Transport for NSW

Galston Road Bridge BN390 Rehabilitation

Review of Environmental Factors

November 2024

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the Guringai and Darug the traditional custodians of the land on which the Galston Road Bridge BN390 Rehabilitation is proposed.

We pay our respects to their Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.

Approval and authorisation

Title	Project Manager
Accepted on behalf of Transport for NSW by:	Enda Mulvey
Signed	[redacted]
Date:	11/11/2024

Executive summary

The proposal

Transport for NSW (TfNSW), proposes to remediate the Galston Timber Bridge (the proposal). The bridge was originally built in 1893 and currently has a Bridge Health Index (BHI) rating of "Poor". This rating was initially due to the condition of the abutment wale braces, however further detailed inspection has found that the cross-girders, butting blocks and abutment sheeting are also deteriorating. The existing condition impacts on the structural integrity of the bridge, necessitating a structural refurbishment to some elements of the bridge. As such the rehabilitation of the Bridge is required to maintain the safety of road users, as well as users of Berowra Valley National Park.

Galston Timber Bridge is located within the Hornsby Shire Local Governmern Area (LGA), about 40 kilometres north of Sydney Central Business District (CBD). The Bridge is located at the western edge of Berowra Valley National Park. Galston Timber Bridge (BN390) forms part of the state road, Galston Road, and crosses the suburbs of Galston and Dural.

The key features proposed during Stage 3 of the rehabilitation work is expected to be undertaken in two phases. Phase 1 of the Project is expected to commence during quarter 4 of 2024. During the works Galston Road would be closed for approximately 15-night shifts (weather permitting) with the road re-opening the next day. Phase two is expected to commence in quarter 3-2025 and would require a three-week 24/7 road closure.

- Geotechnical investigations for design parameters regarding redesign of Northern Abutment for the Stage 4 works.
- Replacement of seven degraded timber cross girders.
- Cleaning and repainting of entire truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris.
- Repair of the Northern abutment butting block to delay the ongoing deterioration.
- Installation of steel framing and temporary bracing for the capwale/headstock on both Abutment A and B.
- Partial replacement of the timber sheeting at Abutment B timber.
- Replacement of deteriorated timber deck planks and deck corbel.
- Remove the temporary steel support girders once all timber elements have been completed.
- To facilitate construction road closures during the evening and night time periods will be required to ensure the ongoing safety of the public road users and workers.

Stage 3 would be supported by a small site compound located around 130 metres north of the Bridge. The location of this compound is shown in Figure 1-1 and further described in Section 3.4.

Need for the proposal

The bridge was originally built in 1893 and has a current Bridge Health Index (BHI) rating of "Poor", initially due to the condition of the abutment wale braces. Further detailed inspection has found that the cross-girders, butting blocks and abutment sheeting are deteriorating, bringing these components also into Poor condition. Detailed inspection of the Bridge has identified several areas of deterioration that are currently affecting the structural integrity of BN390. Examples of defects that can be seen on the bridge are shown in Figure 2-1.

The proposed works are required to maintain the Bridge asset in its current working order while improving degraded elements of the Bridge. It is anticipated that by carrying out Stage 3 works the overall BHI could be revised to "Fair".

Proposal objectives

The objectives of the proposal include:

- Improve and maintain the structural integrity of the bridge.
- Increase durability of bridge.
- Protect the heritage asset by keeping it in its original form long term
- Meet Asset Performance Measures

Options considered

Owing to the nature of the Project being the rehabilitation of a heritage listed bridge, options for the proposal were limited by NSW legislation and TfNSW guidelines in order to maintain Heritage value.

There were only two options for bridge remediation identified. These were:

Option 1 'Do Nothing'-

The Do-Nothing option would not address the identified need for remediation of the Galston Timber Bridge. The bridge would not be repaired, and the timber would continue to degrade leading to the structural instability of the bridge. There would be a high risk of abutment failure especially in heavy rain events. The durability of the bridge would not be improved, and the Heritage asset would be left to further degrade.

Option 2 "Remediation of the Bridge"-

Option 2 would involve the remediation of the existing bridge. This option would protect the heritage asset by allowing for remediation of the Bridge in a way that is sympathetic to the heritage values of the structure and greater area. Option 2 would increase the durability of the bridge by carrying out the necessary repairs and maintain the structural integrity of the bridge by carrying out necessary repairs.

The preferred option is Option 2 "Remediation of the Bridge".

Option 2 was the only option that satisfied the project objectives. Option 2 would also balance the CHMP requirement of safety and operability, with heritage value by increasing safety with modern engineering in the short term and using traditional methods and materials to reinstate the bridge in the longer term.

Statutory and planning framework

The proposal is for a road and is to be carried out on behalf of Transport for NSW (Transport) and can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979 (NSW)*. Development consent from council is not required.

Heritage Act 1977

The NSW Heritage Act 1977 (Heritage Act) is the primary legislation affording protection to heritage items in NSW. Under the Heritage Act, 'items of environmental heritage' include places, buildings, works, relics, moveable objects, and precincts identified as significant. Significance is based on historical, scientific, cultural, social, archaeological, architectural, natural, or aesthetic values. State significant items can be listed on the NSW SHR and are given automatic protection under the Heritage Act against any activities that may damage an item or affect its heritage significance. The Heritage Act also protects 'relics', which can include archaeological material, features, and deposits.

As the bridge subject to the proposed remediation is state heritage listed a Statement of Heritage Impact (SOHI) has been prepared to inform a Section 60 approval for the proposed works. Both the SOHI and Section 60 approval are attached to this REF as Appendix D.

Community and stakeholder consultation

Consultation with NPWS was undertaken to determine the most appropriate location of the ancillary site for the Project and to determine the level of consultation required under the TISEPP.

The consultation with NPWS is summarised Table 5-1. Information on the materials proposed to be stored at the site compound was communicated as part of this correspondence. NPWS confirmed the compound was suitable for use, no major issues were raised.

Due to the requirement to close Galston Road numerous times throughout the delivery of this Project, active and ongoing consultation with the both the Hornsby and Galston community; and the broader community will be critical in minimising this impact on nearby residents and commuters. ConnectSydney would continue to consult and inform the community throughout the proposal on an as needed basis and provide contact details to the community in the event of enquiries or complaints.

Environmental impacts

The main environmental impacts of the proposal are:

Non-Aboriginal Heritage

The Statement of Heritage Impact (SOHI) identified that the proposed works would have a Minor Adverse physical impact on the 'Bridge over Tunks (Pearces) Creek' heritage item (SHR Listing No. 01478). The proposal would involve staged and targeted removal and replacement of deteriorating bridge fabric. A minor adverse impact would result from the action affecting only a small part of the place or a distant/small part of the setting of a heritage place.

The proposed new works would enhance the significant use by safeguarding the bridge's longevity as an active road asset. Proposed replacement of steel and timber elements and members would be like-for-like to retain the heritage character of the Bridge. If these impacts are mitigated appropriately, the proposed works could potentially result in a Positive impact to the State heritage values of the bridge.

Overall, the impact is considered Minor to the State heritage values of 'Bridge over Tunks (Pearces) Creek' (SHR Listing No. 01478), as the design intent and uniqueness would remain clearly intact, and the bridge would be retained as a functioning and significant road connection between the suburbs of Galston and Hornsby.

Safeguards to protect the Heritage item have been developed based on the SOHI and Heritage NSW Section 60 Approval. These are listed in Section 6.1.3.

Traffic and Transport

During Phase 1 of the Project, Galston Road would be closed for around 15 shifts from 8pm-5am (weather permitting) during quarter 4 of 2024. The road would be re-opened each morning and remain open during the day times, as governed by the Road Occupancy Licence.

Phase 2 works would require 24hr road closures for around 19 shifts (weather permitting), during quarter 3 of 2025. These closures would be between Mountview Parade, Hornsby Heights and Calderwood Road, Galston. The road detour east would be south via the Old Northern Road, Newline Road and Boundary Road through Cherrybrook, then north along Pennant Hills Road to Hornsby. The detour west would mirror the east bound detour, from Pennant Hills Road Hornsby down through Cherrybrook then north along Boundary Road, Newline Road, and Old Northern Road to Galston.

The additional travel time for the detour during the road closures would be approximately 15-25 minutes between the suburbs of Middle Dural and Hornsby as shown in Figure 6-. During the night time period the direct route via Galston Road between Middle Dural and Hornsby is 12-15 minutes (Figure 6-) while the detour required for the works would be approximately 30-40 minutes (Figure 6-).

Safeguards to manage Traffic and Transport impacts have been developed for the project these are listed in Section 6.1.3.

Justification and conclusion

The Galston Timber Bridge (also known as Pearce's Creek or Tunks Creek Bridge) is a heritage listed McDonald timber truss bridge crossing Tunks Creek. The bridge was originally built in 1893 and has a current Bridge Health Index (BHI) rating of "Poor", initially due to the condition of the abutment wale braces. Further detailed inspection found that the cross-girders, butting blocks and abutment sheeting are deteriorating, bringing these components also into Poor condition. The existing condition impacts on the structural integrity of the bridge, necessitating a structural refurbishment to some elements of the bridge.

It is recognised that the proposal will have some impacts to road users during construction as a result of lane closures. However impacts would be temporary in nature. The safeguards and mitigation measures included in the environmental assessment (refer to section 6.2) would minimise impacts during construction.

There would however be positive implications of undertaking the proposal as the rehabilitation Bridge BN390 would subsequently improve the safety of road users and preserve the heritage structure.

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1. Introduction

This chapter introduces the proposal and provides context for the environmental assessment. In introducing the proposal, the objectives and project development history are detailed and the purpose of the report provided.

1.1 Proposal identification

Transport for NSW (TfNSW), proposes toremediate the Galston Timber Bridge (the proposal). The bridge was originally built in 1893 and currently has a Bridge Health Index (BHI) rating of "Poor". This rating was initially due to the condition of the abutment wale braces, however, further detailed inspection has found that the cross-girders, butting blocks, and abutment sheeting are also deteriorating. The existing condition impacts on the structural integrity of the bridge necessitating a structural refurbishment to some elements of the bridge. As such the rehabilitation of the Bridge is required to maintain the safety of road users, as well as users of Berowra Valley National Park.

Galston Timber Bridge is located within the Hornsby Shire Local Government Area (LGA), about 40 kilometres north of Sydney Central Business District (CBD). The Bridge is located at the western edge of Berowra Valley National Park. Galston Timber Bridge (BN390) forms part of the state road, Galston Road, and crosses the suburbs of Galston and Dural.

From Hornsby Heights the road climbs down steeply to the valley of Berowra Valley National Park before ascending to Galston. Galston Road is known for its steep, tight hairpin corners that prevent any vehicles longer than 7.5 metres utilising the road. Owing to loading capacity and width, the crossing of BN390 is only a single lane at the bottom of the Valley. The road is an important thoroughfare for the community as it provides a link between east and west, and is often a faster route to the Pacific Highway and Motorway for community members located in the Galston region and beyond. Additionally, the road provides access to walking trails within Berowra Valley National Park.

BN390 is a historic McDonald timber truss road bridge that crosses Tunks (Pearces) Creek, a tributary of Berowra Creek. BN390 is heritage listed on the following statutory heritage registers:

- State Heritage Register (SHR).
- Roads and Maritime Services (now Transport for NSW) Section 170 Heritage and Conservation Register (S170).
- Hornsby Local Environmental Plan 2013.

The repair works for Galston Timber Bridge have been designed to maintain the significance of the heritage bridge and requires staging due to constructability and to allow seasoning of timbers.

This proposal comprises Stage 3 works, which will be carried out in two phases. This REF seeks to cover work designated as Stage 3.

Key features of Stage 3 of the proposal would include:

Stage 3-

The proposed works for Stage 3 would be undertaken in two phases. During phase 1 of the Project, Galston Road would be closed for approximately 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require 24hr road closures for approximately 19 shifts (weather permitting) during quarter 3 of 2025.

Key features of the stage 3 include:

- Replacement of up to seven degraded timber cross girders.
- Cleaning and repainting of entire truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris.
- Installation of steel framing and temporary bracing for the capwale/headstock on both Abutment A and B.
- Partial replacement of the timber sheeting at Abutment B timber.
- Replacement of deteriorated timber deck planks and deck corbel.
- Remove the temporary steel support girders once all timber elements have been completed.

Stage 3 would be supported by a small site compound located around 130 metres north of the Bridge. The location of this compound is shown in Figure 1-1 and further described in Section 3.4.

The location of the proposal is shown in Figure 1-1 and an image of the current condition of the Bridge is shown in Figure 1-2. Chapter 3 describes the proposal including work methodology in further detail. Figure 3-1 shows the key features of the works.

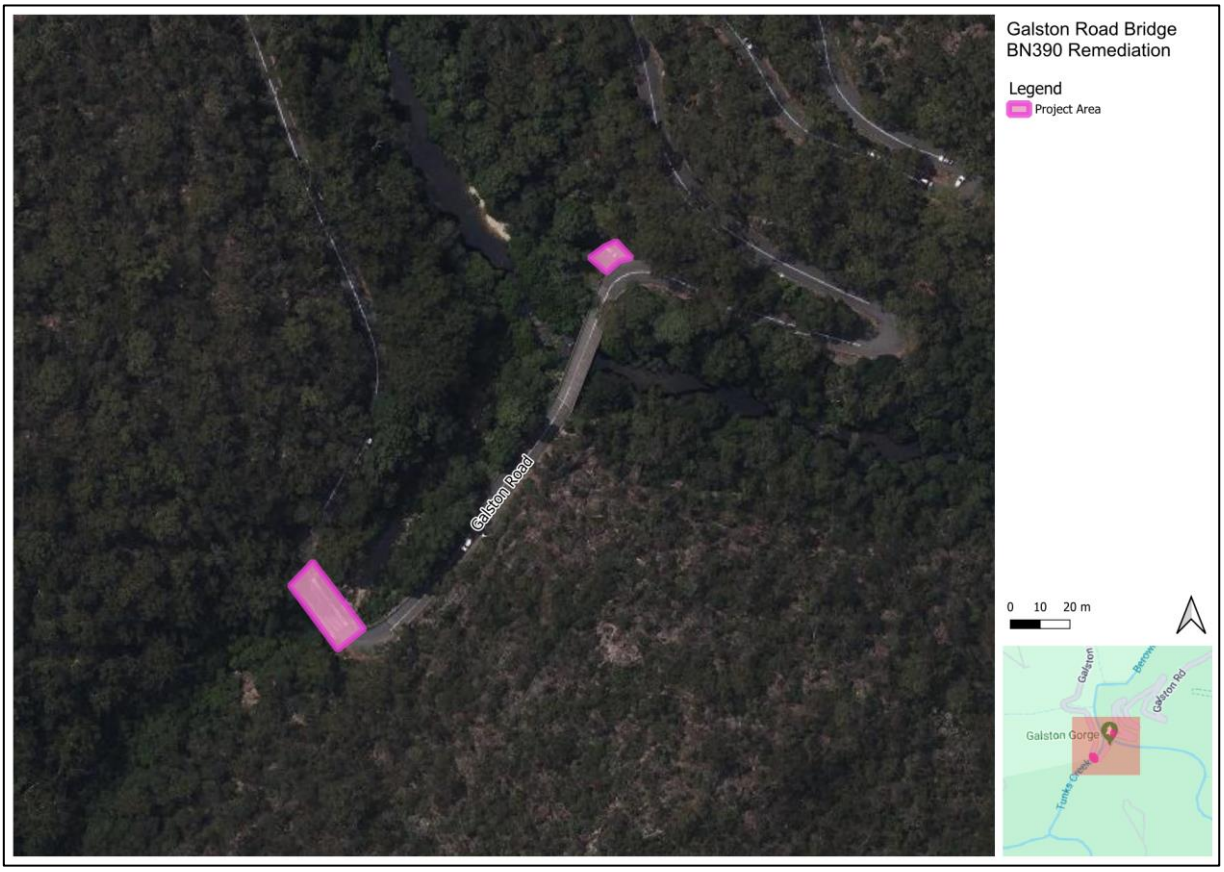


Figure 1-1: Location of the proposal.

Figure 1-2 Galston Timber Bridge BN390 from the underside of the bridge looking upstream.

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Hutchison Weller for ConnectSydney on behalf of Transport. For the purposes of these works, Transport is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979 (NSW)* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of Section 171 of the Environmental Planning and Assessment Regulation 2021, the factors in *Guidelines for Division 5.1 assessments, (DPE 2022)*, *Roads and Related Facilities EIS Guideline* (DUAP 1996), the *Biodiversity Conservation Act, 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)* (EPBC Act).

In doing so, the REF helps to fulfil the requirements of:

Section 5.5 of the EP&A Act including that Transport examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally-listed biodiversity matters under the https://www.awe.gov.au/environment/epbcEPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and if offsets are required and able to be secured.

The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

The bridge was originally built in 1893 and has a current Bridge Health Index (BHI) rating of "Poor", initially due to the condition of the abutment wale braces. Further detailed inspection has found that the cross-girders, butting blocks and abutment sheeting are deteriorating, bringing these components also into poor condition.

A structural assessment carried out by Aurecon in 2022 concluded that the bridge's structural condition has impacted on the load carrying capacity of the bridge with the critical case being bending moment at the minor cross girder. This report also noted deficiencies in the cross girders, and fungal growth affecting the durability of timbers and steel on the Bridge.

The proposed works are required to maintain the Bridge asset in its current working order while improving degraded elements of the Bridge. It is anticipated that by carrying out Stage 3 works the overall BHI could be revised to "Fair".

As the bridge is listed on several heritage registers including as a State Heritage item, the rehabilitation works would be required to maintain the Bridge's status as an important heritage asset.

2.1.1 Strategic plans and policy documents

The proposal is consistent with a number of strategic plans and policy documents as outlined in the following sections.

Future Transport 2056

The NSW Future Transport Strategy 2056 (Transport for NSW, 2018) outlines a clear framework to address transport challenges in NSW over the next 40 years and is an update of the NSW Long Term Transport Master Plan released in 2012. It integrates planning for roads, freight and all other modes of transport and sets out initiatives, solutions and actions to meet NSW transport challenges.

Future Transport 2056 outlines six state-wide outcomes to guide investment, policy and reform and service provision. They provide a framework for planning and investment aimed at harnessing rapid change and innovation to support a modern, innovative transport network.

The proposal would directly support the following two outcomes:

- Successful places – The liveability, amenity and economic success of communities and places are enhanced by transport – The proposal supports this outcome by improving a road that serves as an important connection between communities and places. The completion of the proposal would support safe, efficient and reliable journeys.
- Safety and performance – Every customer should enjoy safe travel across a high performing, efficient network – the proposal supports this outcome by improving the safety and efficiency of Galston Rd and caters for future growth in the network.

The proposal also supports fast and convenient interchanging, which is an identified transport customer outcome for Greater Sydney.

Greater Sydney Regional Plan: A Metropolis of Three Cities

The Greater Sydney Region Plan: A Metropolis of Three Cities (Greater Sydney Commission, 2018) sets out the Greater Sydney Commission's vision for Sydney to 2056. The plan divides the Sydney Metropolitan Area into three cities being Western Parkland City, Central River City and Eastern Harbour City. It provides directions, metrics and objectives in order to achieve the vision for Sydney 2056. The suburb of Galston falls within the Central River City.

This proposal supports the vision within the strategy by improving the Bridge in a way that is sympathetic to Heritage, while also allowing for more reliable and resilient road infrastructure that connects people to communities and places.

Road Safety Plan 2021 – Towards Zero

The Road Safety Plan 2021 – Towards Zero (2017) is a supporting plan of the Future Transport Strategy 2056. The Plan sets out a framework with six priority targets to achieve the NSW Government's State Priority Targets: to reduce fatalities by 30 percent by 2021 and to achieve zero harm by 2056.

The six priority areas are:

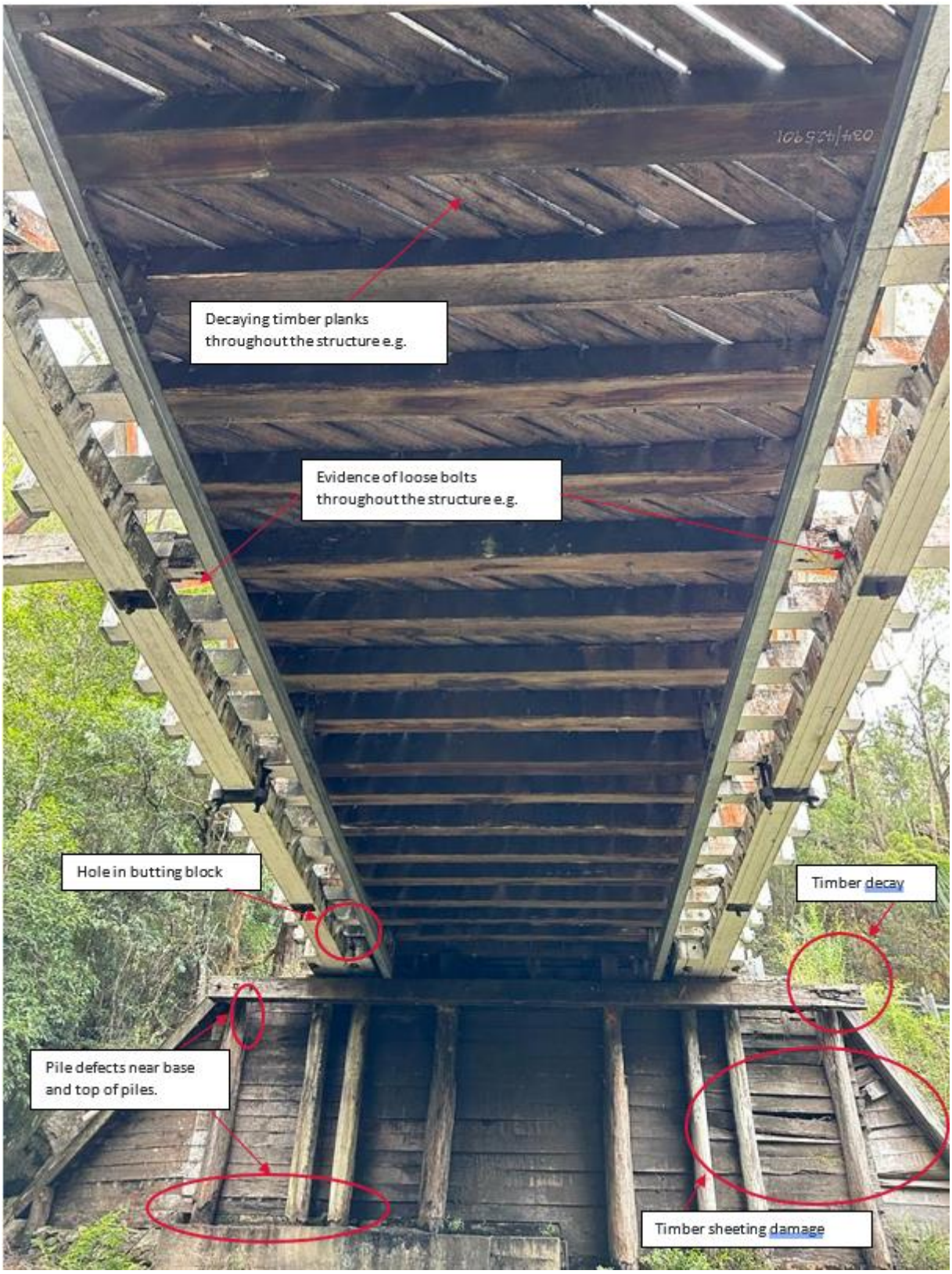
- saving lives on country roads.
- liveable and safe urban communities.
- using the roads safely.
- building a safer community culture.
- new and proven vehicle technology.
- building a safe future.

The Plan has identified the need to keep NSW urban areas safe. Road safety is one of the main proposal objectives. Road safety would be addressed through proactively and strategically addressing risks.

2.2 Limitations of existing infrastructure

Detailed inspection of the Bridge has identified several areas of deterioration that are currently affecting the structural integrity of BN390. Examples of defects that can be seen on the bridge are shown in Figure 2-1 and some of these have already been completed as part of stage 2 works. Details of critical elements of the Bridge that required replacement or refurbishment during stage 3 are listed below:

- The paint on the existing structure shows evidence of mould which requires treatment to protect against further damage to the timbers and steel elements.
- Decaying timber cross girders require replacement, this being the critical component for load capacity. Up to 7 cross girders are nominated for replacement these are predominantly the primary cross girders which are more susceptible to deterioration due to the tension rods running through the centre.
- There are 84 off deck planks, of which 65 are full size across the deck. Approximately 50 off these timber deck planks (which is 60% of all planks) have defects and are proposed to be replaced. Note, Section 4.5.1.4 of RTA Timber Bridge Manual 4 states that, if more than 30-40% of timber sheeting (deck planks) requires replacement, all the sheeting shall be replaced.
- There is evidence of defects, decay and rotting in the 130x90 sacrificial timber member (corbel) where the timber deck planks are fixed.
- A hole in the Abutment B butting blocks is noted, with extensive section loss on the upstream end. Prevention of water ingress around and above the butting block and additional protective coatings will assist in reducing further decay.
- The degraded timber abutment sheeting requires temporary repair and or replacement during Stage 3.



