significant occupational health safety risk for any contractors and or authorised vessels which needs to be considered.

Key stakeholders also have major concerns regarding the risk and liability that may result if swift action and a resolution cannot be reached as soon as practical due to the volume of people not adhering to the exclusion zone despite all the above interventions.

8. CASE STUDIES

The management of redundant historical infrastructure presents significant challenges for managers and public authorities. These challenges are substantially increased when this infrastructure is fully or partially submerged in a water body which can accelerate the decay of fabric, particular timber. Often the cost of ongoing maintenance and repair is prohibited or impractical, particularly when the condition of a structure is deemed critical and major repair or reconstruction becomes necessary. Often these structures are of a scale and location where there are also significant public safety concerns with regard to ongoing decay of the existing fabric.

The following examples provide case studies for the management of large-scale public infrastructure, with a focus on bridges and partially submerged infrastructure.

8.1. Kirwans Bridge, over Goulburn River (VHR H1886)

Kirwans Bridge in Bailieston, northwest of Nagambie, was opened in 1890 preceding the completion of Chinamans Bridge in 1891. The bridge is comparable to Chinamans Bridge, as both bridges historically represent the increased need of local bridge crossings in the area following the completion of the Goulburn Weir in December 1890. The bridges are also comparable for their materiality and design, with both bridges constructed utilising timber trussing and strut-and-straining-piece designs.

In contrast to Kirwans Bridge, Chinamans Bridge was bypassed by a new concrete road bridge in 1989 and has since fallen into a state of disuse and disrepair. The bridge poses a significant public safety risk as fabric continues to fail and create fall and navigation hazards within the waterway. The heritage significance of the bridge is also compromised as there is no ongoing use or requirement to invest in the fabric of the bridge. Kirwan's Bridge has been consistently maintained, with new piles installed or repaired through the use of submerged concrete piles. New steel girders have been installed, and the second lane has been partially closed. Kirwans Bridge is currently closed to trucks due to structural concerns, however conservation engagement is underway to establish ongoing management.

This is considered a relevant example of a local timber bridge with similar conservation issues at play that has been conserved through the successive replacement of degraded materials with contemporary structural materials as opposed to a like-for-like replacement.



Figure 16. Direct overview of Kirwans Bridge looking south. *Source: Extent Heritage, 2022.*



Figure 17. Detail view of new steel girders under Kirwans Bridge. *Source: Extent Heritage, 2022.*



Figure 18. View of contemporary concrete piles on Kirwans Bridge. *Source: Extent Heritage, 2022.*



Figure 19. Overview from the deck of Kirwans Bridge looking south. *Source: Extent Heritage, 2022.*

8.2. Barwon Heads Bridge over Barwon River (VHR H1848)

The Barwon Heads Bridge was constructed in 1927, traversing the Barwon River estuary at Barwon Heads, comprising 34 spans.

The Barwon Heads Bridge was substantially refurbished during adaptation works in 2009 with much of its original fabric replaced. A new bridge was constructed to the south running parallel with the adapted bridge. During construction the new bridge was used for vehicle traffic while the original bridge was upgraded but was eventually converted to a pedestrian bridge.

Both the original Barwon Heads Bridge and Chinamans Bridge are comparable as two historical, timber trussed road bridges that have been subject to consistent alterations since their construction – largely with the inclusion of new concrete piles and a reinforced concrete deck on the Barwon Heads Bridge.



Figure 20. Aerial view of the reconstructed Barwon Heads Bridge and new adjacent William Buckley Bridge. *Source:* Peter Elliot Architecture.



Figure 21. View at water level of Barwon Heads Bridge and new adjacent William Buckley Bridge. *Source:* Peter Elliot Architecture.

8.3. Ovoid Sewer Aqueduct over Barwon River (VHR H0895).

The Ovoid Sewer Aqueduct over the Barwon River was constructed between 1913-1915 and is recorded in the Victorian Heritage Register as being of significance to the State of Victoria for its architectural, historical, technical, and aesthetic significance. The bridge formerly supported an aqueduct siphon carrying sewerage, however access to the bridge is now restricted due to severe deterioration, including risk of falling concrete posing a serious public safety risk. This includes restriction of the waterway underneath the aqueduct where it crossed the Barwon River.