□□□r□ □□□ Examples of key defects to be repaired or elements replaced

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The objectives of the proposal include:

- Improve and maintain the structural integrity of the bridge.
- Increase durability of the bridge.
- Protect the heritage asset by keeping it in its original form long term.
- Meet asset performance measures.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

The NSW Timber Truss Road Bridges Overarching Conservation Management Plan (CMP) (2018) guides the conservation and management of the Galston Timber Bridge. The Bridge is a McDonald type timber truss bridge. In line with Section 5.1.6 of the CMP when considering remediation options the following must be considered:

- Use traditional methods and materials where possible (where upgrading is not required).
- Upgrade (for strength and safety) bridges as required in order to ensure their ongoing safety and operability.

Owing to the Bridge's heritage status options for rehabilitation were limited during the development of detailed design. The principal of maintaining the heritage fabric of BN390 by conducting works in accordance with the CMP determined the chosen rehabilitation methodology.

2.4.2 Identified options

Owing to the nature of the Project being the rehabilitation of a heritage listed bridge, options for the proposal were limited by NSW legislation and TfNSW guidelines in order to maintain Heritage value. Two options have been investigated "Do Nothing" and "Remediation of the Bridge". These were assessed against the proposed objectives and development criteria. The Options are detailed in 2.4.2. The preferred option was selected based on the ability of the option to meet the objectives of the proposal as outlined in section 2.3.1 and the criteria outlined in section 2.4.1.

There were only two options for bridge remediation identified. These were:

Option 1 'Do Nothing'-

The Do Nothing would not address the identified need for remediation of the Galston Timber Bridge. The bridge would not be repaired, and the timber would continue to degrade leading to the structural instability of the bridge. There would be a high risk of abutment failure especially in heavy rain events. The durability of the bridge would not be improved and the Heritage asset would be left to further degrade.

Option 2 "Remediation of the Bridge"-

Option 2would involve the remediation of the existing bridge. This option would protect the heritage asset by allow for remediation of the Bridge in a way that is sympathetic to the heritage values of the structure and greater area. Option 2 would increase the durability of the bridge by carrying out the necessary repairs and maintain the structural integrity of the bridge by carrying out necessary repairs.

The Remediation of the Bridge"" option would generally include the following:

- Cleaning and Repainting of entire truss structure.
- Northern Abutment Butting block repair.
- Abutment A and B capwale temporary braces steel framing.
- Abutment B timber sheeting partial replacement.
- Replacement of deteriorated deck planks and corbels.

- Remove the temporary steel support girders permanently and replace degraded cross girders with like for like timber girders.

2.4.3 Analysis of options

The options identified above were assessed against the Proposal objectives, as shown in Table 2-1.

Table 2-1 Analysis of options against Proposal objectives

	Option 1 'Do Nothing'	Option 2 'Do Something'
Objective 1: Improve and maintain the structural integrity of the bridge.	X This option does not address this objective. The bridge would not be repaired, and the timber would continue to degrade leading to the structural instability of the bridge.	✓ Option 2 would allow for repair work to improve and maintain the structural integrity of BN390.
Objective 2: Increase durability of bridge	X This option does not address this objective. The bridge would not be repaired, and the timber would continue to degrade leading to the structural instability of the bridge.	✓ Option 2 would increase the durability of the Bridge by remediating degraded elements that could lead to structural failure.
Objective 3: Protect the heritage asset by keeping it in its original form long term	X This option does not address this objective. The durability of the bridge would not be improved, and the Heritage asset would be left to further degrade.	✓ This option would protect the heritage asset by remediating it in a heritage sympathetic way that maintains heritage values long term.
Objective 4: Meet Asset Performance Measures.	X This option does not address this objective. The bridge would not be repaired, and the timber would continue to degrade leading to the structural instability of the bridge.	✓ Option 2 would meet asset performance measures by increasing the Bridge Health index of the Bridge to 'Fair'.

2.5 Preferred option

The preferred option is Option 2 "Remediation of the Bridge".

Option 2 was the only option that satisfied the project objectives. Option 2 would also balance the CMP requirement of safety and operability, with heritage value by increasing safety with modern engineering in the short term and using traditional methods and materials to reinstate the bridge in the longer term.

3. Description of the proposal

This chapter describes the proposal and provides descriptions of existing conditions, the design parameters including major design features, the construction method and associated infrastructure and activities.

3.1 The proposal

Transport for NSW (TfNSW), proposes to upgrade and refurbish the Galston Timber Bridge (the proposal) to ensure the ongoing structural stability of the bridge.

Stage 3 has been broken up into 2 phases. Phase 1 is expected to commence in November 2024 for initial works. The initial works are:

- Cleaning and repainting of entire truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris. An assessment of the current paint on the truss has determined the extent of the paint failure and need for repainting. The assessment determined that cleaning and repainting of all existing timber truss elements is required.
- Installation of steel framing and temporary bracing for the capwale/headstock on both Abutment A and B.
- Partial replacement of the timber sheeting at Abutment B timber.
- Geotechnical investigations involving 2 boreholes (75mm diameter and 3m deep) on the northern abutment, which will feed into the design for Stage 4 works.

Phase 2 would commence in quarter 3 of 2025 and would generally include the following works:

- Replacement of up to seven degraded timber cross girders (girders 4, 5, 10, 12, 14 and 19).
- Replacement of deteriorated timber deck planks and deck corbel.
- Remove the temporary steel support girders once all timber elements have been completed.

Longer term roads closures are required in Stage 3 phase 2, which will involve the install of girders and decking. This will involve a 3-week road closure during night shifts due to the complexity of some of the proposed activities. This includes the need for plant and equipment placement along and adjacent to the roadway in order to fulfill the delivery of the Stage 3 proposed works. These closures will require for applicable notifications to be carried out in conjunction with the TMC.

Figure 3-1 to Figure 3-6 indicate the existing condition of the bridge and present excerpts from the detailed design.

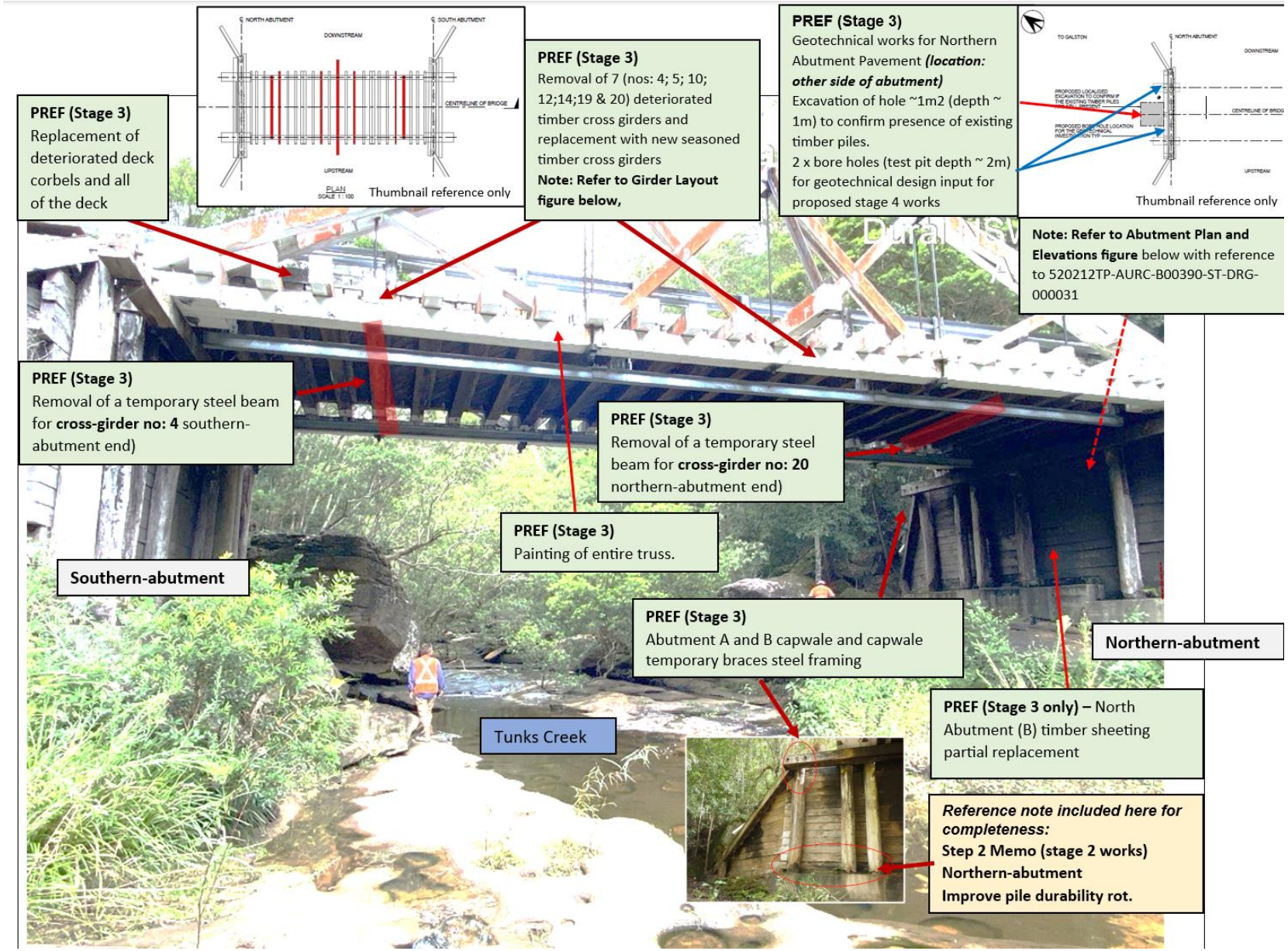
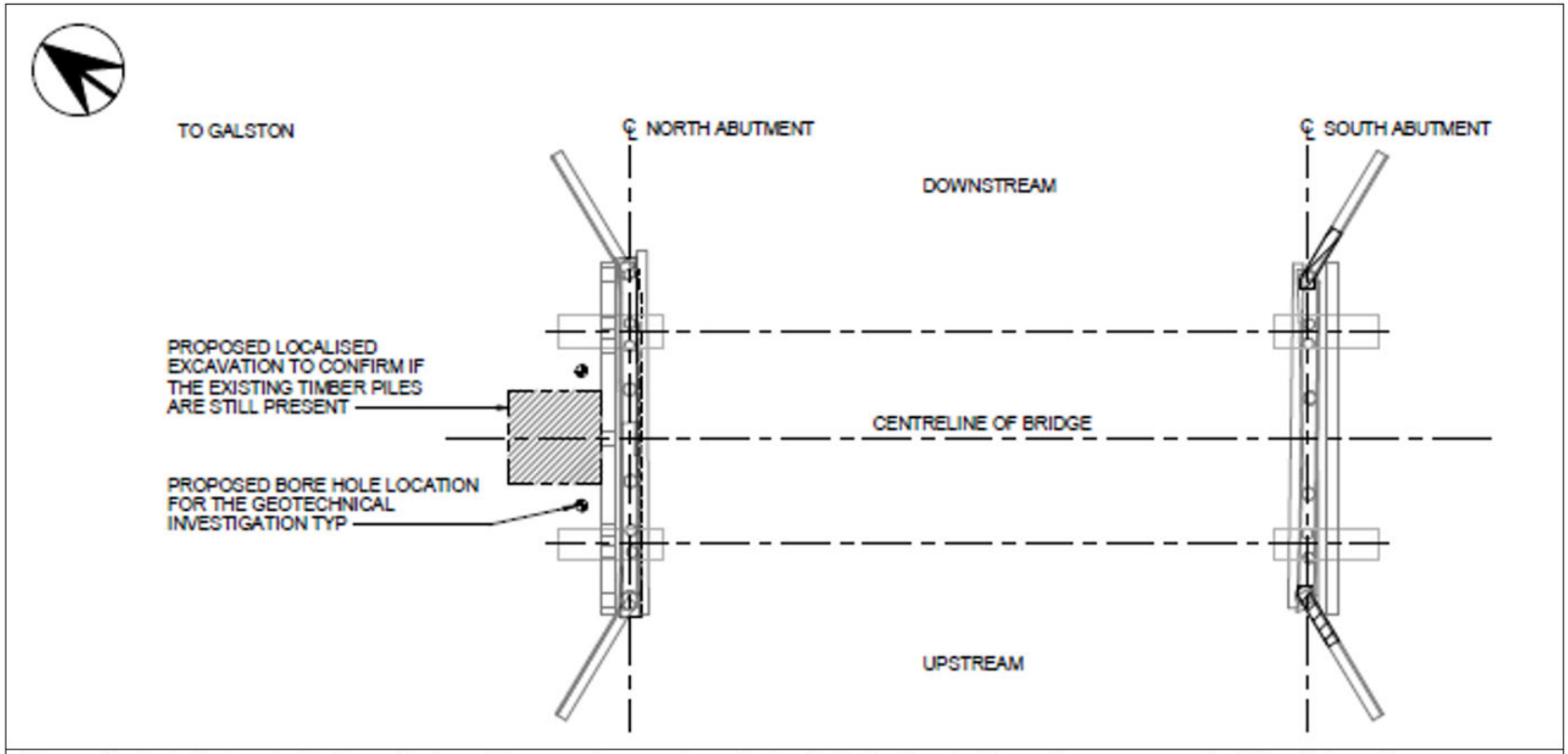
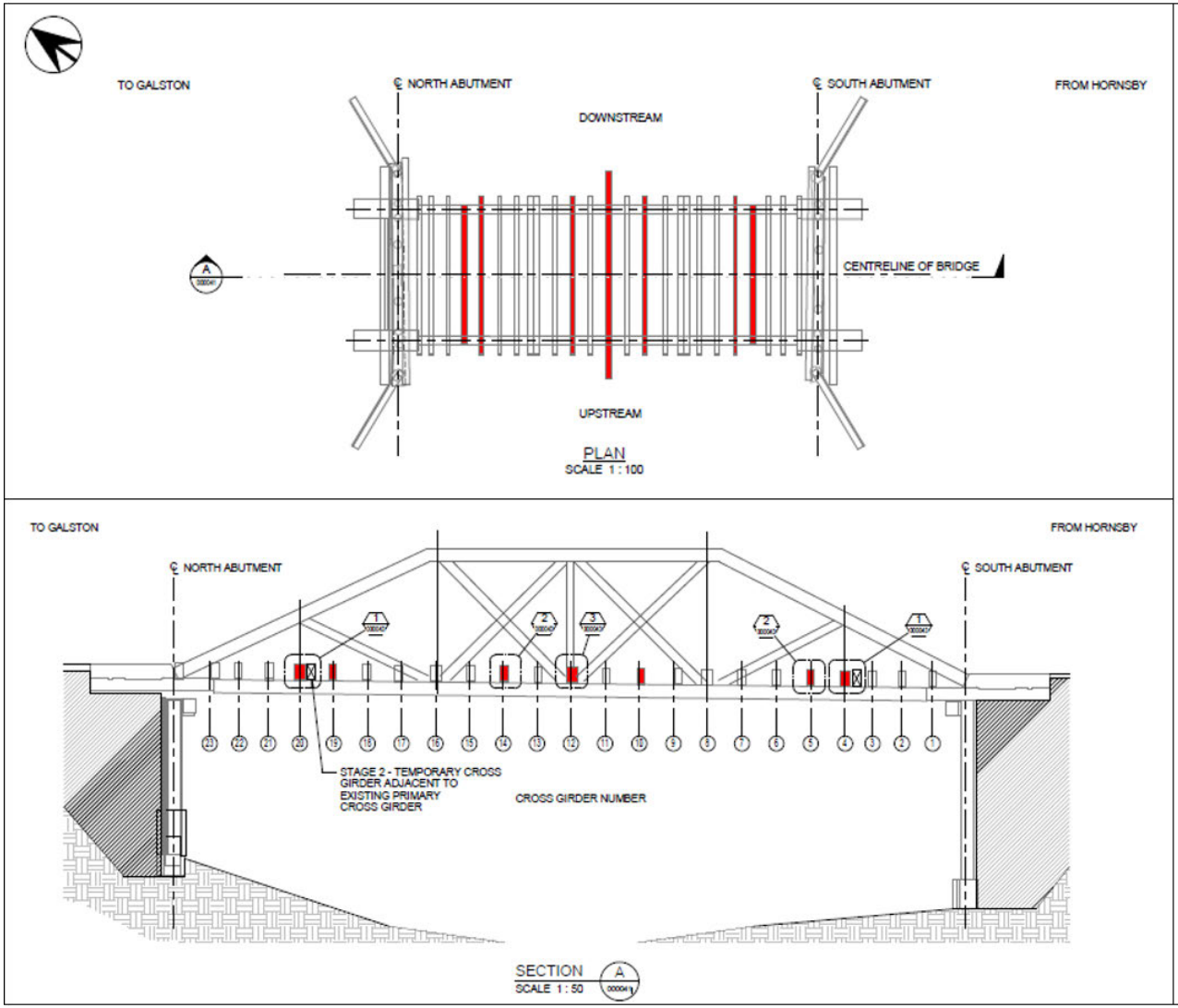


Figure 3-1 Key features for the proposed Stage 3 works



Above: Geotechnical works Northern Abutment Pavement, excavation of hole ~1m2 (depth ~ 1m) to confirm presence of existing timber piles.
2 x bore holes (test pit depth ~ 2m) for geotechnical design input for proposed stage 4 works.
Source: Aurecon, Abutment Plan and Elevations, 520212TP-AURC-B00390-ST-DRG-00003, Detailed Design – 100% Draft.

Figure 3-2 Excerpt from detailed design showing locations of geotechnical works required (Source: 100% Detailed design drawing 520512TP-AURC-B00390-ST-DRG-0000)



Left: Removal of 7 (nos: 4; 5; 10; 12;14;19 & 20) deteriorated timber cross girders and replacement with new seasoned timber cross girders.

Source: Aurecon, Girder Layout, 520212TP-AURC-B00390-ST-DRG-00003, Detailed Design – 100% Draft.

Figure 3-3 Excerpt from detailed design showing timber cross girders to be removed. (Source: 100% Detailed design drawing 520212TP-AURC-B00390-ST-DRG-00003)

3.2 Design

3.2.1 Design criteria

The design solutions have been tailored to suit the specific constraints faced for a heritage structure with a focus on community requirements.

"The best way to conserve a heritage structure is to keep it operational. A bridge that looks like it is held together with ad hoc repairs or poor workmanship, left to deteriorate until traffic restrictions are put in place is less likely to be valued by the community." (Page 23, Overarching Conservation Management Plan, NSW Timber truss road bridges, January 2018)

A heritage specialist was engaged to inform on the constraints to the repair methodology and design. The TfNSW timber truss specialists were consulted to establish the bespoke Conservation Management Plan for this structure.

The design and workmanship of repairs, including temporary supports, is to be compliant with the following TfNSW specifications:

- M757 – Timber Truss repairs.
- M752 – Timber Truss Repairs – Temporary support minor design.
- TfNSW Bailey Bridge Guide (or an approved alternative temporary support system).

3.2.2 Engineering constraints

The following engineering constraints need to be considered:

- Narrow road and shear drops mean reduced space for equipment.
- Painting scope must be done in the hot months to prevent the moisture in the gorge from damaging the paint.
- Owing to load limits, large vehicles (7.5m and over) must exit via the same direction that they access as they would not be able to cross the Bridge.
- Vehicles larger than 7.5m must contact TMC to inform they are entering Galston Road.

3.2.3 Major design features

Cleaning & Repainting of Truss Structure

All exposed timber surfaces of the truss are to be repainted with a like for like paint colour. Additionally, all suspension rods sway brace and other exposed steel members and connections are to be repainted as shown in Figure 3-.

All existing timber shall be cleaned with high pressure water and treated for mould as follows

1. Dry brush or vacuum the affected timber surface to remove loose mould spores and debris
2. Use a stiff brush or scrubbing pad to physically scrub the mouldy areas with a mixture of mild detergent and water
3. Rinse the timber surface with clean water to remove any residual detergent or debris, which will be captured by geofabric
4. Prepare a fungicidal solution similar to borate preservatives and apply in strict accordance with the manufacturer's instructions

Upon completion of mould treatment, the existing timber surface can be abraded to aid in the adhesion of the new paint system. This can extend over selected areas or across the full truss. The new paint system provides a thicker coating and increased durability characteristics.

For damaged timber elements, the timber surface should be repaired, cleaned and flexiseal applied to fill all gaps and cracks. Priming may be required to ensure suitable paint adhesion is reached. Final adhesion testing of the proposed full coating system is recommended prior to painting commencing.

All existing steel shall be cleaned of mud, mould, moss, lichen, dirt and other loose contaminants by scraping, mechanical cleaning and washing using low pressure water. After cleaning the existing paint layer and rust would then removed through abrasive cleaning prior to the coating application.

To ensure environmental protection during the works, the access system will be encapsulated using geofabric/shade cloth with all power tools fitted with dust extraction shrouds as applicable.

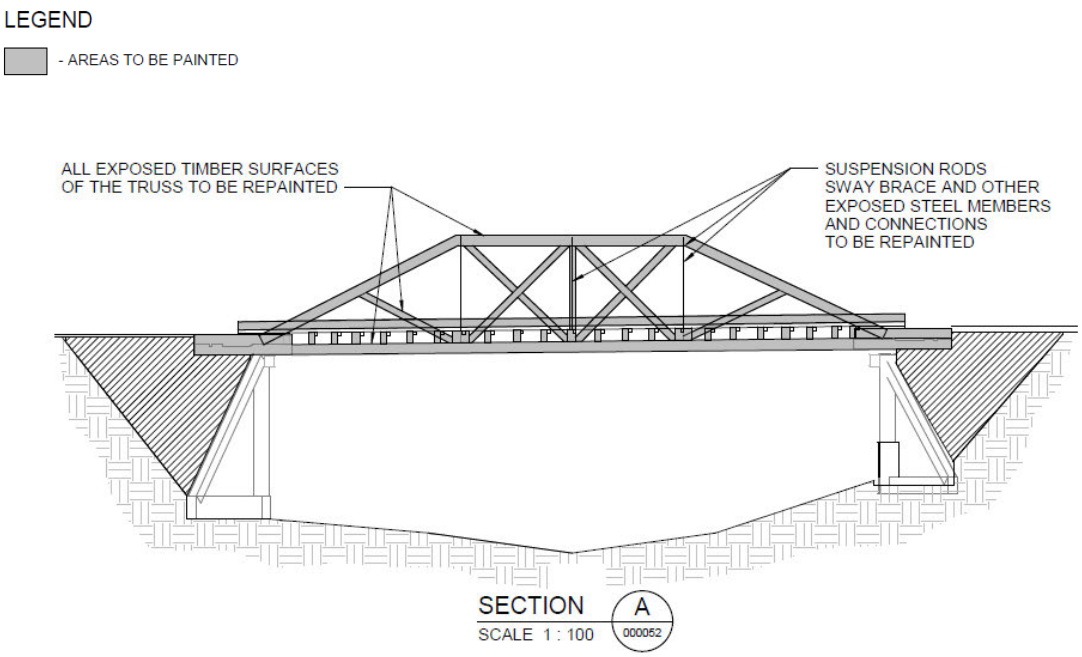


Figure 3-4 Area to be painted (Source: 100% detailed design drawing number 520212TP-AURC-B00390-ST-DRG-000052)

Temporary steel framing to Abutments Capwale & wale

Temporary steel framing to be installed on both abutments capwale and wale as shown in Figure 3- and Figure 3-. The steel framing would be fabricated off-site and then installed manually from the temporary scaffold access.

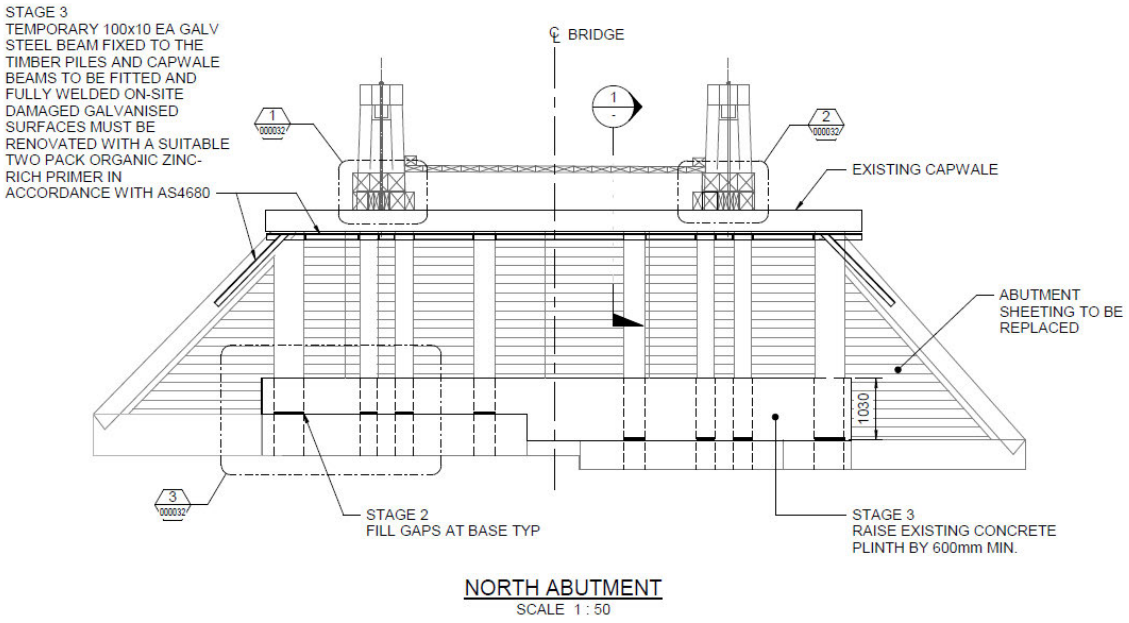


Figure 3-5 North abutment steel framing installation location (Source: 100% detailed design drawing number 520212TP-AURC-B00390-ST-DRG-000013)

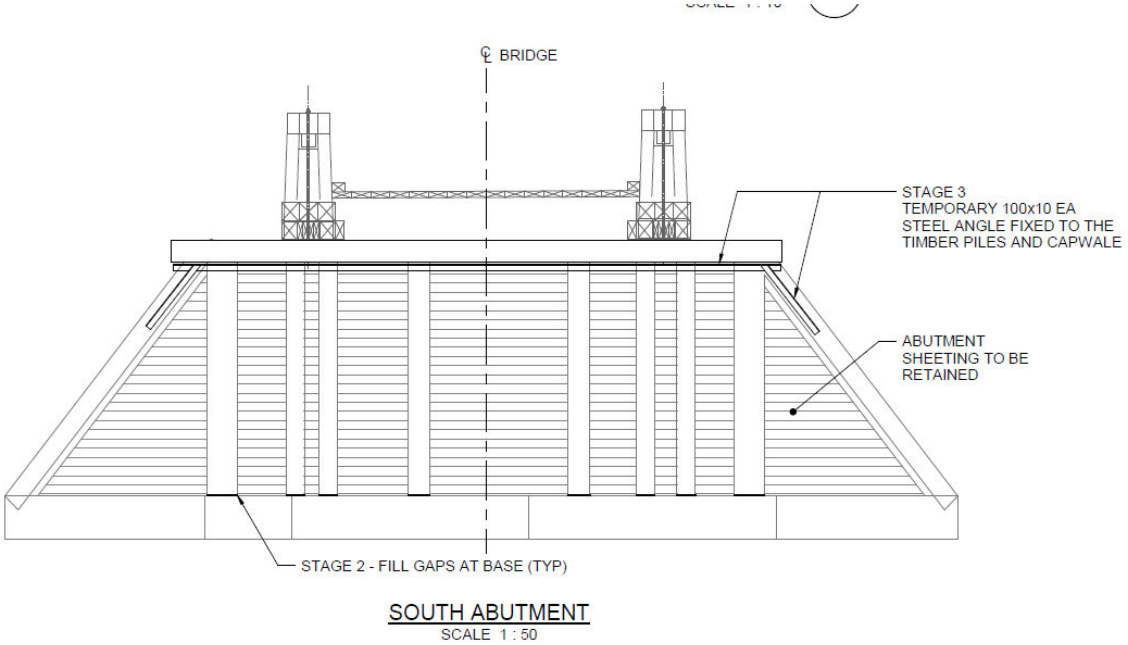


Figure 3-6 South abutment steel framing installation location Source (: 100% detailed design drawing number 520212TP-AURC-B00390-ST-DRG-000013)

Timber Abutment Sheeting

Where abutment sheeting is damaged as shown in Figure 3-1 it would be replaced like for like. To retain the earth behind the abutment, the existing damaged sheets would be replaced one-by-one with hand tools.

Temporary timber pieces will be fixed to the existing abutment sheeting to hold the sheeting in place while one piece is removed at a time. This process will be used to replace the entire failed area. Figure 3-7 indicates a view of this process.

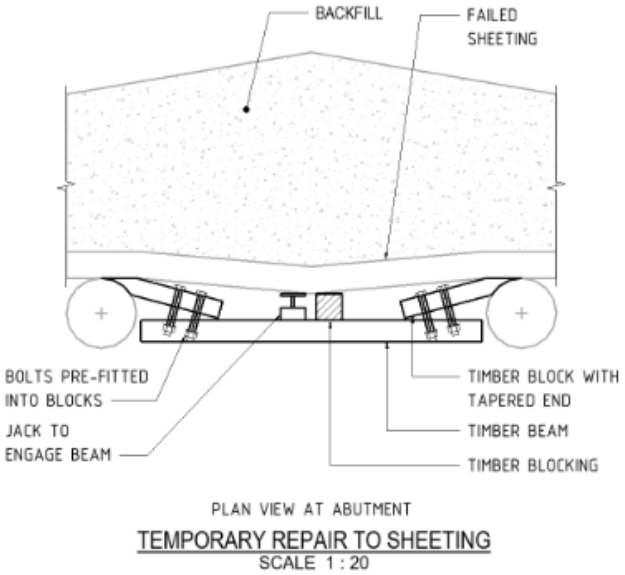


Figure 3-7 Temporary repairs to timber sheeting. (Source: 100% detailed design drawing number 520212TP-AURC-B00390-ST-DRG-000033

Replace timber corbel and deck planks

Deck planks and corbel will be replaced at the same time of installation of the new timber girders.

The deck planks will be removed by unfixing the bolts from the underside of the bridge. This will be done via access to the temporary scaffold. Once the bolts are undone, they will be pulled up and removed from the top of the deck, thus allowancing removal of the deck planks. Planks will be removed one-by-one manually and disposed of appropriately.

Once the deck planks are all removed, detailed inspection of corbels will be undertaken and whichever are deemed to be in a poor condition state, will also be replaced.

The corbel will be manually removed and replaced by hand and bolted into the timber girder with hand tools.

Deck planks will then be measured, fitted and placed in one direction sequentially. As decks are placed, hold down bolts will be installed and fixed from the bottom. All deck planks will be replaced.

Remove and replace timber girders

The replacement of the deck panels of the bridge allows access to the girders underneath and facilitates their removal and replacement. A 20T Franna crane would be used to lift out the old girders, ensuring safe and efficient handling of the heavy components. Once the old girders are removed, they will be replaced with like for like timber girders.

Figure 3-3 shows an excerpt from the detailed design showing the timber cross girders to be removed.

Cross Girder Replacement

Where cross girders 4, 12 and 20 are to be replaced the existing tension hangers at these cross girders that provide structural support will need to be removed. The existing hangers will be replaced with a pair of temporary hangers at each location that will provide the same tension as the existing hangers.

After the hangers have been installed the new cross girder will be placed via a crane from the roadway. Once in place the temporary steel beam placed in Stage 2 can be removed and the permanent tension hangers can be reinstated.

Figure 3-9 Temporary hanger bracket locations (Source: Contractor Works Methodology (August 2024))

3.3 Construction activities

3.3.1 Work methodology

A summary of the work methodology is outlined below with further details for some of the key elements included in Sections 3.3.2 to 3.3.8.

The work would involve the following activities/tasks:

ID	Task Name	Associated work	Duration
BN390 - Tunks Creek Heritage Bridge Staged works			
PHASE 1 - Commencing quarter 4 2024			3 weeks- 15-night shifts weather permitting.
1.1	Site establishment and environmental protection	• Establish ancillary facility. This will involve setting up a site office/lunchroom, Portaloo and material laydown area on existing hardstand. • Mobilise appropriate traffic controls and close road to all traffic. • Install Scaffolding (See 'construction access' section below).	
1.4	Abutment B timber sheeting partial replacement	• Timber support beam to be fixed to the abutment to support the structure while damaged sheeting is removed by hand. See section 3.2.3 for further details	
1.5	Install temporary steel framing to Abutment A&B Capwale & wale	• Pre-fabricated steel frames would be fitted on site to the capwale and wale installed at locations shown in Section 3.2.3.	
1.6	Cleaning & Repainting of Truss Structure	**Timber surface:** • Flexiseal polyurethane construction sealant or poly exterior timber to be used to fill gaps and cracks. • All existing timber cleaned with high pressure water and treated for mould. • Surface of existing timber to be abraded to aid in adhesion of new system. • Painting to commence. **Steel surface:** • Perform a preliminary clean including removing mud, mould, moss, lichen, dirt and other loose. • Contaminants by scraping, mechanical cleaning and washing using low pressure water. • Upon completion remove all existing oil and grease. • The existing paint layer and rust is then removed through abrasive cleaning prior to the coating application. • Painting to commence. See section 3.2.3 for additional details.	

ID	Task Name	Associated work	Duration
1.7	Remove Scaffolding	(See 'construction access' section belo)	
1.8 Site clean-up/demobilisation	Ancillary facility	Remove temporary ancillary facility and associated plant and equipment and reinstate site to the pre-establishment condition.	
PHASE 2 - Commencing quarter 3 2025.			3 weeks – 19 night shifts for on site works (not including timber sourcing and seasoning).
2.0	Source timber	• Approval on timber girder size and specification. • Procurement of timber girders. • Seasoning of timber girder.	
On-site works			
2.1	Site establishment and environmental protection	• Establish ancillary facility. • Implement approved environmental controls including coffer dam and low flow pipe. • Mobilise appropriate traffic controls and close road to all traffic. • Install Scaffolding (See 'construction access' section below).	
2.4	Replace the timber deck corbel and deck planks	• Deck planks will be replaced one by one via unfastening from the bottom and lifting from the top/road. • The corbel will be removed and replace by hand. See section 3.2.3 for further details	
2.5	Remove and replace timber girders	• While deck planks are removed girders to be replaced would be lifted out from the road. • New girders would be installed by the same method. See section 3.2.3 for further details	
2.5	Undertake the replacement to three primary cross girders	• Temporarily remove tension hangers. • Install temporary tension hangers. • Remove unsound primary cross girders. • Install new primary cross girders. • Remove temporary steel cross girders. • Reinstate permanent tension hangers. See section 3.2.3 for further details	
2.8	Remove Scaffolding	(See 'construction access' section below)3.2.3	
2.9 Site clean-up/demobilisation	Ancillary facility	Remove temporary ancillary facility and associated plant and equipment and reinstate site to the pre-establishment condition.	

All works would occur from either the roadway, scaffolding or from under the bridge. The location of works is shown in Figure 1-1.

Construction access

General walkway (temporary) access from Galston Road to Tunks Creek

Left: PRE□ □□a□□ □□– N□r□□r□ A□□□□ □□□ □□d – a□□□□□ □□□□□r □ □r□□r□ □□ T□□□□ Cr□□□
Minor slashing of vegetation proposed to allow for clear and safe access.
Note: No TECs, threatened flora or fauna species were recorded or considered likely to occur within, or in close proximity to the study area *(Lesryk Environment: BN390 BAR – March 2024)*

Inset: W□r□□□□ □□a□ □□□ □□ □a□□□a□ □add□r □□a□□r□ a□□□□d □□r S□a□□ □– □N□□□ □□r□□

Figure 3-10 Indicative placement of temporary ladder/walkway to facilitate safe access to Tunks Creek (northern abutment)

Installing and removing scaffolding

Scaffolding will be lifted from the road to the ground underneath/beside the bridge. Access to below the bridge will be via scaffolding stairs as detailed in Figure 3-4.

The scaffolding is to be installed from the ground and will be suspended from the bridge and spanned over the water due to risk of river flash flooding. The set up of the scaffolding will not involve drilling into the timbers, but rather the scaffolding will be clamped on with fabric and rest on the cross girders. Access onto the scaffold will be stair access from below the bridge to the suspended scaffold. The stair access onto the scaffolding will also be suspended once the shift is completed.

The scaffolding is approximately 1.1m wider than the bridge with an additional deck >2.0m raised on exterior of the main truss. 17mm structural plywood will be installed to the faces adjacent traffic and pedestrians. Figure 3-5 shows an indicative image of the proposed scaffolding.

The scaffold system will be installed from road level down to below the underside of the bridge. All scaffolding will be installed manually by scaffolders, who will be harnessed to the structure to prevent fall from height. All work tools and equipment will be physically connected to scaffolders via tool lanyards/bungee while working over water to erect scaffold. As the structure is being built down, rope access technicians will be required to build down to the underside of the bridge.

The scaffold system will be suspended from the bridge to mitigate any risk of interference from potential flash flooding and water rising in the creek. There will be 2 scaffold access points, i.e. access from the roadside and another access point at the base of the scaffold. The access hatch will be closed at the end of each shift and access ladder removed at the end of each shift for safety reasons.

The scaffolding would be removed in the same way it is established, being lifted from the road or carried out by hand where possible.

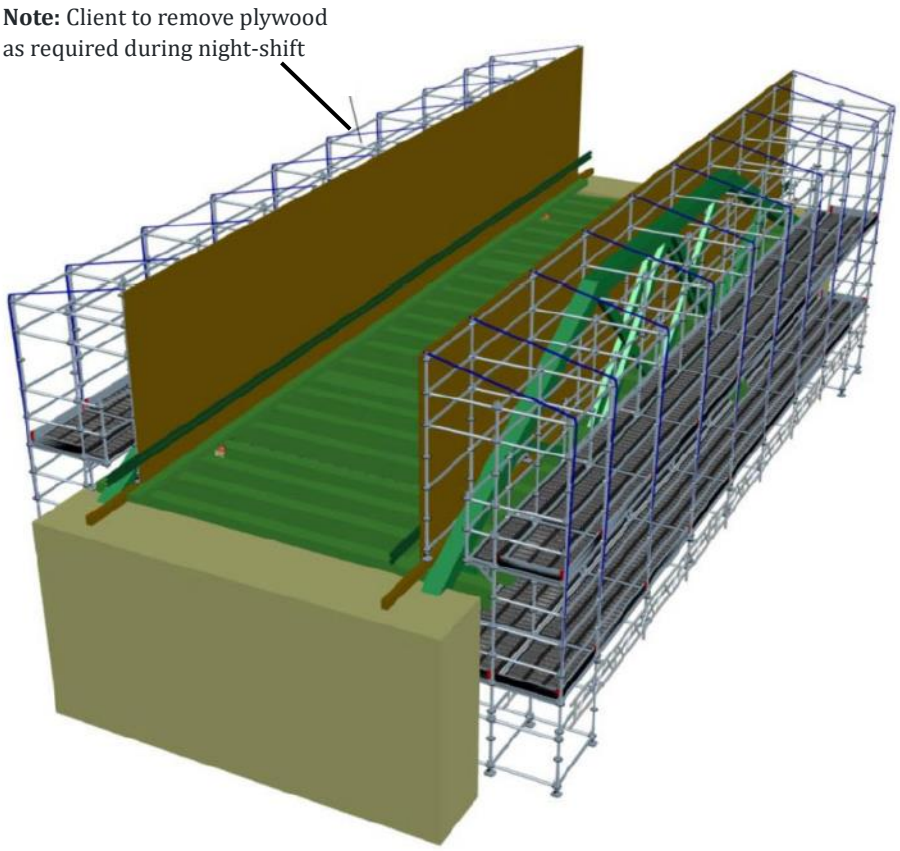


Figure 3 11 Indicative image of proposed scaffolding (Source: Contractor Works Methodology (August 2024))

3.3.2 Construction workforce

The construction workforce is expected to fluctuate depending on the activity of construction, however, in general there is expected to be around 14 workers on the site and any one time. It is expected that there will be 8 work labour personnel for carrying out the Stage 3 works and in addition 6 work personnel overseeing traffic management needs.

3.3.3 Construction hours and duration

Where works do not require the closing of Galston Road, they would be undertaken during standard construction hours as defined in Table 3-1.

The vast majority of works would require the closing of Galston Road following the Road Occupancy Licence process. As Galston Road is a major throughfare for traffic connecting communities northwest of Hornsby and the Pacific Motorway to the Dural area, it is anticipated that majority of work would be undertaken in Out of Hours Work (OOHW) periods 1 and 2 as defined in Table 3-1. This would be necessary to minimise traffic impacts to the local community.

Table 3-1 Construction hours

Period of works	Monday to Friday	Saturday	Sunday and Public Holidays
Standard hours	7am – 6pm	8am – 1pm	No work
OOHW Period 1	6pm – 10pm	7am – 8am	8am – 6pm
		1pm - 10pm	
OOHW Period 2	10pm – 7am	10pm – 8am	6pm – 7am

The proposed works for Stage 3 would be undertaken in two phases. During phase 1 of the Project, Galston Road would be closed for approximately 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2

works would require a three-week 24/7 road closure during quarter 3 of 2025. These road closures would be subject to ROLs approved by the TMC.

3.3.4 Plant and equipment

Owing to the complexity of the site equipment to be used would be determined during construction planning. However, it is likely the following would be utilised to complete the Project.

- Scaffolding
- Site Utility truck (10-15 tonne)
- Light truck/Lighting Plant
- Hand tools
- Temporary lighting for use during night works
- 6Kva Generator
- Compressor
- 20 tonne Franna crane
- Larger mobile crane (between 50 and 200 t)
- Site Office and amenities
- 20 ft Container
- Telehandler
- High pressure washer
- Water pump
- Ute-mounted geotechnical drill.

3.3.5 Earthworks

As the Project concerns rehabilitation of an existing bridge, it is not anticipated that earthworks would be required to complete Stage 3 of the Project. Access to under the bridge has already been cleared where appropriate as part of Stage 2 works. No further clearing or earthworks is anticipated for Stage 3.

3.3.6 Source and quantity of materials

The source and quantity of materials forms a critical part of the project in terms of the replacement of the timbers. Replacement timber must meet durability Class 1 has been sourced from Swading Timber and Hardware.

The quantity of timber required is not a large amount, and therefore, is not expected to put a strain on overall supply, nor add to the scarcity of this type of timber alone. Overall, the estimated quantities of all materials required are small and unlikely to put a strain on the supply of these materials.

Additional sources and estimated quantities of materials are presented in Table 3-2.

Table 3-2 Estimated source and quantity of materials

Material	Estimated Quantity	Source
Timber Girders F22 Sawn Class 1	7 No.	Swadlings Timber & Hardware
Deck Planks Hardwood Sawn F17	84 No.	Swadlings Timber & Hardware
Timber Sheeting Blackbutt F27	16 No.	Swadlings Timber & Hardware
Taubmans Advanced Adhesion Primer and Mould blocker	60 L	Dulux Trade Centre, Gladesville
Acratex Acrashield Advance	100 L	Dulux Trade Centre, Gladesville
Dulux Weathershield Gloss	70 L	Dulux Trade Centre, Gladesville

Capwale Temporary Steel Framing	22 LM	Precision Metal Group, Wetherill

3.3.7 Traffic management and access

For all bridge works Galston Road would need to be closed, with Traffic Controllers at both ends of the corridors to allow working vehicles in and out of the site.

The proposed works for Stage 3 would be undertaken in two phases. During phase 1 of the Project, Galston Road would be closed for approximately 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require a three-week 24/7 road closure during quarter 3 of 2025.

Road closures would be subject to ROLs approved by the TMC. The anticipated detour required during construction works is shown in Section 0.

Traffic Management would be in accordance with TfNSW specification G10. A Traffic Management Plan and Traffic Guidance Scheme would be prepared by the contractor and would be subject to approval prior to implementing on site.

Communication between work crews and traffic control would be maintained through two-way radios. When approaching site, work crews are to inform traffic control of their intentions as advanced warning and once reaching the established work site, traffic control are to guide the work crew vehicles into the work site. Public traffic is to be managed by the traffic management in place in accordance with the approved Traffic Guidance Scheme and Road Occupancy License.

3.4 Ancillary facilities

A laydown area approximately 73m^2 in size is proposed to be located around 200 metres north of BN390 outside the boundary of Berowra National Park as indicated in Figure 3- and Figure 3-. This site would be used for the duration of the Project when works on the Bridge are occurring and would be accessed via Galston Road. The ancillary facility would be used during work shifts, largely during the evening and night-time period.

The site would support parking for one to two vehicles and would be where worker facilities such as amenities and storage are located. There would be no stockpiling of material at the ancillary facility.

The following would be located in the ancillary facility area:

- Site Office/Lunchroom.
- Portaloo.
- Material laydown area.

No residential sensitive receivers are located nearby the site. Access to the Great North Walk would not be impacted by the establishment of a small ancillary facility in this location. This site has also been used regularly in the past during prior maintenance activities on this bridge.

Figure 3-12 Location of the proposed ancillary facility from road

Figure 3-13 Location of proposed ancillary facility

3.5 Public utility adjustment

No public utility adjustment would be required for the Project.

3.6 Property acquisition

No property acquisition would be required for the Project.

4. Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP (Transport and Infrastructure)) aims to facilitate the effective delivery of infrastructure across the State.

Section 2.109 of SEPP (Transport and Infrastructure) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for a road and is to be carried out *on behalf of Transport*, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW). Development consent from council is not required.

The proposal is located immediately adjacent to land reserved under the *National Parks and Wildlife Act 1974*, as such NPWS would be required to be consulted prior to approval.

The Proposal does not require development consent or approval under:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Precincts – Central River City)
- State Environmental Planning Policy (Precincts – Eastern Harbour City)
- State Environmental Planning Policy (Precincts – Regional) 2021
- State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

Section 2.10 to 2.15 of SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by SEPP (Transport and Infrastructure) (where applicable), is discussed in chapter 5 of this REF.

State Environmental Planning Policy (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) commenced on the 1st of March 2022 and replaces the following former SEPPs:

- State Environmental Planning Policy (Coastal Management) 2018
- State Environmental Planning Policy 33 – Hazardous and Offensive Development
- State Environmental Planning Policy 55 – Remediation of Land.

The proposal is not situated within the 'Coastal Use Area' and 'Coastal Environment Area' and therefore the relevant controls are not triggered.

The proposal does not constitute a 'Hazardous or Offensive Development', nor is it identified to be situated on contaminated land that may trigger any remediation requirements.

State Environmental Planning Policy (Drinking Water Catchment) 2021

Chapter 8 (Sydney Drinking Water Catchment) of SEPP (Biodiversity and Conservation) 2021 (SEPP (Biodiversity and Conservation) relates to the use of land within the Sydney drinking water catchment. The Proposal is not located in proximity to a drinking water catchment therefore consideration under Section 8.11 of the SEPP is not required.

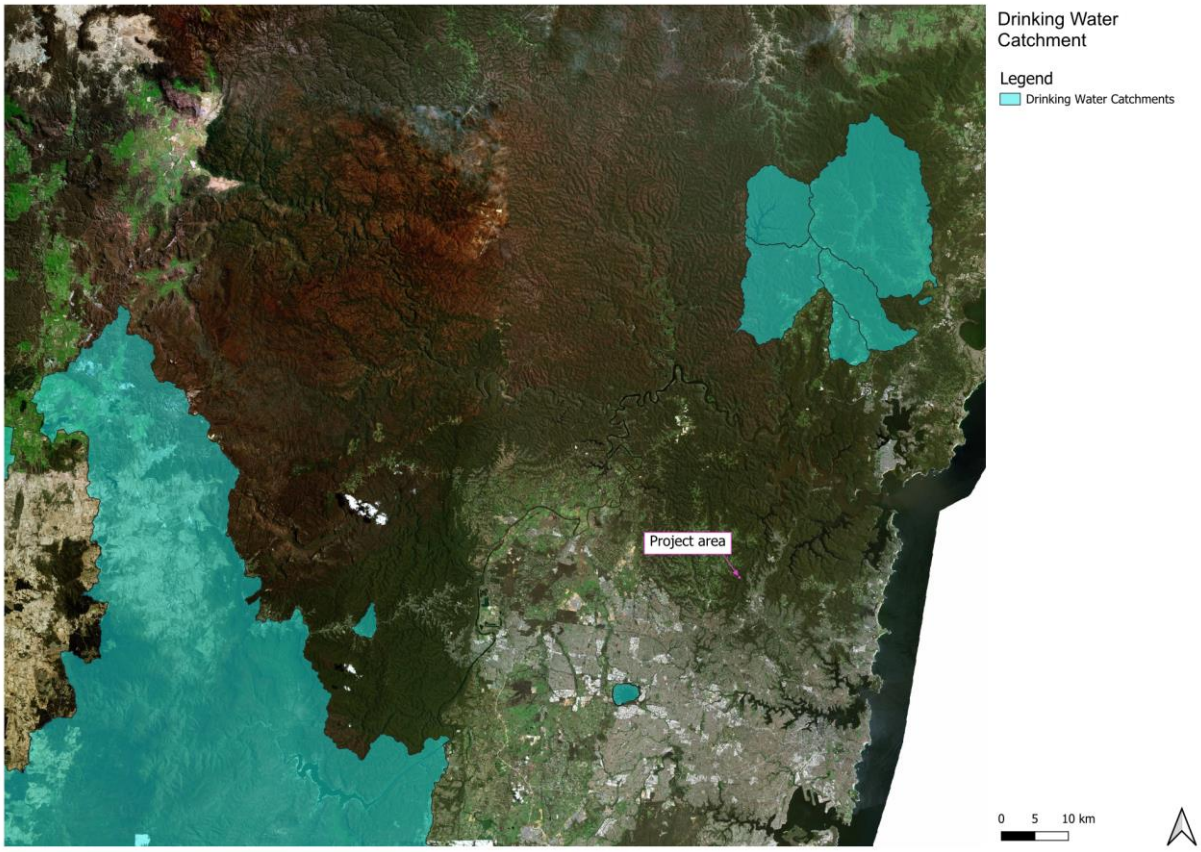


Figure 4-1 Drinking water catchment and location of Project in relation to the catchment areas.