After considerable deliberation and options analysis, a permit was granted by Heritage Victoria to allow the partial demolition of four spans of the aqueduct, particularly to enhance access to the waterway by the Traditional Owners as well as the general public. Other sections of the structure are proposed to be conserved to the fullest extent possible at an exorbitant cost to place managers Barwon Water, with a public exclusion fence constructed to help manage the ongoing risk of the structure.



Figure 22. Detail of the bridge showing concrete deterioration. *Source:* Heritage Victoria, 2020.

8.4. Princes Pier, Hobsons Bay (VHR H0981)

Princes Pier, constructed between 1912 and 1915, is included in the Victorian Heritage Register as place number H0981. It is of architectural and historical significance to the State of Victoria. The original pier structure was 580m long and atop the pier was a collection of buildings to service the incoming and outgoing ships.

Following significant deterioration and cessation of shipping traffic to the pier, the pier was substantially demolished in c.2009-2010 with reconstruction and restoration works undertaken to the first 196 metres of the pier (including the gatehouse) with the remainder of the pier structure left uncovered. This resulted in a 'sea of piles' outcome that demonstrates the original length of the pier while managing the cost considerations of full reconstruction of a redundant structure. However, the ongoing conservation issue is that without the structural decking or girders, the remaining piles have no support and continuously fall into the water. This becomes a concern for boats and other watercrafts with submerged floating piles posing a serious risk to health and safety.

On this basis, similar with the above analysis regarding the Ovoid Sewer Aqueduct, land-based sections of the structure could be conserved to the greatest extent possible, with a public exclusion fence constructed to help manage the ongoing risk of the structure. Additionally, some fabric could be retained to allow for the interpretation and understanding of the site, however the structural risk would be minimised.

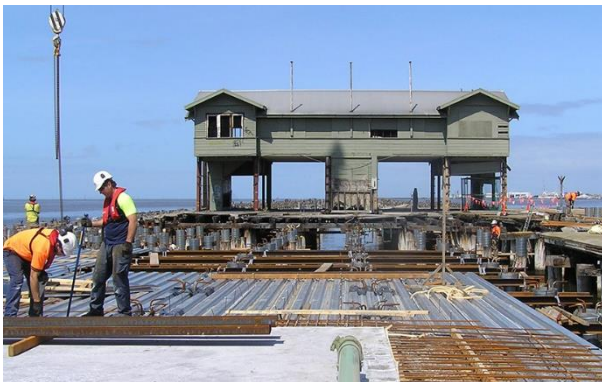


Figure 23. View of Princes Pier in c2008 showing the dilapidation of the structure prior to reconstruction works. *Source:* Major Projects Victoria (Peter Glenane).



Figure 24. View of the 'sea of piles' at Princes Pier where the deck of the pier was not reconstructed following conservation works. *Source:* Major Projects Victoria (Peter Glenane).

8.5. Central Pier, Yarra River (VHR H1720)

Victoria Dock, located in Docklands at Harbour Esplanade and Victoria Harbour Promenade in the City of Melbourne, is protected at the State level by the Victorian Heritage Register under H1720. When opened in 1892, Victoria Dock was the second largest single dock in the world, and for this reason it is recognised for its historical, scientific (technical) and architectural significance to the State of Victoria. Included as significant component of the listing is the 1919 Central Pier.

Central Pier was permanently closed in early 2020 due to fears of major structural failure. Following its closure in 2020, the bridge continued to deteriorate to the point where collapse was deemed imminent. In 2020, Heritage Victoria issued a heritage permit (P37012) allowing the demolition of the structure on public safety grounds.

In comparison with the case study outlined above regarding Princes Pier, there is a precedence set by Heritage Victoria that redundant infrastructure that is in critical condition and poses an immediate public safety risk is permitted to be partially or fully demolished where appropriate.



Figure 25. November 2023 view of Central Pier showing the commencement of demolition. *Source:* Development Victoria, November 2023.