4.1.2 Local Environmental Plans

Hornsby Local Environmental Plan 2013

The Project area falls within the bounds of the Hornsby Local Government area (LGA). Within this area development is generally controlled by the Hornsby Local Environmental Plan 2013 (LEP). The Bridge is located on land zoned SP2- Infrastructure. The area either side of the bridge is zoned C1- National Parks and Nature Reserves and RE1- Public Recreation.

The provisions of the SEPP (Transport and Infrastructure) prevail development consent requirements of the relevant LEP and therefore development consent from Council is not required.

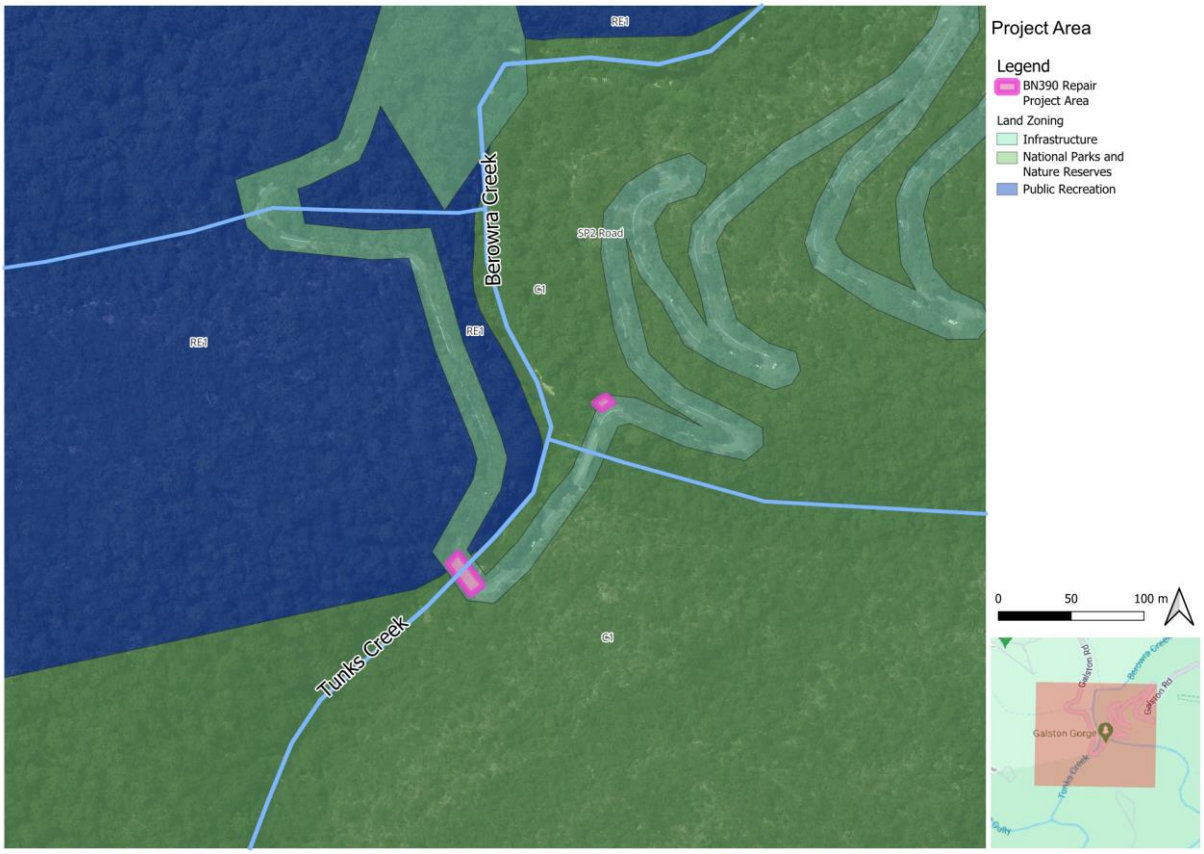


Figure 4-2 Land zoning

4.2 Other relevant NSW legislation

4.2.1 Roads Act 1993

The *Roads Act* 1993 (The Roads Act) provides guidance on the use and access of public roads, including procedures regarding the opening and closure of public roads. The Act also classifies roads and identifies the functions of road authorities.

The Roads Act states that a road authority may carry out road work on any public road for which it is the road authority and on any other land under its control (Division 1, Clause 71). If the road is not under the control of the authority undertaking the works, then consent is required.

The proposal is located on roads that are managed by Transport. An ROL would be required from the Traffic Management Centre by the Contractor for road works and any temporary road closures during construction of the proposal.

4.2.2 Heritage Act 1977

The NSW Heritage Act 1977 (Heritage Act) is the primary legislation affording protection to heritage items in NSW. Under the Heritage Act, 'items of environmental heritage' include places, buildings, works, relics, moveable objects, and precincts identified as significant. Significance is based on historical, scientific, cultural, social, archaeological, architectural, natural, or aesthetic values. State significant items can be listed on the NSW SHR and are given automatic protection under the Heritage Act against any activities that may damage an item or affect its heritage significance. The Heritage Act also protects 'relics', which can include archaeological material, features, and deposits.

As the bridge subject to the proposed remediation is state heritage listed a Statement of Heritage Impact (SOHI) has been prepared to inform the Section 60 approval for the proposed works. Both the SOHI and Section 60 approval are attached to this REF as Appendix D.

4.2.3 Protection of the Environment Operations Act 1997 (POEO Act)

The Protection of the Environment Operations Act 1997 (POEO Act) provides an integrated system of licensing for polluting activities with the objective of protecting the environment. The POEO Act enforces environment protection licenses (EPLs) for specific activities relating to air, noise, and water pollution prevention and waste management. The proposed works would not contravene s. 120 of the POEO Act and are not defined as scheduled activities, and therefore would not require an EPL per this act, however, retain a duty to notify authorities under this Act.

4.2.4 National Park and Wildlife Act 1974

The National Park and Wildlife Act 1974 regulates the control and management of all national parks, historic sites, nature reserves, and Aboriginal areas (among others). The activity is located adjacent to Berowra Valley national park and is not located near any known historic sites or places of Aboriginal cultural significance.

Consultation with the National Parks and Wildlife Services (NPWS) has formed part of the preparation of this REF.

4.2.5 Biodiversity Conservation Act 2016

The B*iodiversity Conservation Act 2016* (BC Act) seeks to conserve biological diversity, promote ESD, prevent extinction and promote the recovery of threatened species, populations and ecological communities and to protect areas of outstanding biodiversity value.

Section 7.3 of the BC Act and Part 7A of the FM Act require that the significance of the impact on threatened species, and endangered ecological communities is assessed using a five-part test. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM). Further detail on the biodiversity assessment conducted for this proposal and the ecological assessment is provided in Section 6.1. A biodiversity assessment has been prepared for this proposal and is attached as Appendix C.

4.2.6 Rural Fires Act 1997 (RF Act)

The *Rural Fires Act 1997* (RF Act) aims to protect life and property through the following objectives:

- To prevent, mitigate and suppress bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts
- The co-ordination of bush fire fighting and bush fire prevention throughout the State
- To protect persons from injury or death, and property from damage, arising from fires
- To protect infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires
- To protect the environment by requiring certain activities to be carried out having regard to the principles of ecologically sustainable development.

Under this Act, NPWS is the prescribed fire authority and is responsible for the control and suppression of all fires on lands that is under NPWS management. To assist in bush and other fire management, the fire management strategy provides the information for managing outbreaks of fire, operational guidelines for hazard reduction work and information to help assess bushfire threats. The relevant fire management strategy for this proposal is the Berowra Valley National and Regional Parks and Dural Nature Reserve Fire Management Strategy.

Part 4 of this Act deals with the prevention of and minimisation of the spread of bushfires throughout the state. This proposal is consistent with the RF Act and the fire management strategy as is it meets the objectives of the minimising and preventing bush and other fires from this proposal. The proposal is also aiming to increase safety and operational longevity of Galston Rd throughout the National Park, which would assist with future fire-fighting efforts.

4.2.7 Fisheries Management Act 1994

Fisheries Management (FM) Act provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. It applies to all inland waters in the NSW, except for those waters classified as Commonwealth waters.

Key Fish Habitat is mapped within Tunks Creek as shown in Figure 4-3.

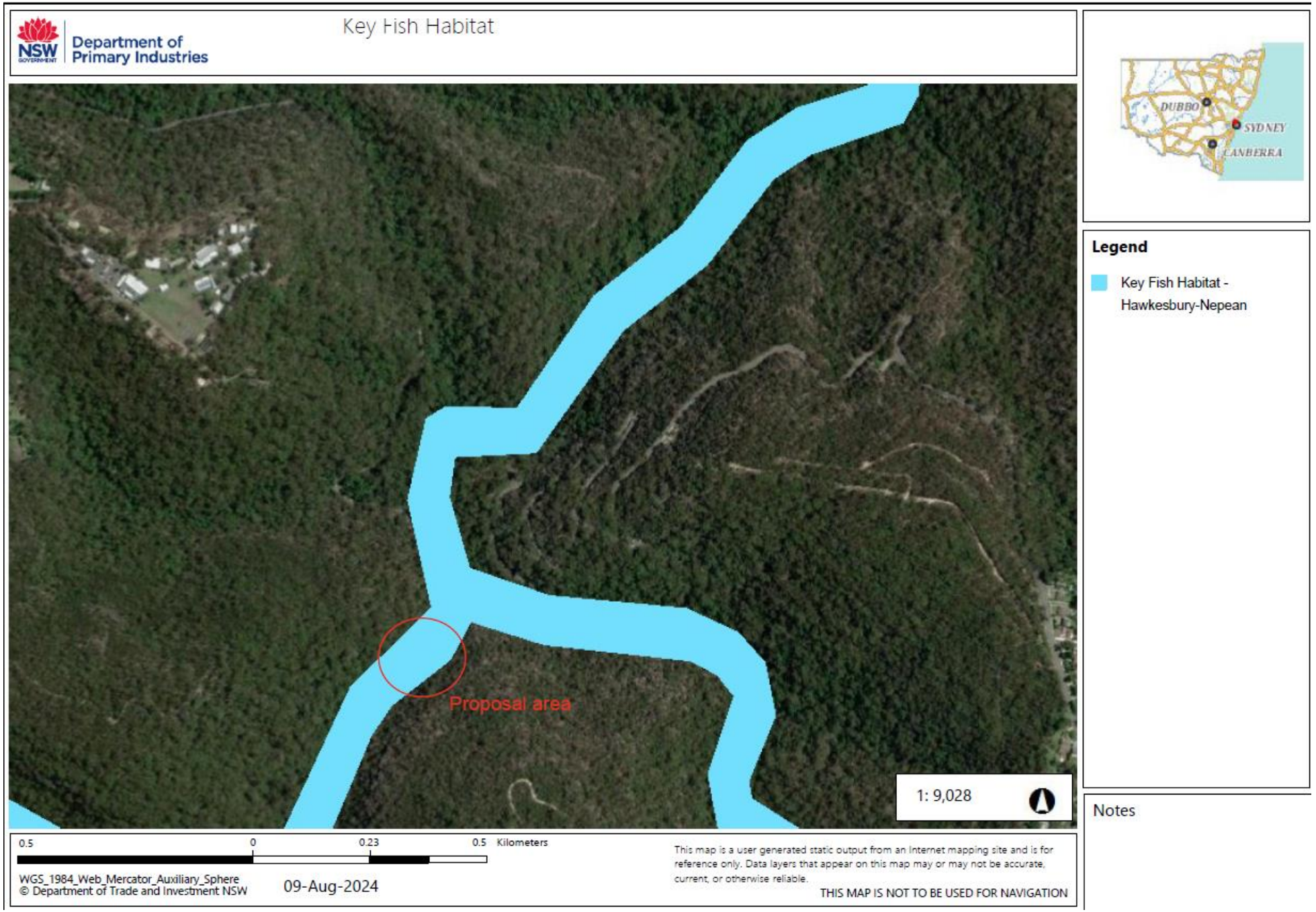


Figure 4-3 Key Fish Habitat Mapping (Source: DPI Fisheries)

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix D and chapter 6 of the REF.

A referral is not required for proposed road activities that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of chapter 6 of the REF and Appendix D.

Findings - matters of national environmental significance

The assessment of the proposal's impact, on matters of national environmental significance and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water under the EPBC Act.

Findings - nationally-listed biodiversity matters (where the strategic assessment applies)

The assessment of the proposal's impact on nationally listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Chapter 6 of the REF describes the safeguards and management measures to be applied.

4.3.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affective native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act, a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was undertaken, with no Native Title holders/claimants identified.

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under section 2.109 of SEPP (Transport and Infrastructure) the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Transport for NSW is the determining authority for the proposal. This REF fulfils Transport's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

5. Consultation

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

Due to the requirement to close Galston Road numerous times throughout the delivery of this Project, active and ongoing consultation with the both the Hornsby and Galston community; and the broader community will be critical in minimising this impact on nearby residents and commuters.

During Phase 1 of the Project Galston Road would be closed for around 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require road closures for around 19 shifts from 8pm to 5am weather permitting, during quarter 3 of 2025.

Consultation and notification regarding road closures will be carried out generally in accordance with the following prior to each closure:

- A forward works notification would be sent to the residents of Galston and Hornsby Heights asking for feedback on the proposed road closures and whether access is required by any residents for emergency purposes or similar.
- Targeted social media posts, newspaper advertisements and radio advertisements would be pushed to potentially effected residents and commuters between 14 and 21 days prior to the closure.
- Variable Message Signs (VMS) will be located at various locations along Galston Road and in Hornsby Heights and Galson to remind road users that the road will be closed.

Based on the surrounding land use and distance to sensitive receivers, a Start of Works (SOW) letter would be distributed between 5- and 14-days priors to the commencement of works. The notification would include:

- When the works would occur.
- What works would be involved.
- How many shifts would be involved.

The letter would be distributed at minimum five business days prior to the commencement of works.

Additional stakeholder engagement may be provided through other communication measures, including:

- Site signage.
- Enquiries hotline.

ConnectSydney would distribute a memorandum letter to businesses located adjacent to and in the vicinity of Hornsby Heights and Galston.

Summary of consultation with NPWS to date is described under Table 5-1.

5.2 Aboriginal community involvement

No Aboriginal archaeological sites were identified within the project footprint based on the AHIMs documentation.

Given the scope of works on the Galston Timber Bridge a Stage 1 PACHCI was not required for these works. An AHIMS Basic Search was undertaken and can be found in . Refer to Appendix F AHIMS Basic Search Results. .

5.3 SEPP (Transport and Infrastructure) 2021Consultation

Appendix D contains a consultation checklist that documents how consultation requirements have been considered. The results of the checklist indicate that consultation with NPWS was required for the proposal.

Consultation with NPWS was undertaken to determine the most appropriate location of the ancillary site for the Project and to determine the level of consultation required under the TISEPP.

The consultation with NPWS is summarised Table 5-1. Information on the materials proposed to be stored at the site compound was communicated as part of this correspondence. NPWS confirmed the compound was suitable for use, no major issues were raised.

Formal consultation with NPWS was carried out in accordance with Section 2.15 of the TISEPP in the form of a letter dated 20/09/2024.

Table 5-1 Summary of consultation with NPWS

Date	Communication and/or engagement activity	Description
19 /02/2023	Email from ConnectSydney to NPWS	Introductory email to introduce the ConnectSydney team and the required works. NPWS and wildlife service requested that a formal TISEPP consultation letter be provided to NPWS. NPWS confirmed that the proposed ancillary site was located outside of the NPWS and is within TfNSW land.
20/09/2024	TISEPP Letter to NPWS	TISEPP Letter sent to NPWS outlining the proposal.
14/10/2024	Reply from NPWS	NPWS sent through a number of queries similar to those asked for other adjacent projects: • Water flow and runoff • Waste Management and Storage • Threatened Species • Guidelines for Developments Adjoining Park • Vegetation removal • Access for machinery through NPWS • Galston Road NPWS Car Park • Cultural Heritage Sites
15/10/2024	ConnectSydney to NPWS	ConnectSydney replied to NPWS and closed out a number of queries.
18/10/2024	NPWS to ConnectSydney	NPWS stated that the following mitigation should be put in place on the Project- "Contact Birdlife Australia 14 days prior to commencing works to access current monitoring data and determine mitigation measures for project."

5.4 Ongoing or future consultation

ConnectSydney would continue to consult and inform the community throughout the proposal on an as needed basis and provide contact details to the community in the event of enquiries or complaints.

A start of works notification will be sent to the stakeholder list provided by the NPWS and the Galston and Hornsby Heights communities to inform them of any upcoming road closures.

6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment, potentially impacted upon by the proposal, are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act.
- The factors specified in the Guideline for Division 5.1 assessments (DPE 2022) and as required under section 171 of the Environmental Planning and Assessment Regulation 2021 and the Roads and Related Facilities EIS Guideline (DUAP 1996). The factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021 are also considered in Appendix A.
- Site-specific safeguards and management measures are provided to mitigate the identified potential impacts.

6.1 Non-Aboriginal Heritage

6.1.1 Methodology

A statement of Heritage Impacts (SOHI) has been prepared for the Project in accordance with the following guidance documents:

- *Assessing Heritage Significance*, Department of Planning and Environment, 2023
- Guidelines for preparing a Statement of Heritage Impact, Department of Planning and Environment, 2023
- Design in Context: Guidelines for Infill Development in the Historic Environment, NSW Heritage Office and Royal Australian Institute of Architects, 2005
- The Burra Charter, Australia ICOMOS (The International Council on Monuments and Sites), 2013.

Heritage items within and adjacent to the study area were searched on the following relevant state and federal statutory heritage registers as part of the SOHI:

- World Heritage List (WHL)
- Commonwealth Heritage List (CHL)
- National Heritage List (NHL)
- State Heritage Register
- Hornsby LEP 2013
- Section 170 Heritage and Conservation Registers.

Non-Statutory registers were also searched, including:

- Register of the National Estate (RNE)
- Australian Institute of Architects Register of Significant Architecture
- Engineering Heritage Australia Register
- The National Trust (NSW).

A search of all relevant registers was undertaken in June 2022. This search found six items listed on statutory heritage registers within the study area or in the vicinity of Galston Timber Bridge.

The results of the statutory heritage register search are provided in Table 6-1and in Figure 6-1.

Table 6 1 Statutory Heritage Register results for the Galston Timber Bridge

Item	Address	Significance	Listing	Place ID (Listing/Item No.)	Distance from Study area
Galston Timber Bridge					
Bridge over Tunks (Pearces) Creek	Main Road 161, Galston NSW 2159	State	SHR	01478	Within study area
Pearces Creek Bridge, Galston Gorge	Galston Road (MR 161), Hornsby NSW 2077	State	Roads and Maritime (now Transport for NSW) S170 Register	4300009	Within study area
Galston Gorge timber bridge	Galston Road, Galston NSW 2159	State	Hornsby LEP 2013	A46	Within study area
Items within the vicinity					
Galston Gorge culvert	Galston Road (under road curve at Lookout), Galston NSW 2159	Local	Hornsby LEP 2013	A44	280m (north)
Galston Gorge sandstone buttressing	Galston Road, Galston NSW 2159	Local	Hornsby LEP 2013	A43	95m (north-east)
Galston Gorge water troughs	Galston Road (S side), Galston NSW 2159	Local	Hornsby LEP 2013	A45	250m (north-east)

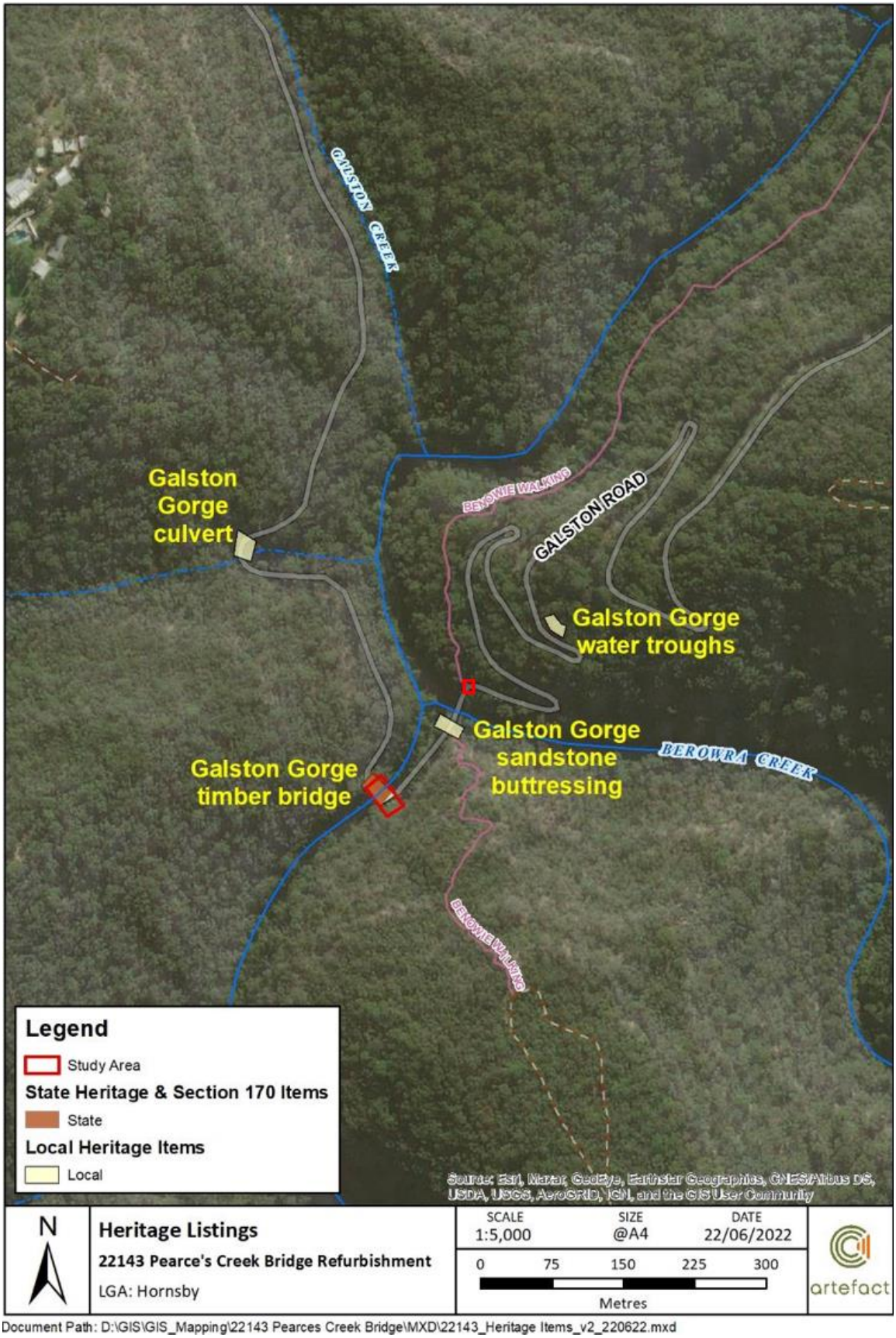


Figure 6-1 Heritage items in the vicinity of the Proposal

6.1.1 Existing environment

Site and context

Galston Timber Bridge is located on Main Road 161, Galston Road in Hornsby, about 40km north of Sydney. The bridge serves as a road crossing for Galston Road across Tunks Creek (originally known as Pearces Creek), which intersects nearby with Berowra Creek. The creeks form tributaries of the Hawkesbury River. The surrounding landscape consists of mature bushland and steep escarpments, providing a distinctive and isolated setting for the bridge.

The proposed ancillary facility required to support construction is located around 200m north of the Bridge and is not directly adjacent to any identified heritage items.

History

Engineer John McDonald (see Figure 3-1) joined the Public Works Department in 1879, and although he specialised in metal bridges, he updated the standard timber truss design for heavier design loads. Large, long, quality hardwoods were still plentiful during the latter part of the 19th century, and permanent stone or iron bridges were not considered economical. McDonald's design changes were informed by the growing knowledge of timber as a structural material, with extensive testing at the University of Sydney in 1886. It was McDonald's truss design which would form an intrinsic link for commuters between the suburbs of Hornsby and Galston.

Work on the Galston Timber Bridge and the former Berowra Creek Bridge on Galston Road commenced in February of 1893. Work on the bridges was finished by early 1894. Galston Road itself was not finished until 1895 and was officially opened in March of that year by Mr. J. H. Young, the then Minister for Works. The opening of the road was expected to shorten the distance to market for the fruit growers of the Galston area who, as a result of this new route, were now within six miles (9.5 km) of Hornsby railway station.

Galston Timber Bridge is a single span, timber truss bridge approximately 20m long and 6.4m wide and the former bridge over Berowra Creek was also a single span, timber truss bridge which was over 27m long. A concrete bridge replaced the longer bridge over Berowra Creek in the 1930s after it was washed away during a flood. This left Galston Timber Bridge one of the last remaining examples of the shortest of the standard McDonald Truss designs. Records that it is one of four remaining in NSW as of 2018.

Figure 6-2 Two McDonald Truss bridges at Galston Gorge provided examples of the longest and shortest of the standard McDonald Truss designs, the former Berowra Creek Bridge at 27.4 metres (bottom) and the remaining Galston Timber Bridge (Tunks Creek Bridge) at 19.8m.

Item description

Galston Timber Bridge is a single span, timber truss bridge approximately 20m long and 6.4m wide. The truss consists of 6 bays, with the bottom chord divided up into 6.2m lengths at each end and 3.2m within the two middle bays. The diagonal timber decking is supported on 27 cross girders of two widths, the larger being used where vertical rods pass through the section. Lateral bracing is provided at the centre of the bridge, connecting the top chord with an extended cross girder. It is presumed that cast iron steel shoes and mild steel tie rods have been adopted.

The bridge accommodates a single lane of vehicular traffic; there is no designated access for pedestrians. There is a restriction on the maximum vehicle length of 7.5m for Galston Road and across the bridge. A detailed description of the Galston Timber Bridge is found in the CMP 2002.

The State Heritage Inventory (SHI) database entry for the SHR listing of the bridge provides the following summary description:

> *The bridge consists of one 65' (19.96m) truss span supported at each end on timber abutments which also retain the road earthworks. The bridge width is 4.57m (15ft) between kerbs and at both ends the approach road turns sharply at right angles… Original condition assessment: 'Currently good condition following major repairs between November 2001 and February 2002' (Last updated: 15/07/2002.) 2007-08 condition update:*

'Good.' (Last updated: 17/4/09.) ...1958 - Centre pile replaced; 1961-63 - Some cross girders and truss members replaced. Two timber piles and short timber headstock erected against Hornsby side abutment.; 1978 - replacement of some girders, decking and steel plating; c1980 - some struts and deck planks replaced.

Galston Timber Bridge has undergone numerous maintenance and repair activities since its construction. The earliest maintenance records for Galston Timber Bridge held by TfNSW date from 1957. Maintenance works have generally involved routine replacement of rotting timber, repainting, etc., although at various times there have been suggestions that the bridge be replaced or moved. The Berowra Creek Bridge, built at the same time as the Galston Timber Bridge, was replaced by a concrete bridge in 1937.

The summary below provides an overview of the maintenance of the Galston Timber Bridge, extracted from the draft CMP 2002.

Table 6-2 Summary of maintenance of Galston Timber Bridge

Date	Description
1958	Hornsby side abutment strengthened by installing a new pile to replace the centre pile. Temporary strengthening of faulty cross girders. If bridge is not replaced within a year or two, extensive repairs may be required. Arrangements made for the investigation of a site for a new bridge.
1960	Alternative road alignments using a new bridge proposed and discussed. Recommended that the design for a new bridge be proceeded with 'with view to its construction being provided for in the 1962/63 programme.'
1961-1963	Replacement of a number of cross girders, some truss members. Two timber piles and short timber headstock erected against the Hornsby side abutment.
1970	Abutments in poor condition, suggested by Hornsby Shire Council that new abutments be built downstream and the existing truss transferred to them – proposal rejected by DMR.
1971-72	Urgent repairs to abutments (new to be built in front of old). Some delay experienced as headstock timber was not readily available.
1978	Replacement of a number of girders, part of the upstream truss bottom chord, some decking and steel plating both sides of the bottom chords of the trusses. Bailey truss temporary support system hired for use during repairs.
1980	Also some painting and replacement of sheeting planks required.
1987	Two struts on upstream truss and 2 deck planks to be replaced
2001-02	Major repairs carried out
2007	Replacement of 8 timber piles at abutments

Assessment of Significance

Galston Timber Bridge is a recognised item of both State and local heritage significance. The following Statement of Significance is extracted from the SHI database for the SHR listing of the bridge:

This bridge is a McDonald timber truss road bridge. Timber truss road bridges were extensively used in New South Wales because of the high quality of local hardwoods and the shortage of steel during the early decades of settlement of the state. The timber truss was highly developed for bridges in New South Wales, perhaps more so than anywhere else in the world at that time. The McDonald truss is a significant evolutionary link in the development of timber road bridges in New South Wales and has three standard span lengths, 65'/19.96m, 75'/22.86m and 90'27.43m. At (sic) *March 1998 there were seven McDonald truss road bridges remaining in New South Wales, Pearces Creek Bridge is a rare example of a 65' 19.96m truss span. It has been assessed as having State significance*

The following provides an overview of the gradings of significance of each of the individual components of the Pearce's Creek Bridge. These gradings have been adapted from the *Pearce's Creek Bridge, Galston Gorge: Conservation Management Plan* prepared for the item in 2002 and have been updated where required.

Table 6-3 Significance gradings of bridge components

Element	Details	Grading
Truss span	The truss type employed in this bridge is the McDonald Design. The bottom chord of each half-truss is vertically laminated, consisting of four pieces of timber placed side by side, sandwiched between two 18mm steel plates. The timber laminate is true to the original design, however, outer steel plates were installed in 1962 to strengthen the bottom chords. When further work was carried out in June 1978, the steel plate stiffeners on the bottom chords were also replaced. The frequency of horizontal bolting across the laminated pieces is as in the original. The truss members are in good condition.	**High**
Cross girders	The cross girders on the bridge are located at and between the panel points. Those placed at the panel points are approximately 270 x 300 millimetres in section and are drilled to allow the steel hangers to pass through for connection to the bottom chord. The three intermediate cross girders between each panel point are approximately 170 x 300 millimetres in section. These intermediate girders are sometimes referred to as stringers in bridge files and reports. All cross beams are supported directly on the bottom chord, however, the cross beams at the panel points directly support the diagonal members of the truss which bear on each side of the cross beam as described above. This is an important point because it makes it difficult to replace these cross beams as the diagonal members must be de-stressed in order to remove the cross beams. The timber cross girders are in good condition.	**High**
Decking	The bridge is decked with timber planking laid diagonally across the cross girders in accordance with the original configuration. The existing transverse decking is approximately 125 millimetres deep, which is likely to be of a similar depth to that of the original timbers. The entire surface of the deck has been flush sealed to provide a better travelling surface and to improve its waterproofing qualities by reducing the effects of rapid moisture changes. Timber kerbing of 250 millimetres square is situated along the edges of the deck that represents a change from the original 150 x 150-millimetre kerbs (6 x 6 inches). The kerbing forms part of the railing system that is discussed in the following section. The timber used in both longitudinal and transverse bridge decking was typically blackbutt, ironbark, grey box brush box or tallowwood. However, the decking represents one of the primary maintenance features and it is likely that it has been replaced numerous times since the bridge was constructed. In this regard, due to the diminishing availability of the higher quality timbers the existing decking is probably not comprised of timber from one of the previously mentioned high durability species. Although longitudinal sheeting is almost a universal feature on timber bridges today, the bridge does not have longitudinal timber sheeting placed over the transverse sheeting. Bridges of this era were usually designed with transverse decking only.	**High**

Element	Details	Grading
Abutments	The design of the abutments is common to that of almost every timber road bridge throughout the state. The two bridge abutments, South Abutment (A) on the Hornsby side and North Abutment (B) on the Galston side, comprise vertical timber piles socketed into off-form concrete sill beams founded on rock at or close to the surface. The piles are sheeted on the rear with horizontal timbers. Above the piles on each abutment is a timber headstock. The function of the abutments is to retain the fill material of the approach embankments in addition to supporting the truss span. Documentary material indicates that both abutments were rebuilt in the early 1970s. The new abutments were built immediately in front of the existing abutments, following the original configuration apart from the use of the concrete sill beams. The bridge plans show that the piles of the original abutments were socketed into rock a short distance below the creek bed. The original abutments remain behind the new. The original abutments were of standard design that was used in the majority of timber road bridges (both truss and beam designs) constructed in NSW. The replacement abutments are not overly visually intrusive, are clearly recognisable as new fabric and do not detract from the overall significance of the bridge.	**Moderate**

This archaeological assessment has identified that the study area has low potential to contain intact historical archaeological remains associated with the original log crossing to reach the local significance threshold.

6.1.2 Potential impacts

Construction

The SOHI identified that the proposed works would have a **Minor Adverse** physical impact on the 'Bridge over Tunks (Pearces) Creek' heritage item (SHR Listing No. 01478).

The proposal would involve staged and targeted removal and like for like replacement of deteriorating timber and steel bridge fabric. Similarly, the painting would be undertaken in a like for like manner. A minor adverse impact would result from the action affecting only a small part of the place or a distant/small part of the setting of a heritage place.

Proposed works within Stage 3 of the proposal would include refurbishment of abutments and associated timber sheeting, refurbishment of the superstructure, replacement of three primary cross girders, assessment and installation of new corbel and timber ties, and replacement of timber deck planks. These would be a like for liked replacement and so the heritage impacts would be minimal.

The steel elements used as temporary structural support for the bridge will be removed at the end of the project and only like for like bridge structures which are important to the significance of the bridge will remain.

Timber typically has a limited lifespan of 20-30 years, and therefore it is likely that the timber elements have been replaced multiple times on the bridge. All timber elements would be replaced in a like-for-like fashion to keep the heritage character intact.

The proposed new works are limited in scope, and otherwise mainly affect the northern abutment (North Abutment (B)) that constitutes a small part of the overall bridge. Within this context, it is considered the proposed works are minor in nature. It is noted the bridge has significance as one of four remaining McDonald Truss bridges still operating as a road connection within NSW. The proposed new works would enhance the significant use by safeguarding the bridge's longevity as an active road asset. Overall the proposed replacement of timber elements and repair of steel elements would have minimal impacts as all works would repair the bridge in a like-for-like manner.

If these impacts are mitigated appropriately, the proposed works could potentially result in a **Positive** impact to the State heritage values of the bridge. A Section 60 approval has been granted for the proposed works and all requirements of this approval are included as safeguards in Section 6.13.

Indirect impacts-

The proposal would involve construction works on and adjacent to the heritage item. Construction activities around or on the bridge include movement of plant on, beneath and around the bridge vicinity, the installation of a temporary support system for the bridge during removal and replacement activities. These activities are not likely to use vibration generating equipment.

Although it is unlikely that vibration from construction plant and equipment would lead to impacts to BN390, best practice mitigation measures such as vibration monitoring are recommended as part of the SoHI and would be implemented on site if any vibration intensive equipment is to be used on the Bridge. .

Visual heritage impacts-

The proposed works would have a **Minor Adverse** visual impact on the 'Bridge over Tunks (Pearces) Creek' (SHR Listing No. 01478).

The proposal would involve some temporary adverse visual impacts to the bridge during construction, owing to the presence of construction plant, equipment, and scaffolding. Remediation works would not result in any drastic changes to the visual character of the bridge. The overall unique McDonald Truss design would remain legible and intact.

Some timber elements would be painted as part of the proposal, including repainting of all timber elements to the truss structure, and as such it would not be easily distinguishable by a casual observer which elements constitute new works. It is noted that timber fades with time and weathering, so non-painted elements would eventually blend in with the surrounding non-painted timber.

Archaeological impacts-

The proposal would involve staged and targeted removal and replacement of deteriorating bridge fabric. It is not anticipated that an intact archaeological resource survives in those locations currently containing bridge elements i.e. the bridge approaches, piles and abutments. The proposed works are therefore unlikely to result in impacts to significant archaeological resources.

Ancillary Facility impacts-

The proposed ancillary facility is not located adjacent to any known heritage items. The establishment of the proposed site does not involve any soil disturbance as such there is limited potential for uncovering archaeological items. No heritage impacts are expected to result from the establishment and operation of this facility.

Cumulative impacts-

The cumulative impact within this context would therefore be considered **Minor Adverse** in this instance, given there is likely to be minimal (if any) original elements impacted as part of this proposal. Maintenance exercises such as this proposal occur frequently for the durability, operability, and safety of the historic timber truss bridge and its road users. Overall, the cumulative impact is considered Minor to the State heritage values of 'Bridge over Tunks (Pearces) Creek' (SHR Listing No. 01478), as the design intent and uniqueness would remain clearly intact and the bridge would be retained as a functioning and significant road connection between the suburbs of Galston and Hornsby.

Operation

No operational impacts are expected as a result of this Proposal.

6.1.3 Safeguards and management measures

Table 6-4 Non-Aboriginal heritage safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal Heritage	All work is to be undertaken in accordance with the requirements of the SOHI and Section 60 Approval	Contractor ConnectSydney	Pre-Construction Construction	SOHI Section 60 Approval
Non-Aboriginal Heritage	A Construction Heritage Management Plan (CHMP) containing heritage input and advice from a heritage specialist is required for the contractor to implement on site.	ConnectSydney	Pre-Construction	SOHI

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal Heritage	A Photographic Archival Recording (PAR) should be undertaken of all areas proposed for maintenance and repair activities in accordance with Policy 11 of the NSW Timber Truss Road Bridges Overarching CMP 2018. The PAR should be undertaken prior to, during and following completion of works. This PAR should be undertaken in accordance with the Heritage Council of NSW guidelines Photographic Recording of Heritage Items using Film or Digital capture (Revised 2006). A digital copy of the PAR would be provided to Heritage NSW, Hornsby Shire Council and TfNSW	ConnectSydney TfNSW	Pre-Construction	SOHI
Non-Aboriginal Heritage	Any replacement of materials on the bridge would be like-for-like materials.	Contractor	Pre-Construction	SOHI
Non-Aboriginal Heritage	If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the Transport for NSW Standard Management Procedure: Unexpected Heritage Items must be followed. Transport for NSW Regional Environmental Manager must be contacted immediately.	Contractor	Construction	SOHI
Non-Aboriginal Heritage	All works are to be conducted in line with the conservation policies outlined in the NSW Timber Truss Road Bridges Overarching Conservation Management Plan (RMS, 2018).	Contractor	Construction	SOHI
Non-Aboriginal Heritage	Where vibration intensive equipment is proposed to be used during construction, vibration monitoring of the bridge must occur in accordance with the Construction Heritage Management Plan	Contractor	Construction	SOHI
Non-Aboriginal Heritage	All contractors are to participate in a heritage induction and toolbox talk prior to	Contractor	Construction	SOHI

Impact	Environmental safeguards	Responsibility	Timing	Reference
	commencing works to ensure they understand the significance of the Pearces Creek Bridge, and areas to avoid. This must be developed in consultation with a heritage specialist.			
Non-Aboriginal Heritage	The site is to be made good following completion of maintenance and repair works.	Contractor	Construction	SOHI
Non-Aboriginal Heritage		ConnectSydney	Post- Construction	SOHI
Non-Aboriginal Heritage	The SHI database entries for the Pearces Creek Bridge should be updated to record the latest repair works.	ConnectSydney	Post- Construction	SOHI

6.2 Biodiversity

A targeted inspection of the Galston Timber Bridge, Dural, NSW, has been conducted by Lesryk Environmental for the proposal. The purpose of this inspection was to determine the presence or absence of any threatened flora, fauna or ecological communities in the vicinity of the proposal works and determine any potential impacts on these.

6.2.1 Methodology

Threatened Fauna Survey

A review of the BioNet (Atlas of NSW Wildlife) (NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW] 2024; data accessed 30 January 2024) was conducted to identify those threatened species listed under the Schedules of the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), NSW Biodiversity Conservation Act 2016 (BC Act) and/or NSW Fisheries Management Act 1994 (FM Act) that have been previously recorded within 10 km of the study area.

Though not previously recorded within 10 km, reference to Transport's Microbat Management Guidelines (Transport for NSW 2023), also identifies the Southern Myotis (Myotis macropus) as a microbat species known to use Transport structures as roosting habitat. Therefore, it was considered necessary to also adopt a precautionary approach to the potential presence of this species during the investigation.

A targeted inspection of the Galston Timber Bridge, Dural, NSW, has been conducted. The inspection was undertaken on 23 January 2024 between the hours of 11:45 am and 1:00 pm. During the course of the field survey, consideration was given to the presence of the microbats.

The Galston Timber Bridge subject site was accessed and foot traverses conducted across those portions of the bridge that were accessible (i.e. its deck) and the proximate Tunks Creek embankments.

Binoculars and a hand-held torch were used to inspect cavities and suitable crevices within those under-deck portions of Galston Timber Bridge, particularly those areas that could not be physically accessed (i.e., the bridge abutments, trusses). Fissures (i.e., cavities) that were covered by spider webs were not inspected; the existence of these negating the presence of microbats (i.e. if microbats were moving in and out of these sites their actions would prevent the development of spider webs).

In addition, during the course of the site inspection, any evidence that would suggest occupation by microbats (e.g., accumulation of guano, characteristic staining) was sought.

Vegetation Mapping

A review of the State Vegetation Type Mapping (SVTM) (State Government of NSW and NSW DCCEEW 2022) was undertaken for the proposal. This mapping is shown in Figure 6-3. The following PCTs have been mapped as occurring within the study area:

- PCT 3038 – Sydney Coastal Coachwood Gallery Rain Forest
- PCT 3176 – Sydney Enriched Sandstone Moist Forest
- PCT 3593 – Sydney Coastal Sandstone Bloodwood Shrub Forest
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest.

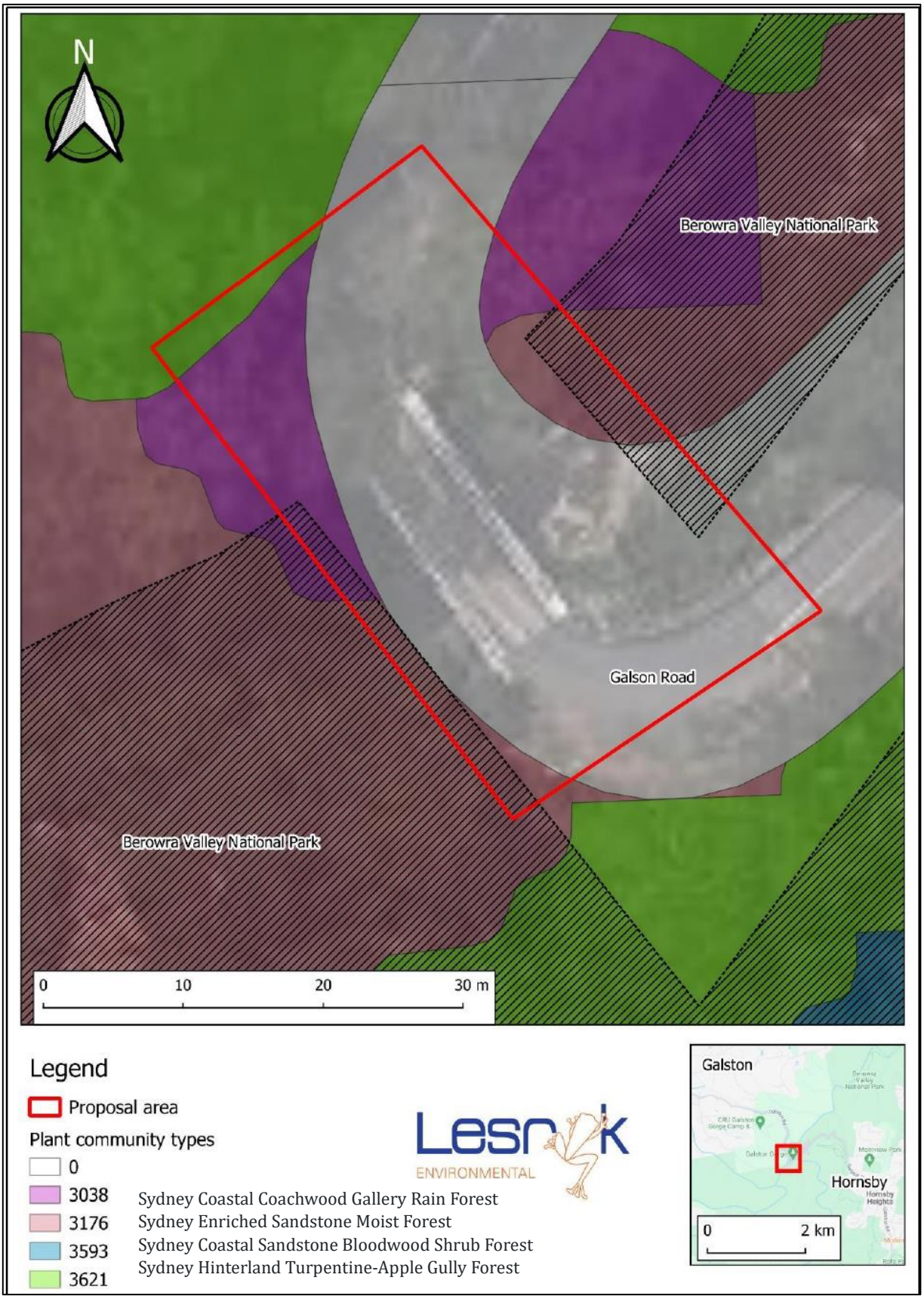


Figure 6-3 State vegetation mapping in the proposal area

6.2.2 Existing Environment

Fauna

The review of the NSW BioNet database found the following, State and/or Federally listed microbats previously recorded within 10 km of Galston Timber Bridge:

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Eastern Coastal Free-tailed bat (*Micronomus norfolkensis*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

The full mapped results of the Bionet search are shown in Figure 6-4 below.

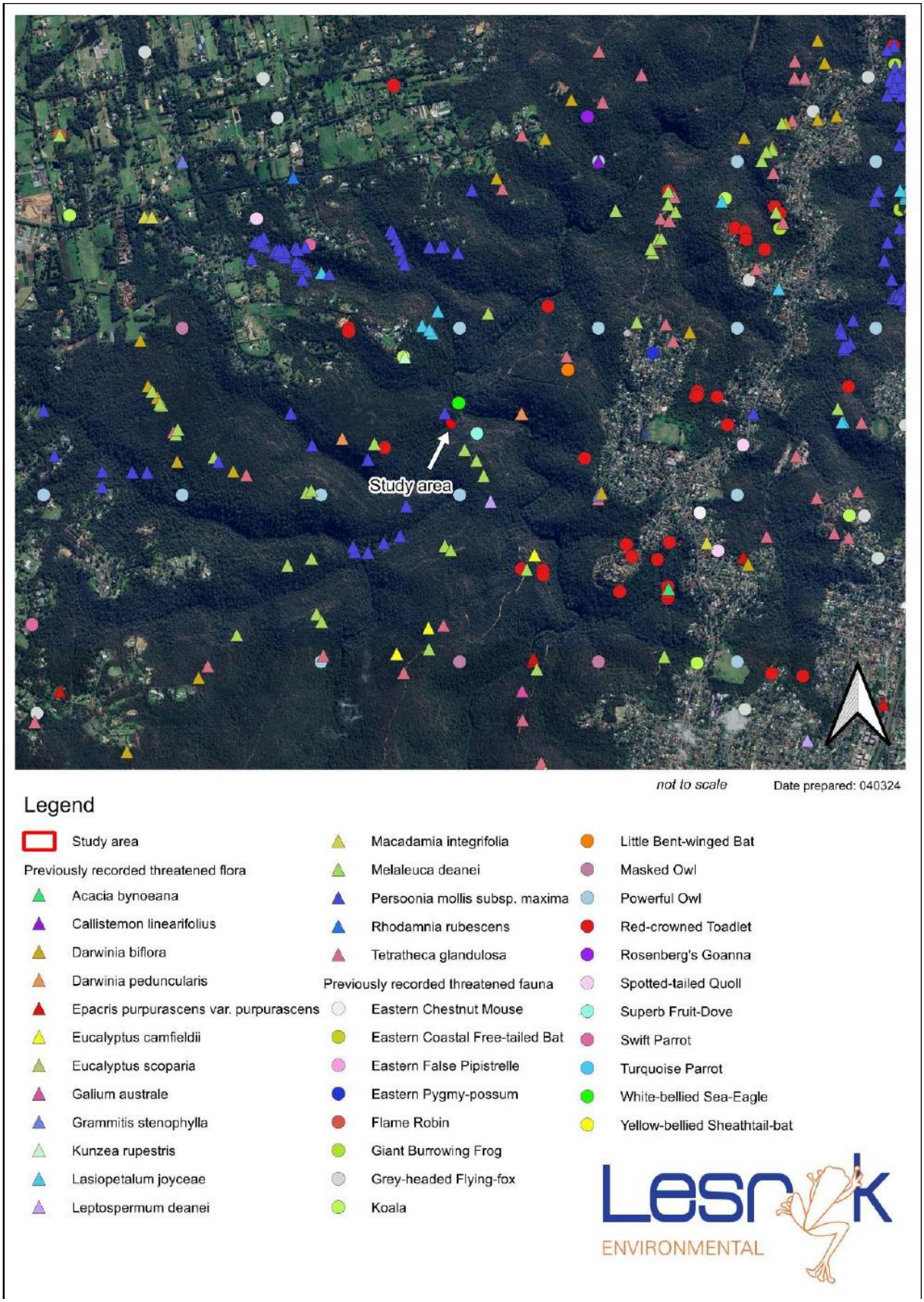


Figure 6-4 BioNet database search

By the completion of the investigation, from visual inspections of the identified cavities (cracks and fissures) associated with the timber abutments of Galston Timber Bridge, although considered and targeted, no microbats were recorded roosting in association with this structure.