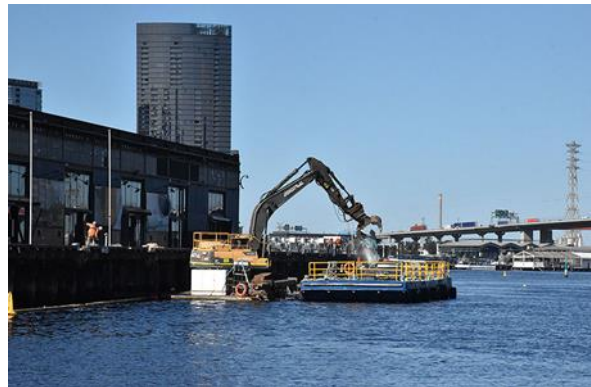


Figure 26. January 2024 view of Central Pier showing continued demolition. *Source:* Sean Car, Dockland News, January 2024.

8.6. NSW examples

New South Wales has struggled with similar issues regarding the conservation of historic timber bridges, in terms of load capacity, availability of materials and availability of skilled labour. Extent's predecessor company (Futurepast Heritage Consulting) was responsible for developing the *Timber Truss Bridge Management Strategy* for the (then) NSW Roads and Traffic Authority.

Issues identified in the NSW study included:

- Bridge width;
- Height of overhead truss members;
- Structural capacity of the deck;
- Lateral structural capacity of piers (related to the braking force of heavy vehicles);
- Strength of timber guard rails;
- Availability of suitable structural timber;
- Availability of skilled work crews.

In general, the road authority's desire was to upgrade these bridges, where possible, to the T44 load standard, which equated to a fully laden single semi-trailer. Double and triple semi-trailers exceeded this threshold and in areas where such loads were required, there was no alternative but to bypass the timber bridge.

Truss bridges can be successfully modified to the T44 load standard; however, this required a degree of modification to the bridge, including:

- Replacement of bottom chords with box section steel instead of timber;
- Replacement of decking with stress laminated timber decking;
- Replacement of wooden guardrails with metal designed to match original timber profile;
- Other site-specific requirements such as upgrades to approach spans, hanger rods, portal frames and additional lateral bracing; and
- In general, the approach to these bridges was, where possible, to rebuild the bridge to its original configuration using these new structural devices as a compromise between heritage, function and aesthetics.

9. OPTIONS ASSESSMENT

The following options assessment will be prepared considering the following key matters:

- Maintaining the established architectural and historical importance of the bridge to the State of Victoria, and the conservation of significant fabric, form and setting;
- The existing poor condition of the bridge and the extent of works required to restore structural stability and live load capacity;
- Key issues including a lack of viable use, maintenance requirements, structural instability, financial considerations, and risks to public safety and river access; and
- Case studies of comparable heritage transport infrastructure, relevant management considerations and recent Heritage Victoria determinations permitting partial/full demolition where appropriate.

The below options have been developed by Extent Heritage to address overarching fabric management actions which could be undertaken in relation to Chinamans Bridge. Detailed specification regarding the proposed management actions (e.g., design solutions, cost considerations etc.) have not yet been undertaken as part of this scope of work. Accordingly, a high-level assessment regarding the potential opportunities and constraints, with a focus on heritage considerations, has been provided to guide future feasibility and option assessment by Strathbogie Shire.

All of the options addressed below have key opportunities to assist in mitigating heritage impacts, including the use of interpretation, recording and salvage works.

Based on the poor condition of the bridge and lack of ongoing compatible or viable use, it is recommended that the structure is considered a 'heritage ruin'. As per the guiding document prepared by the Australian Heritage Council in 2013 – *Ruins: a guide to conservation and management* – a heritage ruin is defined as a place that currently, through abandonment, redundancy, or condition, is disused and incomplete, is unusually no longer maintained and appears unlikely to regain its original or substantive use, function, or purpose other than interpretation.

As per the Australian Heritage Council guide, there are generally five key management approaches to heritage ruins. Some places may require a combination of these approaches, or an entirely new approach may need to be developed. To summarise, the approaches are as follows:

- **Come alive again** – actions designed to enable a place to again be used.
- **Returning it to its former state** – restoration and reconstruction to reveal significance.
- **Simply maintain** – stopping further deterioration but with minimal reconstruction.
- **Letting nature take its course** – no further maintenance or restoration works.
- **When removal is inevitable** – proactive demolition.