While previously recorded within 10 km of the study area, none of the additional threatened fauna species listed under the EPBC and/or BC Acts were recorded during the inspection. Given the character of the existing disturbed and modified area in association with the bridge, and the structure of the proximate fauna habitats recorded, the species identified in Figure 6-4 are considered to have a low or unlikely likelihood of occurrence within the study area. These species are not considered to be reliant upon the habitats observed within the study area for any of their critical lifecycle requirements.

It is acknowledged that no hollow-bearing trees (suitable roosting habitat for those hollow-dependent microbats previously recorded in the study region) were observed within the study area.

The Fisheries NSW Spatial Data Portal (DPI 2024a) indicates that Tunks Creek, and Berowra Creek which occurs downstream of the works site, are identify these as Key Fish Habitat1 (KFH) [search: Hawkesbury Nepean].

During the course of the field survey, no State or Federally listed threatened animals, or areas of their documented habitats, were observed.

Vegetation

The review of the State Vegetation Type Mapping (SVTM) found the following PCTs have been mapped as occurring within the study area:

- PCT 3038 – Sydney Coastal Coachwood Gallery Rain Forest
- PCT 3176 – Sydney Enriched Sandstone Moist Forest
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest.

The field survey confirmed the vegetation mapping for the study area is accurate as:

PCT 3028 Sydney Coastal Coachwood Gallery Rain Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater).
- Occurs along streams on creek flats and alluvial flats, and sometimes on sheltered lower slopes, in north-east metropolitan Sydney.
- The dominant canopy species were Turpentine (*Syncarpia glomulifera*), Sydney Peppermint (*Eucalyptus piperita*) and Blackbutt (*Eucalyptus pilularis*), which are listed as diagnostic species.
- The midstory was comprised of Coachwood (*Ceratopetalum apetalum*), Blueberry Ash (*Elaeocarpus reticulatus*) and Water Gum (*Tristaniopsis laurina*), which are listed as diagnostic species.
- The mean rainfall of the area is between 1060 – 1250 mm and the site occurs at elevations <90 m Above Sea Level (ASL).

PCT 3176 Sydney Enriched Sandstone Moist Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater)
- The dominant canopy species include Turpentine, Sydney Peppermint and Blackbutt which are listed as diagnostic species.
- The midstory was comprised of Forest Oak (*Allocasuarina torulosa*), Blueberry Ash, Sweet Pittosporum (*Pittosporum undulatum*) and Mock Olive (*Notolaea longifolia*), which are listed as diagnostic species.
- Occurs in low elevation gullies that incise the shale rich landscapes of the north shore of Sydney where rainfall exceeds 1100 mm per annum.

PCT 3261 Sydney Hinterland Turpentine-Apple Gully Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater)
- Occurs on Hawkesbury Sandstone (Hawkesbury Soil Landscape) slopes and gullies on the Sydney hinterland plateaus.
- The dominant canopy species were Turpentine and Sydney Peppermint, which are listed as diagnostic species.

- The midstory was comprised of Blueberry Ash, Forest Oak, Christmas Bush (*Ceratopetalum gummiferum*) and Narrow-leaved Geebung (*Persoonia linearis*), which are diagnostic species.
- The groundcover consisted of Grass Tree (*Xanthorrhoea arborea*), Small Rasp Fern (*Doodia caudata*) and Bracken Fern (*Pteridium esculentum*) and Native Sarsaparilla (*Smilax glyciphylla*), which are diagnostic species.

It was acknowledged in the BAR that PCT 3176 – Sydney Enriched Sandstone Moist Forest is associated with the BC Act listed Critically Endangered Ecological Community (CEEC) known as 'Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion'. The NSW Scientific Committee's Final Determination for this CEEC notes that this name is given to the species assemblage of macrofungi present in Lane Cove National Park, the majority of which occur in gallery rainforest centred on the banks of the north-eastern arm of Gore Creek and its tributaries in Lane Cove Bushland Park.

As the proposed works do not occur within, or in proximity to the geographic location of Lane Cove Bushland Park, it was determined that PCT 3176 within the proposed works area was not a component of this threatened ecological community (TEC).

Flora

Whilst detected within 10 km of the study area, reference to the BioNet database (Figure 6-4) indicates that no threatened flora have been previously recorded within, or in close proximity to, the subject site. The closest recording, being one *Persoonia mollis* subsp. *maxima* (listed as Endangered under the EPBC and BC Acts) individual that was detected in 1999, is located about 70 m north-west of the subject site.

None of the plants recorded during the field investigation are listed, or currently being considered for listing, under the Schedules to the EPBC or BC Acts.

All of the native species recorded are identified as being common and abundant throughout their distribution ranges (Harden 1992-2002, Fairley and Moore 2010). The limited extent of vegetation disturbance required, particularly down the embankment to access to the bridge abutments, is not expected to affect the viability of their local or regional populations.

Under the NSW *Biosecurity Act 2015* 'all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Of those introduced plants recorded, Blackberry (*Rubus fruticosus* agg. Sp.) is listed:

- Under Schedule 3 of the NSW Biosecurity Regulation 2017
- As Priority weeds for the Greater Sydney (including the Hornsby Shire LGA) (DPI 2024a)
- As a Weed of National Significance (WoNS) (DPI 2024b).

Ludwigia (*Ludwigia peruviana*) was also recorded within the proposed works area and is listed as a priority weed for the Greater Sydney region (DPI 2024a).

6.2.3 Potential impacts

Construction

Fauna Results

The proposed works will be confined to the bridge and will not involve any vegetation removal or trimming. There will no impacts to fauna and flora.

During the field survey, no State or Federally listed threatened animals, or areas of their documented habitats, were observed. The habitats associated with the existing bridge have been disturbed by past road works and on-going site maintenance.

Considering the scope of works required to achieve the objectives of Stage 3, these including raising of the existing concrete plinth, installing steel beams and providing safe access to the bridge abutments for workers, no habitats significant for the local occurrence of native fauna, particularly those species listed under the EPBC and/or BC Act that have been previously recorded in the surrounding region, would be directly or indirectly affected.

Given the character of the existing disturbed and modified area in association with the bridge, and the structure of the proximate fauna habitats recorded, threatened species identified in the BioNet Searches are considered to have a low or unlikely likelihood of occurrence within the study area.

These species are not considered to be reliant upon the habitats observed within the study area for any of their critical lifecycle requirements.

No impacts to fauna is expected to result from the proposed project activities.

Vegetation results

No native vegetation mature native trees, including no hollow-bearing trees, would require removal to permit the proposal; the growth form of those plants present within the construction footprint was determined with reference to DPE's native species by growth form database (DPE undated). Vegetation mapping is presented in Figure 6-3.

As no mature native trees would require removal to permit the bridge remediation works, Transport for NSW is not required to offset the removal of vegetation for this project.

No impacts to vegetation are expected to result from the proposed project activities.

Flora results

All of the native species recorded are identified as being common and abundant throughout their distribution ranges (Harden 1992-2002, Fairley and Moore 2010). No vegetation disturbance is required as such the project is not expected to affect the viability of their local or regional populations.

The two weed species identified in the BAR being:

- Blackberry (*Rubus fruticosus* agg. spp)
- Ludwigia (*Ludwigia peruviana*)

It was recommended these species be removed as part of the vegetation clearing works.

As no TECs, threatened flora and fauna species, or significant components of their habitat, were recorded within, or in close proximity to, the construction footprint of the proposed works, and none are considered likely to occur, no assessments referencing the EPBC Act Significant Guidelines or the criteria provided under Section 7.3 of the BC Act are considered necessary.

No impacts to flora is expected to result from the proposed project activities.

Ancillary Facility

The proposed ancillary facility is located on a hardstand area and establishment would not involve any vegetation removal or trimming. As such no biodiversity impacts are expected to result from the sites establishment and use.

Operation

The proposal is not expected to have any lasting impacts on biodiversity through to operation. As no vegetation removal is proposed from the works it is not anticipated that disturbance would occur beyond the construction period.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act, 2016* or *Fisheries Management Act 1994* and therefore a *Species Impact Statement* or Biodiversity Development Assessment Report is not required.

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

6.2.4 Safeguards and management measures

Table 6-5 Biodiversity safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	If unexpected threatened fauna or flora species are discovered, stop works immediately and	Contractor	Construction	BAR

	follow the Roads and Maritime's Unexpected Threatened Species Find Procedure in the Biodiversity Guidelines 2011 - Guide I (Pre-clearing process) (RTA, 2011).			
Biodiversity	Where present on-site, it is recommended that the weeds: Blackberry and Ludwigia are removed.	Contactor	Pre-construction Construction	BAR
Biodiversity	Contact Birdlife Australia 14 days prior to commencing works to access current monitoring data on Powerful Owls and determine any additional mitigation measures for project.	Contactor	Pre-construction Construction	NPWS consultation

6.3 Soils and Surface water

6.3.1 Methodology

The surface water assessment adopted the following methodology:

- Review of available water quality, flooding data and existing conditions to obtain background information on catchment history and land use and define the existing environment.
- Identification of the potential impact of construction activities impact on water quality
- Development of any additional measures to manage potential cumulative impact resulting from the proposal.

The flooding assessment adopted the following methodology:

- Review of available flooding data
- Assessment of the impact of construction and operational activities for the proposal on flooding
- Identification of measures to manage potential flooding impacts.

The desktop investigation of soils included a review of publicly available information to obtain an understanding of the geological formations and soils landscapes within the proposal area.

6.3.2 Existing environment

Surface water features

Galson Timber Bridge BN390 is located over Tunks Creek, also known as Pearces Creek. Tunks Creek is a Tributary of Berowra Creek and ultimately the Hawkesbury River. The Creek flows North through Berowra Valley National Park until it reaches Berowra Waters at the Northern Extent of the Park. At Bridge BN390 the Tunks Creek bed is approximately 8 metres wide and flows into a natural retention pool. While flood mapping is not available for this area, it is known that Tunks Creek is subject to flash flooding in heavy rain events as shown in Figure -6-5, 6-6 and 6-7. Active monitoring of the weather forecast will be carried out during the works and in the event of a large rainfall event plant/machinery will be taken away from the creek.

Figure 6-5: Flash flooding at Tunks Creek

Figure 6-6 Flash Flooding by Galston Timber Bridge in July 2022

Figure 6-7 Flash Flooding at Galston Timber Bridge in July 2022

Figure 6-8 Tunks Creek below Galston Timber Bridge BN390 looking South

Figure 6-9 Tunks Creek below Galston Timber Bridge BN390 looking North facing described natural retention pool

Soils

Soil Landscape and Topography

A search of the Soil Landscapes of the Sydney 1:100,000 was carried out using the NSW eSPADE spatial viewer.

The soil landscape in the area of the proposal is Hawkesbury Sandstone and consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. The topography of the area is characterised by rolling to very steep hills, BN390 lies within the valley across Tunks Creek.

Local relief varies from 40–200 metres. Slope gradients range from 25–70%. Crests and ridges are convex and narrow, at >300 metres wide. Slopes are moderately inclined to precipitous. Rock outcrop occurs as horizontal benches and broken scarps up to 10 metres high. Boulders and cobbles cover up to 50% of the ground surface. Valleys are narrow and incised.

Severe sheet erosion often occurs during storms and after ground cover is destroyed by bushfires. Minor gully erosion occurs along unpaved tracks and fire trails, especially those used regularly by four-wheel drive vehicles, motorcycles and horses.

Generally, this soil type has the following limitations:

- Mass movement hazard
- Rockfall hazard
- Steep slopes
- Severe erosion hazard
- Rock outcrop
- Shallow soils

Acid Sulfate Soils

Acid sulfate soils are soils and sediments containing iron sulfides that, when disturbed and exposed to oxygen, generate sulfuric acid and toxic quantities of aluminium and other heavy metals. The online NSW Planning Portal mapping indicates that the proposal is not located within an area which has been identified as having a risk of acid sulfate soil occurrence.

Contamination

A search of the EPA contaminated lands register was undertaken on the 21/03/2024 for the suburb of Galston and Hornsby Heights. These searches indicated that there are no known contaminated locations within these suburbs. These search results are attached as Appendix E.

The proposal area has not been previously used for purposes commonly associated with contamination – industrial, agricultural and/or defence uses. As such it is not expected that contamination would be present on site. The paint to be removed has been assessed as not lead containing. The test results have been included in Appendix E.

6.3.3 Potential impacts

Construction

Surface water

There is the potential for water quality impacts during the cleaning and repair works to the Bridge. Any cleaning requiring the use of high-pressure washers would require the use of. An encapsulation system would be installed along the scaffolding to prevent any debris or contaminants entering the creek. The scaffold floor would be lined with geofabric material which shall extend 200mm up the walls of the scaffold frame. The walls would be lined with Monarflex containment sheeting and will overlap the 200mm extended floor covering. All joints will be gaffer taped to seal the perimeter. This will allow the capture of paint that is washed off; however, water would filter through the geofabric, removing any potential pollutants and debris.

During painting works the paint would be stored in an impervious container in the encapsulation and there would be no paint stored when there is no work. Paint will be stored in a hazardous chemical container and only paint required for each shift will be brought to site. Paint will be stored in a bunded container with 120% capacity of the largest container.

Any liquid wastes from the cleaning process or materials from the repair works would be contained and assessed on site to determine the most appropriate disposal method in accordance with the Waste Classification Guidelines (EPA 2014). Any contaminated materials would also be disposed of in accordance with the Waste Classification Guidelines (EPA, 2014).

Fuels and other hydrocarbon materials may be used for mobile and stationary equipment such as generators, lighting, high-pressure washing equipment and petrol driven hand tools. Where these items are used, static pieces of equipment would be positioned in mobile bunds, and all equipment would be refuelled at the Ancillary Facility in an impervious bunded area to minimise the risk of spills. No plant or equipment would be stored below the Bridge.

As works would occur over the waterway there is a potential risk of contamination of the creek in the event of accidental spillage. Safeguards in relation to accidental spills are included in the table in section 6.5.3.

As the project area is susceptible to flash flooding, weather forecasts should be monitored every day to maximise construction readiness. If rainfall events are forecast the work area would need to be made into a 'clean water' area to minimise runoff from the Project.

Impacts to surface water would be minimised with the implementation of the mitigation measures included in Section 6.3.4.

Erosion and Sedimentation

No groundwork or excavation is expected to be carried out during repair of the bridge structure, as a result there would be no impacts in relation to disturbance of soils, contaminated land, or potential acid sulphate soils.

The movement of plant and personnel during construction has the potential to increase erosion and release sediment into the river. These risks would be managed with the measures included in Section 6.3.4.

Ancillary Facility

The ancillary facility would be fully established on a hardstand area and therefore has negligible risk of causing erosion and a very low risk of causing contamination due to an accidental spillage as a spill should be able to be fully contained and cleaned up on the hardstand. There will be sandbags at the ancillary facility to contain any spills and prevent them reaching the nearest stormwater drain. In addition, there will be spill kits located at the ancillary facility to enable any spills to be cleaned up. Any paints, fuels or chemicals will be stored in an impervious container 120% larger than the biggest container.

Operation

No operational impacts to surface water and/or erosion and sedimentation are anticipated at the completion of construction. The bridge would operate as normal.

6.3.4 Safeguards and management measures

Table 6-6 Surface water safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	Environmental Work Method Statements (EWMS) are required for the following activities/locations: •Installation of access scaffolding •Water blasting and painting of truss •Installation of temporary steel to timber piles & capwale •Replacement of timber abutment sheeting. All EWMS would be submitted to the TfNSW Environment branch staff for review and endorsement prior to commencement of works. As a minimum, the EWMS will include the following: • detailed description of the work activity, including plant and equipment to be used • timing and staging of the activity, including the relationship to other activities • identify environmentally sensitive sites, risks and mitigation measures or safeguards to be applied • procedures for assessing the performance of mitigation measures or safeguards, and taking remedial action to address any shortcomings • procedures for regular review and, if necessary, updating of the EWMS.	Contractor	Pre-construction	Good Practice
Soil and water	. There will be no deleterious material released into the waterway. Any water released will pass through geofabric and be filtered.	Contractor	Construction	Good Practice
Soil and water	Work would be carried out during a dry period to ensure the water flowing in the creek is a minimum throughout the work.	Contractor	Pre-construction/ Construction	Good Practice
Soil and water	An emergency spill kit (marine spill kit) is to be kept on-site at all times during works. All staff are to be made aware of the location of the spill kit and trained in its use	Contractor	Construction	Good Practice
Soil and water	If a spill occurs, the Transport for NSW Environmental Incident Classification and Management Procedure is to be followed and the Transport for NSW Project Manager notified as soon as practicable	Contractor	Construction	Good Practice
Soil and water	Regular checks of vehicles working on the project would be conducted to ensure that no oils or fuels are leaking.	Contractor	Construction	Good Practice
Soil and water	.	Contractor	Construction	Good Practice
Soil and water	Regular checks of vehicles working on the project would be conducted to ensure that no oils or fuels are leaking	Contractor	Construction	Good Practice
Soil and water	Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls.	Contractor	Construction	Good Practice
Soil and water	Any fuels of chemicals would be stored in an impervious bunded area, sized to capture 120% of the capacity of the largest container stored on site.	Contractor	Construction	Good Practice

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	No washing up of painting equipment must be undertaken on site, rather disposable roller heads, paint brushes, trays and other painting equipment must be used and bagged at the end of the work each day and disposed of at an appropriate waste facility	Contractor	Construction	Good Practice
Soil and water		Contractor	Construction	Good Practice
Soil and Water	An encapsulation system would be installed along the scaffolding to minimise any debris or contaminants entering the creek. The scaffold floor would be lined with geofabric material which shall extends 200mm up the walls of the scaffold frame. The walls would be lined with a plastic layer and will overlap the 200mm extended floor covering.	Contractor	Construction	Good Practice
Soil and Water	Flood emergency safeguards and mitigation measures would be included in the Project CEMP in consultation with the construction contractor.	Contractor	Pre-Construction	Good Practice

6.4 Traffic and transport

6.4.1 Methodology

A desktop review of traffic and transport impacts was undertaken for the proposal to determine:

- defining the study area
- existing environment: existing road network, road safety and transport data. Data was collated using publicly available information
- construction impacts and operational impacts to the proposed locations. Where feasible, management measures were identified to manage potential impacts.

No traffic modelling was undertaken as part of this assessment as the road infrastructure would remain unchanged during the operational phase.

6.4.2 Existing environment

Galston Road is a state road that connects the suburbs of Hornsby Heights to Galston. From Hornsby Heights the road climbs down steeply to the valley of Berowra Valley National Park before ascending to Galston. Galston road is known for its steep, tight hairpin corners that prevent any vehicles longer that 7.5 metres utilising the road. Additionally owing to loading capacity and width, the crossing of BN390 is only single lane at the bottom of the Valley.

The speed limit signposted along the road is variable, but generally varies between 45km/h and 25km/h owing to the steep descents, ascents, and tight corners.

The road is an important throughfare for the community as it provides a link between east and west and is often a faster route to the Pacific Highway and Motorway for community members located in the Galston region and beyond. The road however does not have a dedicated pedestrian path and is not mapped as a designated cycle or shared path on the TfNSW Cycleway Finder. Owing to the steep, narrow road and tight corners, no public transport utilises the subject section of Galston Road.

According to the Transport for NSW Traffic Volume viewer (Station ID: T0085), Galston Road carries 4,089 AADT daily, with the majority of these vehicle movements occurring each day between 5am and 7pm. There is a clear trend in this traffic data with most vehicles travelling eastbound during morning peak hours and westbound during the evening peak hours.

The parking area to be occupied by the Ancillary Facility during construction does not provide for more than 2-3 cars therefore does not provide significant capacity for users of Berowra National Park. The narrow nature of Galston Road does not allow for roadside parking, as such major parking areas for the National Park are located on either side of the valley in Galston and Hornsby.

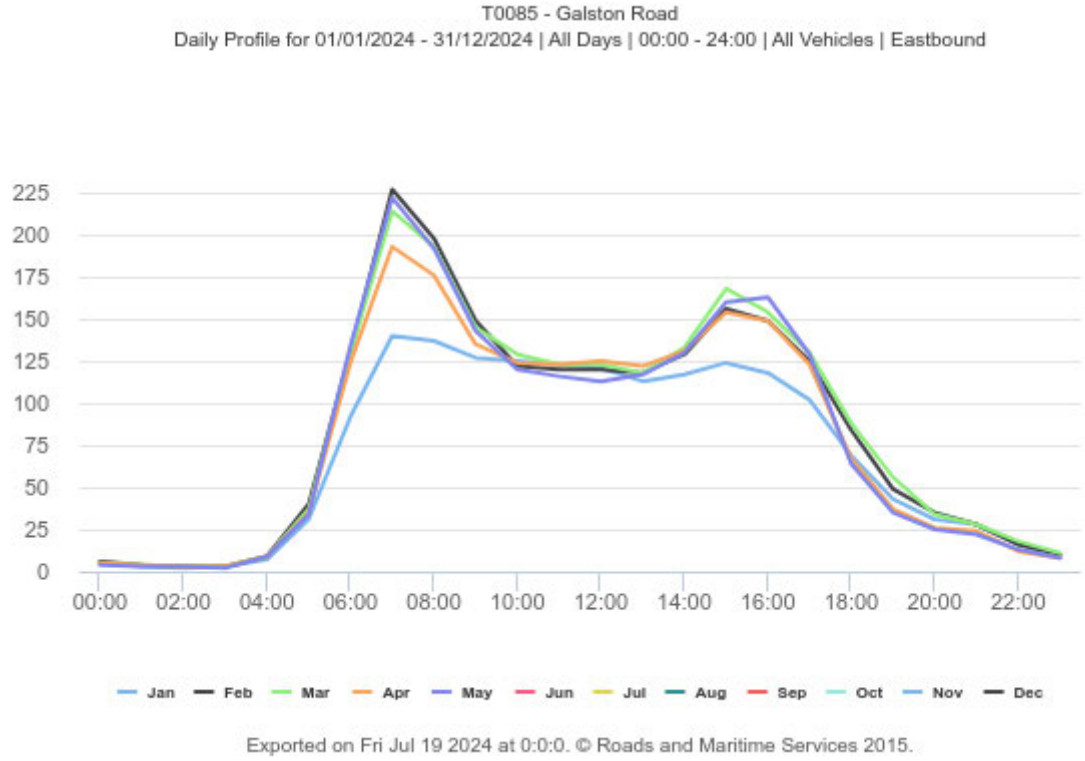


Figure 6-10 Eastbound average traffic numbers- Galston Road

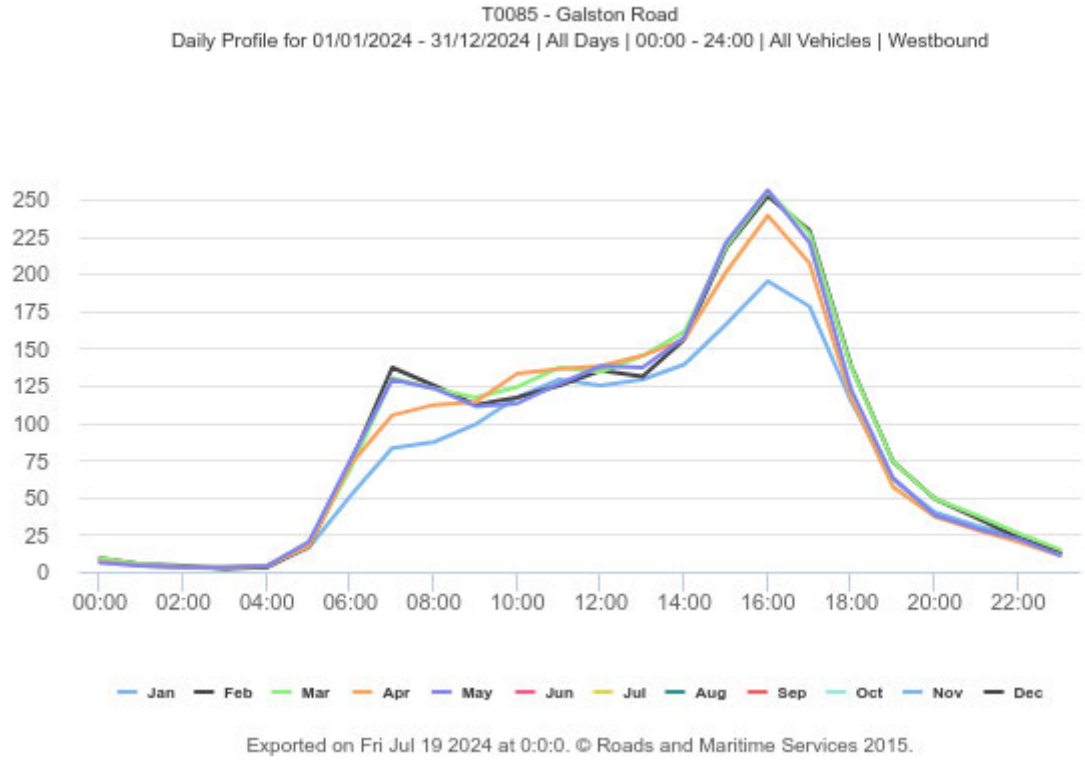


Figure 6-11 Westbound average traffic numbers- Galston Road

6.4.3 Potential impacts

Construction

During Phase 1 of the Project Galston Road would be closed for around 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require 24/7 road closures for a three-week period weather permitting, during quarter 3 of 2025. These short-term closures would be between Mountview Parade, Hornsby Heights and Calderwood Road, Galston. The road would be re-opened each morning and remain open during the day times, as governed by the Road Occupancy Licence.