Each approach involves specific types of conservation action and a different level of intervention. A decision as to which approach to take must be guided by careful consideration of the significance

of the place and analysis of its social, economic, and environmental setting. These approaches will be referenced in further detail below in relation to the various management actions considered.

9.1. Option 1 – Conserve whole or part of the structure for adaptive reuse

Management Option 1 is to undertake a scope of conservation works to whole or part of the structure to either ‘make the place come alive again’ or ‘return it to a former state’.

Relevant considerations associated with this option are as follows:

- Whether there is sufficient evidence to reinstate lost elements of the place noting that the condition and integrity of the bridge has been severely impacted in past decades (noting in particular, sections that have partially collapsed) and that the historic arrangement of the bridge (with lift span) was significantly altered in the 1940s.
- Whether a new compatible use could be found to support the ongoing conservation and interpretation of the place. If major reconstruction and restoration works are proposed, allowing a new use that would generate the needed funds to repair and maintain the structure long-term is considered essential.
- The extent of works that would be required to ensure baseline structural integrity / capacity loading to establish an active use, or for interpretation purposes only.
- The extent to which maintaining the bridge as a ruin is acceptable to Strathbogie Shire Council as the place managers and the general community. In regard to the latter, the strength of community attachment or when leaving a place in a ruined state is distressing should be considered. It would also result in the continued closure of the river due to safety issues which is not likely to be supported by the local community.

Constraints associated with conserving the whole of the structure for adaptive reuse are extensive. To begin, based on the condition of the structure, it is likely that a significant extent of original fabric would need to be in-situ repaired, treated and/or reconstructed like-for-like using timber species that do not match the original. While a combination of repair and reconstruction could be possible in theory, the logistics of undertaking such extensive works within the river corridor whilst ensuring public safety would be immense. As addressed in the structural engineering advice, the full extent of deterioration of the bridge is yet unknown unless the deck were to be removed, meaning that development of a full works methodology would be overly complex and likely subject to modification whilst works were underway.

Noting that the use of the bridge as a vehicle crossing is now redundant, there are limited opportunities to adaptively reuse the bridge other than for use by pedestrians. This potential use is not considered realistic noting the significant investment that would be required to repair the bridge, reinstate live loading capacity, and implement a long-term maintenance plan. Due to the isolated location of the bridge on the outskirts of Nagambie, any future visitation would likely be low which is also a consideration.

An opportunity exists to partially demolish the structure and retain, prop, and restore land-based elements of the bridge (e.g., abutments and approach spans). As this retainment would be for visual interpretation purposes only, this opportunity will be considered below under Option 2. It is not considered that an option to partially retain the structure for an adaptive reuse purpose is possible, noting the constraints outlined previously.

If the option to pursue full demolition is explored, there exists many and varied opportunities to preserve the historical and architectural significance associated with the bridge in both tangible and intangible ways, including as follows:

- Full archival-quality photographic recording and the development of 3D model (using the 3D cloud data already collected by Extent Heritage through Measure Australia) to capture the existing condition of the structure and its architectural importance as the earliest timber road bridge in Victoria, its use of hand-hewn timber in its construction and details, and as a rare surviving example of a bridge which once included a vertical lift span. Digital technology could be also utilised to recreate what the bridge may have looked like before the vertical lift span mechanism was removed.
- Installation of physical interpretative signage onsite and/or offsite in associated with a Council-managed Museum/gallery or facility to capture and communicate the historical importance of the bridge for its associations with the expansion of Victoria's infrastructure in the 1980s and for its role in the development of transport systems. The significance of the bridge in association with historic Chinese communities and multiculturalism could also be further explored which is an under-represented narrative in many areas of regional Victoria.
- Construction of a new onsite landscaped area for visitors to the bridge location, including physical interpretative signage as mentioned above and other urban design outcomes including reuse of salvaged fabric from the structure to create park furniture, landscaping elements or art/public realm items.

9.2. Option 2 – Conserve whole or part of the structure for visual interpretation

Management Option 2 considers the potential to conserve the whole or part of the structure for visual interpretation only, based on the approach to either 'make the place come alive again', 'return it to a former state' or 'simply maintain'.

While this option would not presumably require the extent of conservation works required under Option 1 to restore/reconstruct the bridge to re-establish structural stability and live loading capacity, as addressed under Option 1, it is not considered that conservation of the full structure is feasible based on the logistics of undertaking such extensive works within the river corridor whilst ensuring public safety. Even the option to 'simply maintain' the structure in its current condition to slow future deterioration would be extensive based on the critical condition of the structure. Further, the financial implication associated with fully conserving the bridge would be immense, noting that an option for visual interpretation only would not generate any funds to ensure the

ongoing maintenance of the structure into the future, noting that this would be essential to address the ongoing risk to public safety and the possibility of reopening the river corridor.

As briefly mentioned under Option 1, there exists an opportunity to partially conserve land-based elements of the bridge, including potentially the north abutments and approach span and the south abutment (noting the approach span is in extremely poor condition) for visual interpretation. This option would preserve the location and land-based setting of the structure and provide some physical evidence of historic fabric and form. Extensive repair and reconstruction works would be required to retained fabric to ensure structural stability, and it is likely that an exclusion fence would be required to prevent the public from climbing on the retained items themselves. While a significant cost could be required to undertake this option, it is considered logistically feasible from a constructability and safety perspective (although noting an ongoing maintenance program to 'simply maintain' the structure would be required as well to prevent falling fabric due to further deterioration over time). This option balances the preservation of the structure's significance whilst significantly improving public safety and access to the Goulburn River. This option also addresses risks associated with any future major flooding events which could threaten the structural stability of the river spans.

To supplement this option and further mitigate likely physical harm to the structure associated with partial demolition, there is an opportunity to implement robust interpretation outcomes as outlined above under Option 1 (e.g., photographic recording, 3D modelling, onsite and offsite interpretation panels and the development of an onsite landscaped tourist area). While this option could potentially see the physical loss of over 80% of the structure, partial physical retainment of land-based fabric in associated with robust interpretation opportunities could achieve a greater appreciation of the significance of the structure from a community perspective.

The following matters would need to be considered under an approach to 'simply maintain' retained sections of the bridge, as summarised in the Australian Heritage Council document (2013):

- Whether the physical fabric to be retained and its location are suited to long term preservation, noting that timber has a higher deterioration rate than more durable materials such as stone or brick. Once established, timber items will still require long-term maintenance and possible future reconstruction/repair that would have ongoing financial implications.
- Whether the occupational health and safety issues related to the place's ruinous state can be effectively managed, noting that it is important that the preservation of a ruin does not create a hazard, especially when it is open to visitors. Control of access to various parts of the site may be needed, based on condition.

9.3. Option 3 – Manage the decline of the structure as a ruin

Option 3 considers the possibility of managing the decline of the structure as a ruin, or simply 'letting nature take its course'. As considered in the Australian Heritage Council document, this approach might be appropriate under the following circumstances:

- When the severely deteriorated condition of the fabric means that nothing can be done.
- When the heritage values are slight and there are other better examples.
- When the heritage values of the ruin are adversely impacting on other heritage values that are of greater importance.
- Where this management action does not cause a risk to the public, to adjoining property or to other heritage values. If in the process of decay, a place could collapse and damage life or property, letting nature takes its course may not be acceptable. Restrictions on access may be needed or the removal of the elements which create risk.

As previously considered under Option 1 and 2, due to the condition of the bridge and its location spanning the Goulburn River, significant public safety risks are associated with potential structural collapse if no action is taken. Impacts on other infrastructure located further upstream and environmental impacts on native ecosystems if the bridge were to fail are also relevant considerations.

As the condition of the bridge has severely deteriorated and as this management action could cause serious risk to the public and adjoining property, it is not deemed feasible to consider further.