The road detour east would be south via the Old Northern Road, Newline Road and Boundary Road through Cherrybrook, then north along Pennant Hills Road to Hornsby. The detour west would mirror the east bound detour, from Pennant Hills Road Hornsby down through Cherrybrook then north along Boundary Road, Newline Road, and Old Northern Road to Galston.

Typically, during the night time period the direct route via Galston Road between Middle Dural and Hornsby is 12-15 minutes (Figure 6-12) while the detour required for the works would be approximately 30-40 minutes (Figure 6-13 Figure 6-). As such the additional travel time for the detour during the road closures would be approximately 15-25 minutes between the suburbs of Middle Dural and Hornsby as shown in Figure 6-.

Traffic Management would be in accordance with TfNSW specification G10. A Traffic Management Plan and Traffic Guidance Scheme would be prepared by the contractor and would be subject to approval prior to implementing on site.

Community notification details would be included in Section 5.1.

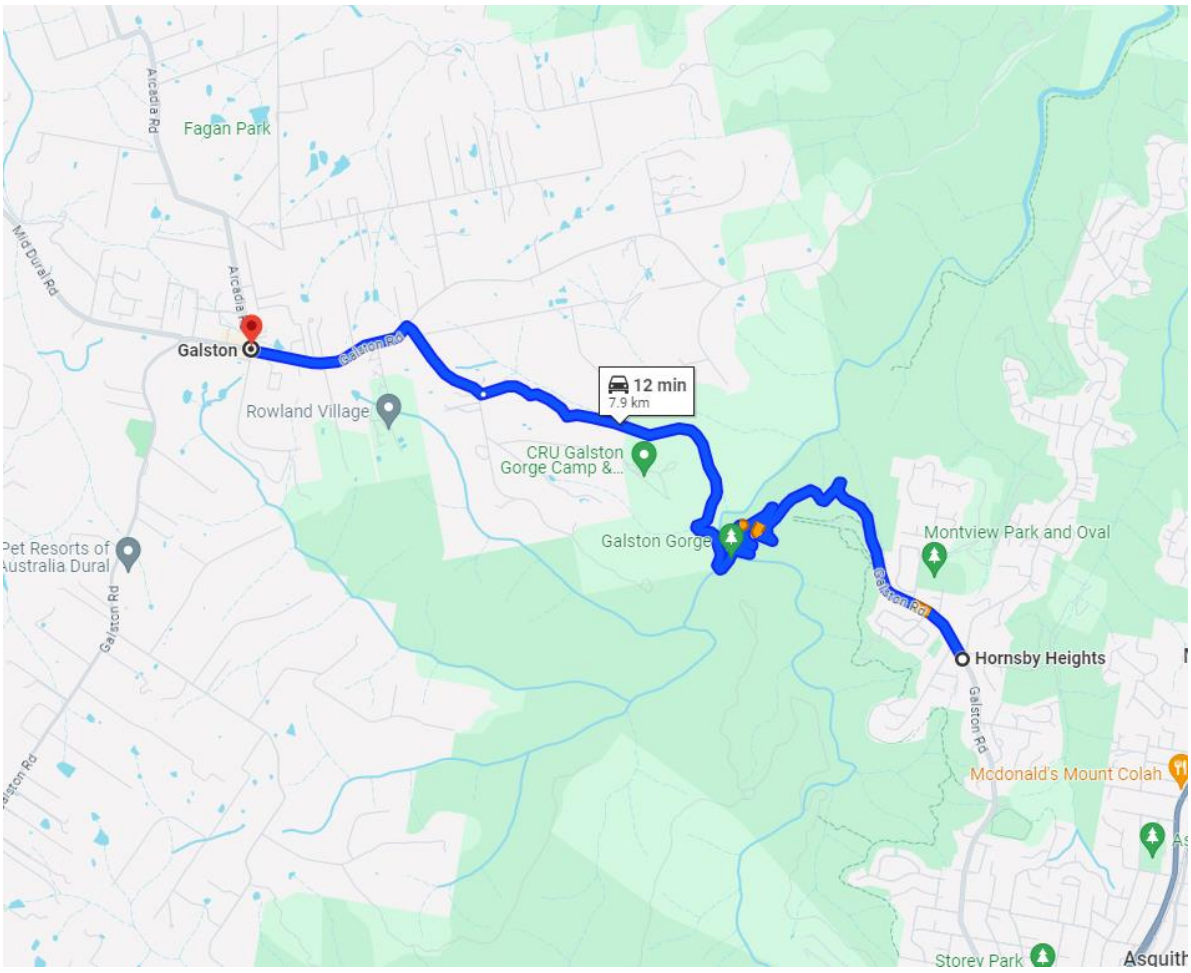


Figure 6-12 Normal travel time at 8 pm between Galston and Hornsby Heights

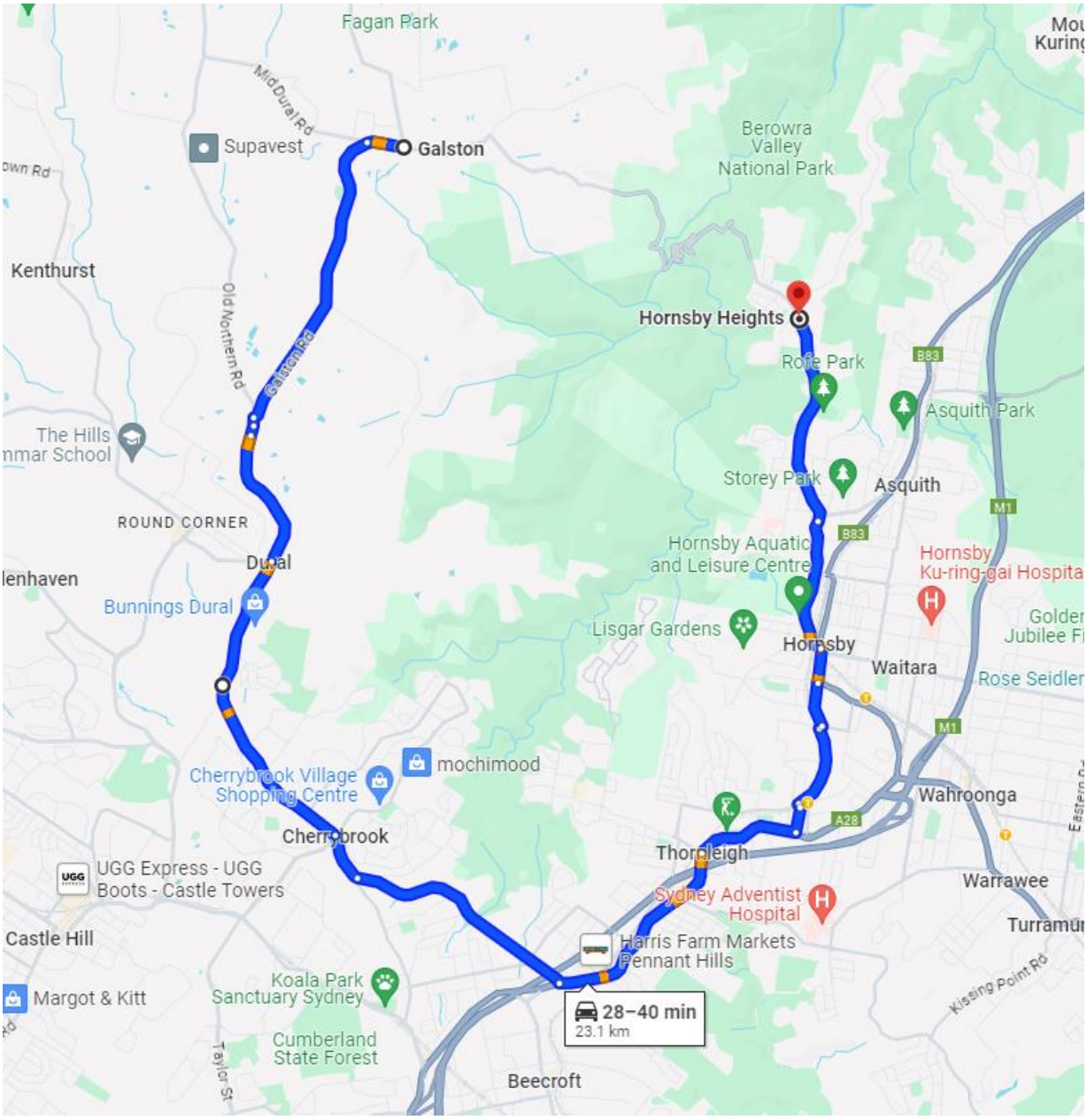


Figure 6-13 Galston Road Detour between Galston and Hornsby Heights.

Operation

No operational impacts to traffic and transport are anticipated at the completion of construction. The bridge would operate at normal capacity at the completion of works.

Ancillary Facility

Impacts from the use of the proposed ancillary facility would be limited to the removal of 1-2 car parking spaces. As the existing area only supports 2-3 vehicles depending on their size, and there is no infrastructure in the vicinity of the parking lot the loss of this parking during construction is considered low impact. This parking area links to one walking track that is readily accessible from larger parking areas within the national park that are more frequently used as they include additional supporting infrastructure such as waste facilities.

6.4.4 Safeguards and management measures

Table 6-7 Traffic and transport safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport *Traffic Control at Work Sites Manual* (RTA, 2010) and *QA Specification G10 Control of Traffic* (Transport for NSW, 2008). The TMP will include: measures to maintain access to local roads and properties site-specific traffic control measures (including signage) to manage and regulate traffic movement measures to maintain pedestrian and cyclist access requirements and methods to consult and inform the local community of impacts on the local road network access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. A response plan for any construction traffic incident monitoring, review and amendment mechanisms.	Contractor	Pre-construction	Section 4.8 of QA *G36 Environment Protection*
Traffic and transport	Where possible, current traffic movements are to be maintained during day during the maintenance work. Any disturbance is to be minimised to prevent unnecessary traffic delays.	Contractor	Pre-construction	
Traffic and transport	A Road Occupancy Licence (ROL) would be obtained from Transport for NSW and a Traffic Control Plan would be prepared in accordance with the requirements of the Transport for NSW's Traffic Control at Worksites Manual (2022). Any road closure would need to be undertaken in accordance with any ROL issued by the Transport Management Centre (TMC).	Contractor	Pre-construction	Good Practice
Traffic and transport	Appropriate signage (such as variable message signs) and supervision would be provided at all times to ensure that all work areas are controlled and that unauthorised personnel (e.g. pedestrians) are excluded from work areas.	Contractor	Pre-construction	Good Practice
Traffic and transport	Vehicle movement arrangements would be developed to limit impacts on other road users (including vehicles and cyclists) and the environment, with specific regard to other road works in the area, local traffic movement requirements and peak traffic volumes.	Contractor	Pre-construction	Good Practice
Traffic and transport	Designated work areas within any road reserve would be delineated prior to the work commencing. This area would be the minimum required for undertaking the activity.	Contractor	Pre-construction	Good Practice

6.5 Noise and vibration

6.5.1 Methodology

The following guidelines were considered as part of the noise and vibration assessment:

- Interim Construction Noise Guideline (ICNG) (DECC, 2009)
- Road Noise Policy (RNP) (DECCW, 2011)
- BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2, BSI, 1993
- DIN 4150:Part 3-2016 Structural vibration – Effects of vibration on structures, Deutsches Institute fur Normung, 1999
- Assessing Vibration: a technical guideline (DEC, 2006)
- Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- Noise Criteria Guideline (NCG) (Roads and Maritime, 2015)
- Noise Mitigation Guideline (NMG) (Roads and Maritime, 2015)
- Environmental Noise Management Manual (ENMM) (Roads and Traffic Authority, 2001).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 1000 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

6.5.2 Existing environment

Owing to the location of the proposal within a national park, at the bottom of a valley, it is likely that anthropogenic noise sources are largely vehicular related. It is expected that the noise environment in the area corresponds to the daily profile of the traffic movements along Galston Road. It is anticipated that the background noise levels along Galston Road would be highest during the daytime and early evening, with a corresponding drop in noise levels between 7pm and 7am outside of Peak periods.

The location of sensitive receivers was determined through an inspection of aerial photography and available mapping data. For this assessment and based on the proximity of receivers to the works locations, the location of vibration and noise sensitive receivers will be the same. Land use in the vicinity of the proposal site comprises bushland.

The closest residential receivers are located at the end of Pine Valley Road around 700 metres away as the crow flies from the work area. The CRU Galston Gorge Camp & Conference Centre is also located around 700 metres from the proposal. This facility provides short term accommodation primarily for school camps.

Figure 6-11 location of closest sensitive receivers to the Project area

6.5.3 Criteria

Background Noise Levels

The proposed works would be undertaken in a predominantly Rural / Suburban, characterised as:

- Areas with negligible transportation or very limited local traffic, typically light vehicles only.
- Residents are 100m or more from the road.

This noise area category was selected owing to the remote location of the Bridge and the significant distance of the closest receivers from the proposal. Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 6-8.

Table 6-8 Background Noise levels

R1 Noise Environment (dB(A))		
Day	Evening	Night
40	35	30

Noise Management Levels

In NSW, noise impacts arising from construction activities are managed in accordance with the ICNG. The guideline has been developed to assist with the management of noise impacts, rather than to present strict numeric noise criteria for construction activities. The ICNG recommends establishing Noise Management Levels (NMLs) at receiver locations adjacent to the works, using information from the existing background noise levels. Where the NML may be exceeded and there is potential for adverse noise impacts to occur, appropriate management measures would be implemented.

Table 6-9 details the method for determining NMLs for residential receivers only, during standard and nonstandard working hours. While there are separate criteria for non-residential receivers, residential dwellings and commercial properties were identified for the proposal.

Table 6-9 Construction noise management levels – residential receivers (ICNG, DECC 2009)

Hours	Noise Management Level (NML)	Description
Recommended standard hours: Monday to Friday 7am– 6pm Saturday 8am– 1pm No work on Sundays or public holidays)	Noise affected RBL +10 dB(A)	The noise affected level represents the point above, which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected >75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: Times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid- afternoon for work near residences). If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where

Hours	Noise Management Level (NML)	Description
Outside recommended standard hours ('out-of- hours' work)	Noise affected RBL +5 dB(A)	all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should then undertake negotiations with the community.

Using the background noise data from Table 6-8 and the ICNG requirements for residential receivers in Table 6-9, NMLs have been determined for the specified construction periods and are presented in Table 6-10 Construction NMLs.

Table 6-10 Construction NMLs.

Receiver	Construction noise management level, LAeq(15min)					
	Standard recommended hours		Outside of standard recommended hours			
	Noise affected	Highly noise affected	Day	Evening	Night	Sleep disturbance
Passive recreation	60	-	-	-	-	-
Commercial	70	-	-	-	-	-
Residential receivers	50	75	45	40	35	65

Sleep Disturbance

Noise impacts or events that can cause interruptions to sleeping patterns are considered separately to noise levels during works outside standard hours. The ICNG does not provide a specific method for assessment of potential sleep disturbance noise impacts; and guidance on the acceptability of these events is taken from the Road Noise Policy (RNP).

The RNP provides targets for considering sleep disturbance impacts:

- Sleep disturbance screening criterion – used to identify situations where there is the potential for sleep disturbance
- Sleep disturbance awakening criterion – levels below which awakening is unlikely to occur.

The sleep disturbance screening criterion recommends that where the $L_{A1\ (1\ minute)}$ does not exceed the $L_{A90,\ (15\ minute)}$ by 15 dB(A) or more, sleep disturbance impacts are likely to be maintained at an acceptable level. The $L_{A1,\ (1\ minute)}$ descriptor is meant to represent a typical maximum noise level when measured using a 'fast' time response. The sleep disturbance awakening guideline is the threshold at which an awakening reaction is likely to occur. Research discussed in the RNP identified this threshold to be an internal bedroom noise level of around 50 to 55 dB(A).

Windows often allow the greatest amount of sound transmission from outside to inside across a building facade. Allowing a 10 dB(A) reduction though an open window, external noise levels of about $L_{A1,\ 1\ min}$ 65 dB(A) would generally give rise to internal noise goal of up 55 dB(A). Where levels are lower than this, the sleep disturbance goals are expected to be met.

6.5.4 Potential impacts

Construction

A noise assessment of the noisiest activity has been carried out to represent the worst-case noise impacts that would be expected during construction. The noisiest activity associated with the proposal would be high pressure cleaning of the bridge structure. This could involve the use of the plant listed in Table 6-10.

Equipment	Quantity	Usage (over any 15minute period)	SWL
Daymakers / Lighting plant	2	100%	96
Generator (6 kVA)	1	100%	89
Support Vehicle	1	100%	100
High pressure washer[1]	1	100%	109
Water pump small	1	100%	80

The assessment found that for works outside standard hours, no receivers are predicted to be classified as Highly Impacted during the Night period. A number of receivers are expected to be impacted to a 'noticeable' level between 1-5dB(A) above the night time NML. A summary of predicted noise impacts is presented in Table 6-11 and shown in Figure 6-5 The full assessment report is attached as Appendix G.

Table 6-11 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	3
Clearly audible	5 – 15 dB above NML	0
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

As the assessment tool used is 2D, the outputs are conservative in nature. In reality owing to the location of BN390 at the bottom of the Valley it is highly unlikely that these receivers would experience any noise impacts.

Impacted receiver would be managed in line with the additional mitigation measures outlined in the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016). Triggers for additional mitigation from the CNVG are shown in Appendix G and Table 6-12 below.

As it is predicted that receivers would only exceed the NML by between 1-5dB(A), the 'additional mitigation' required would be Notification.

Table 6 12 Triggers for additional mitigation measures – Airborne noise –
EMF-NV-GD-0056 Construction Noise and Vibration Guideline (Roads) July 2023

Predicted airborne LAeq(15min) noise level at receiver			
Perception	**dB(A) above RBL**	**dB(A) above NML**	**Additional mitigation measures**
All hours			
75 dB(A) or greater			**N, V, PC, RO**
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes: PC = Phone calls V = verification; IB = Individual briefings; N= Notification; AA = Alternative accommodation; SN = Specific notifications; RO = Respite offer; R1 = Respite period 1; R2 = Respite period 2; DR = Duration respite; Perception = relates to levels above RBL; NML = Noise management level; HA = Highly affected

Operation

No changes to the road surface or alignment are proposed as part of the construction works. As such no changes to the existing noise environment are expected to result from the proposal during operation.

Ancillary Facility

A noise assessment has been undertaken for the establishment and operation of the ancillary facility proposed to be utilised for the project. The equipment presented in Table 6-13 was assessed as working on site during establishment and operation.

Table 6-13 Equipment list for ancillary facility establishment and operation

Equipment	Quantity	Usage	Reduction	SWL
Establishment				
Franna Crane	1	100%	0	98
Hand Tools (electric)	1	100%	0	94
Light vehicle	1	100%	0	85
Truck (10-15 tonne)	1	100%	0	100
Facility Operation				
Compressor	1	100%	0	93
Daymakers/Lighting Plant	1	100%	0	93
Generator (6kVA)	1	100%	0	89

The assessment found that no receivers are predicted to be impacted by the establishment or operation of the proposed ancillary facility at any impact level. The full assessment report is attached as Appendix G.

Figure 6-12 Impacted receivers during pressure washing for Stage 3

6.5.5 Safeguards and management measures

Table 6-14 Noise and vibration safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and Vibration	Where alternative plant is available, the plant emitting the lowest noise levels is to be selected. Similarly, where an alternative method for undertaking a process of activity would result in reduced noise emissions, this must be considered, where practicable.	Contractor	Construction	CNVG Good Practice
Noise and Vibration	Engines would be switched off when equipment is not in use for extended periods (i.e. more than 30 minutes).	Contractor	Construction	CNVG Good Practice
Noise and Vibration	All construction plant and equipment used on site are to be: a) Fitted with properly maintained suppression devices in accordance with the manufacturer's specifications, where feasible and reasonable. b) Maintained in an efficient condition. c) Operated in a proper and efficient manner.	Contractor	Construction	CNVG Good Practice
Noise and Vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected would be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise impact. The notification will provide details of: • the project • the construction period and construction hours • contact information for project management staff complaint and incident reporting and how to obtain further information. .	Contractor	Construction	CNVG Good Practice
Noise and Vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers	Contractor	Construction	CNVG Good Practice

	• construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) environmental incident procedures			
Noise and Vibration	No swearing or unnecessary shouting or loud stereos/radios on site. Limit compression braking at night in residential areas. No dropping of materials from height, throwing of metal items and slamming of doors.	Contractor	Construction	CNVG Good Practice
Noise and Vibration	Respite would be scheduled as indicated in the noise assessment report and described in the CNVG.	Contractor	Construction	CNVG Good Practice
Noise and Vibration	stationary noise sources such as pumps, generators, and compressors should be shielded or enclosed where reasonable and feasible.	Contractor	Construction	CNVG Good Practice

6.6 Other impacts

6.6.1 Existing environment and potential impacts

Table 6-15 Other potential impacts

Environmental factor	Existing environment	Potential impacts
Air Quality	The National Pollutant Inventory (NPI) for the Sydney area identified 17 air pollutant substances emitted across three facilities during the 2019 to 2020 period (NPI, 2021). The type of industry emissions identified included: • carbon monoxide • Total Volatile Organic Compounds • polycyclic aromatic hydrocarbons • oxides of nitrogen • PM10 or PM2.5. There are no facilities within 10 kilometres of this site that produce these emissions. The local road network and associating arterial roads across the locality are therefore main contributing sources of local air pollution. A paint condition report was completed during detailed design to test for hazardous materials. No hazardous materials including lead or chromate were found in this inspection and testing.	***Construction*** The potential impacts of the proposal relating to air quality during construction include: • Vegetation removal • Transport and handling of rock and vegetation • Use of construction vehicles leading to the creation of exhaust fumes • Waste management at ancillary facilities The scope of the proposed works is largely confined to the Bridge structure so subsequent dust impacts would be temporary and minor if appropriately managed by the Project safeguards. No fumes or odours expected from works. Emissions from plant, equipment and vehicles is unavoidable, however, they will be managed in accordance with the safeguards listed in Table 6-11 **Operation** The proposal would not result in any air quality impacts during operation.
Aboriginal Heritage	A search of the AHIMS register shows no registered sites in the vicinity of the project. This search is attached as Appendix F.	***Construction*** The proposal is considered to have no impacts to Aboriginal heritage items, as there are no items mapped within or near the sites. ***Operation*** Operation of the proposal is not expected to impact Aboriginal heritage.
Socio-economic	The proposed site is located on an arterial road. The road would be used by motorists, and emergency services as well as recreational users of the National Park. The closest sensitive receivers are identified in Section 6.5.2. These receiver would largely be unaffected by the proposed works as access to their properties would not be impacted by the proposal.	**Construction** The following socio-economic impacts have been assessed in previous sections: • Noise and vibration, including sleep disturbance (Section 6.5). • Traffic and transport (Section 6.4). Short term impacts may result owing to road closures however this would be temporary in nature. The Project would be programmed to minimise community impacts. **Operation** The proposal would maintain an important piece of infrastructure that is significant for local communities. There would be no ongoing negative socio-economic impacts during operation of the proposal
Landscape character and visual amenity	The project footprint is directly adjacent to Berowra Valley National Park which is	**Construction** The proposed work will have short term negative impacts on the landscape during

Environmental factor	Existing environment	Potential impacts
	a major element of the landscape of the Region. BN390 is a Heritage listed Bridge that contributes to the character of the Galston Gorge area.	construction owing to the presence of plant, equipment, and structures associated with the construction site and ancillary facility. These impacts would be short term and minimal in nature as visual receivers along Galston Road are generally only motorists. The proposal would ultimately improve the visual and scenic landscape by restoring the Bridge and protecting from future damage. **Operation** The proposal is rehabilitating existing damaged infrastructure and no changes to the prior visual character or landscape is proposed.
Waste	The proposed works requires one ancillary facility. This site would temporarily store plant/equipment, portable toilets as well as general waste skips bins.	**Construction** Construction activities would generate waste, and if not managed correctly could potentially impact nearby land and water. Waste streams likely to be generated during construction of the proposal include: • Liquid waste (non-putrescible and non-hazardous) including waste from high pressure cleaning. • General solid waste (non-putrescible) including any fill/spoil, mulch, bark, woodchips and soil blends, used erosion and sediment controls, weed waste Unsuitable spoil and all other wastes would be classified in accordance with the NSW EPA Waste Classification Guidelines (NSW EPA 2014) and disposed of at an appropriately licenced facility. Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. **Operation** There are no anticipated impacts from waste during the operation of the proposal.
Property and Land Use	The proposal area falls within the bounds of the Hornsby Local Government area (LGA). Within this area development is generally controlled by the Hornsby Local Environmental Plan 2013 (LEP). The Bridge is located on land zoned SP2-Infrastructure. The area either side of the bridge is zoned C1- National Parks and Nature Reserves and RE1- Public Recreation. The proposal is not located on any private property.	**Construction** The proposal would not impact on the existing land use at BN390. The proposal is not located on private property and is not expected to impact any property access. The proposal would reduce the amount of parking where the proposed ancillary facility would be located. However as this area only supports the parking of 2-3 vehicles and it not located near any infrastructure it is considered low impact. **Operation** There are no anticipated impacts to property and land use during the operation of the proposal.