9.4. Option 4 – Record and demolish all or part of the structure

The option to record the structure and demolish all or part of the structure have been considered under Options 1 and 2. This approach has been considered by the Australian Heritage Council in their 2013 document when ‘removal is considered inevitable’, noting that this approach can be considered appropriate under the following circumstances:

- *When the complete loss of the place is inevitable because letting nature take its course presents too many hazards.* In this case, proactive recording prior to removal will enable the place and its heritage values to be understood.
- *When the place is creating an unacceptable risk to public safety or an environmental hazard.* Recording and then removal of the hazardous elements should be employed where the significance of the place does not warrant the investment of substantial resources required to make them safe.

As previously considered, the complete loss of the place is considered inevitable if a ‘do nothing’ approach is pursued which creates an unacceptable risk to public safety and environmental hazard. On this basis, it is considered that full or partial demolition can be considered an appropriate management action from a heritage perspective. If full or partial demolition of fabric is pursued, as previously addressed regarding Option 1 and 2, a robust program of recording and interpretation would be essential to maintain the historical and architectural significance of the structure. In this regard, various options exist to install new interpretative signage, adaptively re-use fabric for new seating/public realm items, and to capture and communicate intangible values associated with community members of the bridge, including in association with under-representative narratives associated with historic Chinese communities and multi-culturalism.

10. STATUTORY PROCESS

As Chinamans Bridge is included on the VHR as a State significant site, proposed works would require a heritage permit under the *Heritage Act 2017*. The Heritage Act is administered by the Executive Director, Heritage Victoria. The key milestones associated with this permit process are as follows.

10.1. Permit Process

10.1.1. Pre-application process

The pre-application process involves at minimum one pre-application meeting with Heritage Victoria. Given the complexity of this project, in this instance it is likely that multiple pre-application meetings would be required, including potentially a site visit to the bridge with Heritage Victoria officers.

Heritage Victoria will not provide any formal indication of approval in advance of a permit application; however, the purpose of the pre-application process will be to establish the key issues related to the proposal and the expectations regarding the application documentation and stakeholder engagement.

10.1.2. Permit process

The heritage permit process is subject to an assessment timeframe of 45 business days. The permit 'clock' may be stopped/extended for the following reasons:

- Requests for further information (RFI), there is a standard response timeframe of 30 days to RFIs, however this can be extended if required.
- Public advertising for 14 days (at least a 3-week process allowing for arrangement of advertising).
- Heritage Victoria may request an additional 45 business days for the assessment of a permit application from the Victorian Heritage Council (a separate independent heritage body) for complex matters.

For a permit process as complex as Chinamans Bridge, in reality a minimum of a 6-month permit process should be allowed for, however this could extend to 12 months should there be multiple RFIs or extensions to the permit assessment timeframe.

10.1.3. Post permit process

Permit management

In the event that a permit is issued it is almost certain that conditions would be placed on the approval.

Conditions cannot necessarily be anticipated in advance of the permit process, however there are a number of common conditions that may be applied such as:

- A bank guarantee (value often tied to the cost of conservation works to ensure these are undertaken).
- Submission of detailed design/tender ready/construction ready drawings.
- Archival photographic recording, or other recording requirements (e.g., measured drawings, 3D scan etc.).
- Heritage management plan.
- Interpretation strategy and implementation.
- Conservation works requirements.

The management and satisfaction of 'pre-commencement' conditions should be considered in any construction planning or timeframes.

Appeal rights

The Heritage Act does not grant third party appeal rights for permit decisions; however, applicants have review rights to the Victorian Heritage Council in the case of a permit refusal or against conditions placed on permits granted. The Victorian Heritage Council has a process of calling for submissions and submissions in reply and then will usually hold a hearing at which parties can provide verbal evidence to support their written submissions. The Heritage Act requires that a decision must be made within 60 days of the permit review request being lodged with the Heritage Council, although the Heritage Council has the capacity to 'stop the clock' by granting an adjournment or issuing a request for further information.

It should also be noted that the relevant Minister with oversight of the Act (currently the Minister for Planning) also has 'call-in' rights in the case of appeals. In the case that an appeal is lodged with the Victorian Heritage Council the Minister may 'call-in' the appeal and either determine the review themselves or direct the review to VCAT under certain circumstances. The 'call-in' power is rarely used.

10.2. Heritage Act tests

The Heritage Act establishes a number of mandatory and optional considerations for the assessment of an application for a heritage permit.

As per s. 101(2) of the Heritage Act the Executive Director must consider the following in the assessment of a heritage permit application (items of particular relevance to Chinamans Bridge are italicised):

- a. the extent to which the application, if approved, would affect the cultural heritage significance of the registered place or registered object;
- b. the extent to which the application, if refused, would affect the reasonable or economic use of the registered place or registered object;
- c. any submissions made under section 95 [public submissions] or 100 [submissions by responsible authority/municipal councils];
- d. if the applicant is a public authority, the extent to which the application, if refused, would unreasonably detrimentally affect the ability of the public authority to perform a statutory duty specified in the application;
- e. if the application relates to a listed place or to a registered place or registered object in a World Heritage Environs Area, the extent to which the application, if approved, would affect—
 - i. the world heritage values of the listed place; or
 - ii. any relevant Approved World Heritage Strategy Plan;
- f. any matters relating to the protection and conservation of the registered place or registered object that the Executive Director considers relevant.

As per s.101(3) of the Heritage Act the Executive Director may consider the following in the assessment of a heritage permit application:

- a. the extent to which the application, if approved, would affect the cultural heritage significance of any adjacent or neighbouring property that is—
 - i. included in the Heritage Register; or
 - ii. subject to a heritage requirement or control in the relevant planning scheme; or
- b. any other relevant matter.

10.3. Application documentation

The Heritage Act does not establish a requirement for the documents to accompany a permit application, however Heritage Victoria have a series of guidelines regarding the content of application documentation and can request any information to aid in the assessment of the application.

For the Chinamans Bridge application the following information would be required, noting that this is not an exhaustive list and would be further developed in consultation with Heritage Victoria during the pre-application phase of the project:

- A heritage impact statement prepared in accordance with the *Heritage Victoria Guidelines for preparing heritage impact statements* (Heritage Victoria, June 2021)
- A structural engineering assessment of the existing bridge, including an assessment of the viability of repair/conservation of the existing fabric. In this instance there may also be a request for the engineering work to be peer reviewed, particularly by specialist heritage engineer.
- Detailed options assessment, including engineering advice and high-level cost analysis for each option.
- An economic and reasonable use assessment of the proposal having consideration of Heritage Victoria policy's document *Reasonable or economic use* (Heritage Victoria, June 2021).
- Detail of stakeholder engagement undertaken in advance of the permit application.
- Details of the cost of the proposal, preferably prepared by a quantity surveyor.
- Proposed interpretation outcomes (e.g., indicative Heritage Interpretation Plan).

As the site is included in an area of Aboriginal Cultural Heritage Sensitivity, a Cultural Heritage Management Plan (CHMP) may be required. Please note that Heritage Victoria is unable to grant a heritage permit if it is deemed that a CHMP is required, and this has not yet been approved. Heritage Victoria is able to commence assessing the permit but cannot make a determination on the permit until CHMP approval has been granted.

11. RECOMMENDATIONS

Based on a consideration of the various risk factors including in particular condition, integrity, safety, constructability and cost, and the various options addressed in Section 9 of this report, it is recommended that full or partial demolition of the structure is the only viable option moving forward. Based on the severely deteriorated condition of the structure, it is considered that addressing the immediate risk to human life is a key priority. Mitigative measures to address the extent of this impact could include partial retainment of the land-based abutments, salvaging of original fabric (where possible) for interpretation, urban design purposes and for use in restoring other historic bridges in the municipality, archival recording, and the implementation of a robust interpretation scheme including onsite devices.

It is recommended that Strathbogie Shire Council undertake the following steps:

- Commence detailed specification regarding the proposed management action to partially demolish the structure, including relevant cost considerations and constructability.
- Request a pre-application meeting with Heritage Victoria to discuss the options outlined in this report and the preferred management action.
- Re-engage with the community to outline the proposed management action and to ensure they are informed, noting that it is likely that any permit application considered by Heritage Victoria would be publicly advertised for community comment.