6.6.2 Safeguards and management measures

Table 6-16 Other impacts Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	• Vehicles and plant used on site are to be kept in efficient working order. The *Protection of the Environment Operations Act* 1997 and associated regulations must be complied with. The *POEO Regulation (Clean Air)* 2010 states that vehicles must not have continuous smoky emissions for more than 10 seconds. • Work vehicles / machinery would not be left running or idling when not in use.	Contractor	Construction	Good Practice
Waste	• The following resource management hierarchy principles would be followed in accordance with the Waste Avoidance and Resource Recovery Act 2001: ○ Avoid unnecessary resource consumption as a priority. ○ Use resource recovery measures (including re-use of materials, reprocessing, recycling and energy recovery) where waste generation cannot be avoided. ○ Dispose of wastes as a last resort. • All waste material would be removed from the site once the activity is complete. • The work site would be kept tidy and free of rubbish at all times.	Contractor	Construction	Good Practice
Landscape character and visual amenity	• The work site will be left in a tidy manner at the end of each work day. • Construction plant and equipment would not remain on-site any longer than necessary after work is completed.	Contractor	Construction	Good Practice
Aboriginal Heritage	• In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work would cease in the affected area and Transport for NSW's Environmental Officer, Sydney Region and the Transport for NSW Senior Environmental Specialist for Aboriginal Heritage would be contacted on advice on how to proceed. The Standard Management Procedure Unexpected Heritage Items would be followed in the event of the uncovering of a potential item.	Contractor	Construction	Good Practice

6.7 Cumulative impacts

Cumulative impacts are not expected to result from the proposal owing to the isolated location of the work within Berowra Valley National Park. Consultation with National Parks has no identified any additional works programmed by National Parks and Wildlife that would cause cumulative impacts.

7. Environmental management

This chapter describes how the proposal will be managed to reduce potential environmental impacts during detailed design, construction and operation. A framework for managing potential impacts is provided. A summary of site-specific environmental safeguards is provided, and the licence and/or approval requirements required prior to construction are listed.

7.1 Environmental management plans (or system)

Safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Transport for NSW Environment and Sustainability Officer, Sydney Region prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7 1.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH1	Non-Aboriginal Heritage	All work is to be undertaken in accordance with the requirements of the SOHI and Section 60 Approval	Contractor Connect Sydney	Pre-Construction Construction	SOHI Section 60 Approval (pending)
NAH2	Non-Aboriginal Heritage	A Construction Heritage Management Plan (CHMP) containing heritage input and advice from a heritage specialist is required for the contractor to implement on site.	Connect Sydney	Pre-Construction	SOHI
NAH3	Non-Aboriginal Heritage	A Photographic Archival Recording (PAR) should be undertaken of all areas proposed for maintenance and repair activities in accordance with Policy 11 of the NSW Timber Truss Road Bridges Overarching CMP 2018. The PAR should be undertaken prior to, during and following completion of works. This PAR should be undertaken in accordance with the Heritage Council of NSW guidelines Photographic Recording of Heritage Items using Film or Digital capture (Revised 2006). A digital copy of the PAR would be provided to Heritage NSW, Hornsby Shire Council and TfNSW	Connect Sydney TfNSW	Pre-Construction	SOHI
NAH4	Non-Aboriginal Heritage	The detail design of temporary support works will be determined by the contractor for TfNSW. Further heritage review of the temporary works design by a heritage specialist prior to construction is required before works can commence	Connect Sydney Contractor	Pre-Construction	SOHI
NAH5	Non-Aboriginal Heritage	Any replacement of materials on the bridge would be like-for-like materials.	Contractor	Pre-Construction	SOHI
NAH6	Non-Aboriginal Heritage	If unexpected archaeological remains are uncovered during the works, all works must cease in the vicinity of the material/find and the steps in the Transport for NSW Standard Management Procedure: Unexpected Heritage Items must be followed. Transport for NSW Regional Environmental Manager must be contacted immediately.	Contractor	Construction	SOHI
NAH7	Non-Aboriginal Heritage	All works are to be conducted in line with the conservation policies outlined in the NSW Timber Truss Road Bridges Overarching Conservation Management Plan (RMS, 2018)	Contractor	Construction	SOHI
NAH8	Non-Aboriginal Heritage	Vibration monitoring of the bridge must occur during the construction phase of the works in accordance with the Construction Heritage Management Plan	Contractor	Construction	SOHI
NAH9	Non-Aboriginal Heritage	All contractors are to participate in a heritage induction and toolbox talk prior to commencing works to ensure they understand the significance of the Pearces Creek Bridge (Galston Timber Bridge), and areas to avoid. This must be developed in consultation with a heritage specialist.	Contractor	Construction	SOHI

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NAH10	Non-Aboriginal Heritage	The site is to be made good following completion of maintenance and repair works.	Contractor	Construction	SOHI
NAH11	Non-Aboriginal Heritage	A heritage interpretation specialist should prepare a Heritage Interpretation Strategy for the bridge, including recommendations for appropriate interpretation of the history and significance of the bridge in the nearby laydown / car park areas and nearby bushwalks. This could include (but is not limited to) updated signage on the approaches to the bridge, outlining the key stories, themes and cultural significance of Pearces Creek Bridge (Galston Timber Bridge).	Connect Sydney	Post-Construction	SOHI
NAH12	Non-Aboriginal Heritage	The SHI database entries for the Pearces Creek Bridge (Galston Timber Bridge) should be updated to record the latest repair works.	Connect Sydney	Post-Construction	SOHI
BIO1	Biodiversity	If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the Roads and Maritime's Unexpected Threatened Species Find Procedure in the Biodiversity Guidelines 2011 - Guide I (Pre-clearing process) (RTA, 2011).	Contractor	Construction	BAR
BIO2	Biodiversity	Where present on-site, it is recommended that the weeds: Blackberry and Ludwigia are removed.	Contactor	Pre-construction Construction	BAR
BIO3	Biodiversity	Contact Birdlife Australia 14 days prior to commencing works to access current monitoring data on Powerful Owls and determine any additional mitigation measures for project.	Contactor	Pre-construction Construction	NPWS consultation
SW1	Soil and water	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented (in accordance with the Landcom/Department of Housing *Managing Urban Stormwater, Soils and Construction Guidelines* (the Blue Book)). This will include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	pre-construction	Good Practice The Blue Book

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW2	Soil and water	Environmental Work Method Statements (EWMS) are required for the following activities/locations: •Installation of access scaffolding •Water blasting and painting of truss •Installation of temporary steel to timber piles & capwale •Replacement of timber abutment sheeting. All EWMS would be submitted to the TfNSW Environment branch staff for review and endorsement prior to commencement of works. As a minimum, the EWMS will include the following: • detailed description of the work activity, including plant and equipment to be used • timing and staging of the activity, including the relationship to other activities • identify environmentally sensitive sites, risks and mitigation measures or safeguards to be applied • procedures for assessing the performance of mitigation measures or safeguards, and taking remedial action to address any shortcomings • procedures for regular review and, if necessary, updating of the EWMS.			
SW3	Soil and water	There is to be no release of dirty water into drainage lines and/or waterways.	Contractor	Construction	Good Practice The Blue Book
SW4	Soil and water	Work would be carried out during a dry period to ensure the water flowing in the creek is a minimum throughout the work.	Contractor	Pre-construction Construction	Good Practice The Blue Book
SW5	Soil and water	An emergency spill kit (marine spill kit) is to be kept on-site at all times during works. All staff are to be made aware of the location of the spill kit and trained in its use	Contractor	Construction	Good Practice The Blue Book
SW6	Soil and water	If a spill occurs, the Transport for NSW Environmental Incident Classification and Management Procedure is to be followed and the Transport for NSW Project Manager notified as soon as practicable	Contractor	Construction	Good Practice The Blue Book
SW7	Soil and water	Regular checks of vehicles working on the project would be conducted to ensure that no oils or fuels are leaking.	Contractor	Construction	Good Practice The Blue Book
SW8	Soil and water	Hydrocarbon booms are to be deployed in a downstream pool as a precaution.	Contractor	Construction	Good Practice

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW9	Soil and water	Regular checks of vehicles working on the project would be conducted to ensure that no oils or fuels are leaking	Contractor	Construction	The Blue Book
SW10	Soil and water	Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls.	Contractor	Construction	Good Practice The Blue Book
SW11	Soil and water	Any fuels of chemicals would be stored in an impervious bunded area, sized to capture 120% of the capacity of the largest container stored on site.	Contractor	Construction	Good Practice The Blue Book
SW12	Soil and water	No washing up of painting equipment must be undertaken on site, rather disposable roller heads, paint brushes, trays and other painting equipment must be used and bagged at the end of the work each day and disposed of at an appropriate waste facility	Contractor	Construction	Good Practice
SW13	Soil and water	Where rainfall is predicted to exceed 10 millimetres, the work areas should be set up to behave as a "clean" water areas and have all disturbed, and or, exposed surfaces covered and all loose material cleaned up and removed from the work area.	Contractor	Construction	Good Practice
SW14	Soil and Water	An encapsulation system would be installed along the scaffolding to minimise any debris or contaminants entering the creek. The scaffold floor would be lined with geofabric material which shall extends 200mm up the walls of the scaffold frame. The walls would be lined with a plastic layer and will overlap the 200mm extended floor covering.	Contractor	Construction	Good Practice
SW15	Soil and Water	Flood emergency safeguards and mitigation measures would be included in the Project CEMP in consultation with the construction contractor.	Contractor	Pre-Construction	Good Practice
NV1	Noise and Vibration	Where alternative plant is available, the plant emitting the lowest noise levels is to be selected. Similarly, where an alternative method for undertaking a process of activity would result in reduced noise emissions, this must be considered, where practicable.	Contractor	Construction	CNVG Good Practice
NV2	Noise and Vibration	Engines would be switched off when equipment is not in use for extended periods (i.e. more than 30 minutes).	Contractor	Construction	CNVG Good Practice
NV3	Noise and Vibration	All construction plant and equipment used on site are to be: • Fitted with properly maintained suppression devices in accordance with the manufacturer's specifications, where feasible and reasonable. • Maintained in an efficient condition. • Operated in a proper and efficient manner.	Contractor	Construction	CNVG Good Practice

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV4	Noise and Vibration	All sensitive receivers (e.g. schools, local residents) likely to be affected would be notified at least five working days prior to commencement of any works associated with the activity that may have an adverse noise impact. The notification will provide details of: • the project. • the construction period and construction hours. • contact information for project management staff. • complaint and incident reporting and how to obtain further information. .	Contractor	Construction	CNVG Good Practice
NV5	Noise and Vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures site opening/closing times (including deliveries) environmental incident procedures	Contractor	Construction	CNVG Good Practice
NV6	Noise and Vibration	No swearing or unnecessary shouting or loud stereos/radios on site. Limit compression braking at night in residential areas. No dropping of materials from height, throwing of metal items and slamming of doors.	Contractor	Construction	CNVG Good Practice
NV7	Noise and Vibration	Respite would be scheduled as indicated in the noise assessment report and described in the CNVG.	Contractor	Construction	CNVG Good Practice
AQ1	Air quality	Vehicles and plant used on site are to be kept in efficient working order. The *Protection of the Environment Operations Act* 1997 and associated regulations must be complied with. The *POEO Regulation (Clean Air)* 2010 states that vehicles must not have continuous smoky emissions for more than 10 seconds.	Contractor	Construction	Good Practice
AQ2	Air Quality	Work vehicles / machinery would not be left running or idling when not in use.	Contractor	Construction	Good Practice

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
W1	Waste	The following resource management hierarchy principles would be followed in accordance with the Waste Avoidance and Resource Recovery Act 2001: • Avoid unnecessary resource consumption as a priority. • Use resource recovery measures (including re-use of materials, reprocessing, recycling and energy recovery) where waste generation cannot be avoided. • Dispose of wastes as a last resort.	Contractor	Construction	Good Practice *Waste Avoidance and Resource Recovery Act 2001*
W2	Waste	All waste material would be removed from the site once the activity is complete.	Contractor	Construction	Good Practice
W2	Waste	The work site would be kept tidy and free of rubbish at all times.	Contractor	Construction	Good Practice
LC1	Landscape character and visual amenity	The work site will be left in a tidy manner at the end of each workday.	Contractor	Construction	Good Practice
LC2	Landscape character and visual amenity	Construction plant and equipment would not remain on-site any longer than necessary after work is completed.	Contractor	Construction	Good Practice
AH1	Aboriginal Heritage	In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work would cease in the affected area and Transport for NSW's Environmental Officer, Sydney Region and the Transport for NSW Senior Environmental Specialist for Aboriginal Heritage would be contacted on advice on how to proceed. The Standard Management Procedure Unexpected Heritage Items would be followed in the event of the uncovering of a potential item.	Contractor	Construction	Good Practice

7.3 Licensing and approvals

Table 7-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Heritage Act 1977 (s60)	Permit to carry out activities to an item listed on the State Heritage Register or to which an interim heritage order applies from the Heritage Council of NSW.	Prior to start of the activity.

8. Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Section 193 of the Environmental Planning and Assessment Regulation 2021.

8.1 Justification

The Galston Timber Bridge (also known as Pearce's Creek or Tunks Creek Bridge) is a heritage listed McDonald timber truss bridge crossing Tunks Creek. The bridge was originally built in 1893 and has a current Bridge Health Index (BHI) rating of "Poor", initially due to the condition of the abutment wale braces. Further detailed inspection found that the cross-girders, butting blocks and abutment sheeting are deteriorating, bringing these components also into Poor condition. The existing condition impacts on the structural integrity of the bridge, necessitating a structural refurbishment to some elements of the bridge.

8.1.1 Social factors

The proposal is expected to have negligible negative social implications. It is recognised that the proposal will have some impacts to road users during construction as a result of lane closures. Impacts would include negligible visual impacts, traffic impacts and noise impacts, particularly during night works. However impacts would be temporary in nature. The safeguards and mitigation measures included in the environmental assessment (refer to section 6.2) would minimise impacts during construction.

There would however be positive social implications by undertaking this proposal. Rehabilitation Bridge BN390 would subsequently improve the safety of road users and preserve the heritage structure.

8.1.2 Biophysical factors

The proposal would only have minimial biophysical impacts- with no removal of native vegetation (refer to section 6.2). Vegetation removal would only occur in areas that are required to be directly impacted to allow for the rehabilitation works to be carried out.

8.1.3 Economic factors

By undertaking this proposal TfNSW also reduces the ongoing costs and risks to road users associated with the existing maintenance regime of the Bridge.

8.1.4 Public interest

The proposal would be of public interest due to the safety benefit it would provide. The proposal would rehabilitate the degraded structure subsequently improving the safety of road users.

8.2 Objects of the EP&A Act

Table 8-1 Objects of the Environmental Planning and Assessment Act 1979

Instrument	Requirement
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal improves road safety for users of Galston Road including users of the National Park.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development has been considered throughout the proposal, with the legislative context of ecological sustainable development considered in section 4 and the impact of the overall proposal and the REF proposal is considered in detail in section 5. An options process was also undertaken for the proposal that has considered a range of constraints (refer Section 2.4) Outcomes of further investigations would be considered as part of detailed design, constructability assessments and the construction contractor's construction environmental management plans. Mitigation measures are proposed to be implemented to minimise direct and indirect impacts of the proposal.
1.3(c) To promote the orderly and economic use and development of land.	Improving this site would support the use of the road and Berowra Valley National Park. The proposal would also improve safety and reduce the ongoing costs and risks to road users
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the project.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Construction of the proposal would not require the removal of vegetation.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal is seeking to rehabilitate a state heritage listed bridge in a sympathetic fashion so as to keep the bridge open for use.
1.3(g) To promote good design and amenity of the built environment.	The proposal has been developed with the aim to minimise the overall impact of the proposal on existing landscape character of the sites. However, construction the proposal would result in negligible unavoidable visual impacts.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the project
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Section 5 outlines the community and stakeholder consultation carried out during various stages of the proposal.

8.2.1 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during route options development (refer to Chapter 2). The precautionary principle has guided the assessment of environmental impacts for this REF and the development of mitigation measures.

- The best-available technical information, environmental standards and measures have been used to minimise environmental risks.
- Conservative 'worst case' scenarios were considered while assessing environmental impact.
- Specialist studies were incorporated to gain a detailed understanding of the existing environment.

Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The proposal would maintain safe road usage along the road for use for future generations. The proposal would also protect the safety of future generations by maintaining the integrity of the rock structure at all sites. The proposed scope of works is minor and would not impact on biological diversity or ecological integrity.

Conservation of biological diversity and ecological integrity

The proposal will result in minor biodiversity and ecological integrity impacts. Of the options considered, the selected option has the smallest impact while still achieving the proposal goals.

Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources that may be affected by the carrying out of a proposal, including air, water, land and living things.

Valuation of environmental resources has shaped the proposal and mitigation measures. The proposal demonstrates value to the community in regard to improved safety. The design of the proposal has considered all environmental impacts and have tried to reduce impacts to the greatest extent practicable.

8.3 Conclusion

The proposed Rehabilitation of Galston Road Bridge, BN390 over Tunks Creek in Berowra is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species and ecological communities and their habitats, and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal, as described in the REF, best meets the project objectives but would still result in some impacts on Heritage and Traffic and Transport. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve the safety

of Galston Road Bridge BN390 while being sympathetic to its important heritage fabric. On balance, the proposal is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared nor approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance nor the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999 (*Commonwealth). A referral to the Australian Department of Climate Change, Energy, the Environment and Water is not required.

9. Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Name:	Alexander Cooper
Position:	Environment Lead
Company name:	Connect Sydney
Date:	11/11/2024

I certify that I have reviewed and endorsed the contents of this REF and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under Section 170 of the EP&A Regulation, and the information is neither false nor misleading. I accept it on behalf of Transport for NSW.

Name:	Brad Becker [redacted]
Position:	Senior EHC Contract Relationship Manager
Transport region/program:	Road Maintenance and Resilience
Date:	14/11/2024

10. EP&A Regulation publication requirement

Table 10-1 EP&A Regulation publication requirement

Requirement	Yes/No
Does this REF need to be published under section 171(4) of the EP&A Regulation?	Yes

11. References

Department of Planning and Environment 2022, eSPADE, accessed online 21 March 2024 from https://www.environment.nsw.gov.au/eSpade2WebApp

Department of Environment and Conservation 2004, *Threatened Biodiversity Survey and Assessment Guidelines.*

Department of Planning and Environment 2022, Planning Portal, accessed online 20 March 2024 from https://www.planningportal.nsw.gov.au/publications/environmental-planning-instruments?title=&field_local_government_area_value=All&field_epi_type_value=SEPP&field_epi_status_value=All

Roads and Maritime Service (RMS) 2016, *Traffic volume viewer*, accessed online on the 20 March 2024 from ***http://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=11&lat=-34.00372329457109&lon=150.99991035461474&id=37022&ix=0&hv=0***

Assessing Heritage Significance, Department of Planning and Environment, 2023

Guidelines for preparing a Statement of Heritage Impact, Department of Planning and Environment, 2023

Design in Context: Guidelines for Infill Development in the Historic Environment, NSW Heritage Office and Royal Australian Institute of Architects, 2005

The Burra Charter, Australia ICOMOS (The International Council on Monuments and Sites), 2013.

Interim Construction Noise Guideline (ICNG) (DECC, 2009)

Road Noise Policy (RNP) (DECCW, 2011)

BS 7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2, BSI, 1993

DIN 4150:Part 3-2016 Structural vibration – Effects of vibration on structures, Deutsches Institute fur Normung, 1999

Assessing Vibration: a technical guideline (DEC, 2006)

Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

Noise Criteria Guideline (NCG) (Roads and Maritime, 2015)

Noise Mitigation Guideline (NMG) (Roads and Maritime, 2015)

Environmental Noise Management Manual (ENMM) (Roads and Traffic Authority, 2001).

Terms and acronyms used in this REF

Table 11-1 Terms and acronyms used in this REF

Term / Acronym	Description
AHIM	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ASS	Acid Sulphate Soils
BC Act	Biodiversity Conservation Act 2016 (NSW)
BDA	Biodiversity Development Assessment
BDAR	Biodiversity Development Assessment Report
CEMP	Construction environmental management plan
CP	Communication Plan
EIA	Environmental impact assessment
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
ENMM	Environmental Noise Management Manual
EPL	Environment protection licence
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	Fisheries Management Act 1994 (NSW)
Heritage Act	Heritage Act 1977 (NSW)
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NCG	Noise Criteria Guideline
NMG	Noise Mitigation Guideline
NPW Act	National Parks and Wildlife Act 1974 (NSW)
OEH	Office of Environment and Heritage within the Department of Planning and Environment
OOHW	Out of hours work
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PEMP	Project Environmental Management Plan
POEO Act	Protection of the Environment Operations Act 1997
QA Specifications	Specifications developed by Transport for use with road work and bridge work contracts let by Transport
RBLs	Rated background levels
REF	Review of Environmental Factors
RMS	NSW Roads and Maritime Services, now Transport for NSW
ROL	Road occupancy licence
Rw	Weighted sound reduction index
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act

Term / Acronym	Description
Transport and Infrastructure SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
SIS	State Infrastructure Strategy 2018 -2038
SRAPC	Sydney Roads Asset Performance
TGS	Traffic Guidance Scheme
TMP	Traffic Management Plan
Transport	Transport for NSW
WOL	Whole of Life consideration of all aspects of an asset's life cycle, including its purchase, operation, maintenance, repair, replacement, and disposal.

Appendix A - Consideration of section 171 factors and matters of national environmental significance and Commonwealth land

Section 171 Factors

In addition to the requirements of the Guideline for Division 5.1 assessments (DPE 2022) and the Roads and Related Facilities EIS Guideline (DUAP 1996) as detailed in the REF, the following factors, listed in section 171 of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
Any environmental impact on a community? There would be some temporary impacts to the community during construction, particularly in relation to traffic. The proposal would have a positive benefit on the community by improving safety on major roads.	Short-term negative impact during construction Long-term positive impact during operation
Any transformation of a locality? The proposal would not result in visual changes at any of the sites.	Nil
Any environmental impact on the ecosystems of the locality? The proposal is unlikely to have any impacts on the ecosystem at any of the sites.	Nil
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be some temporary impacts during construction particularly in relation to traffic detours. During operation the Proposal would have positive impacts to the community through improving road safety.	Short-term negative impact during construction. Long-term positive impact during operation
Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would rehabilitate a heritage listed bridge in a heritage sympathetic way to maintain it's heritage fabric into the future.	Long-term positive impact
Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposal is unlikely to have any impact on the habitat of protected fauna at any of the sites.	Minor negative impact.
Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal at all sites is unlikely to result in the endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air.	Minor negative impact.
Any long-term effects on the environment? The proposal is unlikely to have any long term effects on the environment at any of the sites as the proposed works are located within the road corridor.	Nil
Any degradation of the quality of the environment? During construction there is potential for traffic impacts. During operation, the proposal is unlikely to have any degradation of the quality of the environment at any of the sites.	Minor negative impact.
Any risk to the safety of the environment? The proposal is unlikely to cause any pollution or safety risks to the environment provided the recommended mitigation measures are implemented.	Nil
Any reduction in the range of beneficial uses of the environment?	Minor negative impact.

Factor	Impact
The proposal is unlikely to have any reduction in the range of beneficial uses of the environment.	
Any pollution of the environment? The proposal is unlikely to cause any pollution of the environment provided the recommended mitigation measures are implemented.	Nil
Any environmental problems associated with the disposal of waste? The proposal is unlikely to cause any environmental problems associated with the disposal of waste. All waste would be managed and disposed of in line with the CEMP requirements. Mitigation measures would be implemented to ensure waste is reduced, reused or recycled where practicable.	Minor negative impact.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal is unlikely to increase demands on resources that are or are likely to become in short supply.	Nil
Any cumulative environmental effect with other existing or likely future activities? Cumulative effects of the Proposal are described in Chapter 6.6. Where feasible, environmental management measures would be coordinated to reduce cumulative construction impacts. The proposal is unlikely to have any significant long term impacts	Minor negative impact.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not affect or be affected by any coastal processes or hazards.	Nil
Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1, See Section 4 of this REF for further information on statutory and planning framework	Nil
Other relevant environmental factors	In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Chapter 6 of this assessment.

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Department of Climate Change, Energy, the Environment and Water .

A referral is not required for proposed actions that may affect nationally-listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor		Impact
a	**Any impact on a World Heritage property?** There are no World Heritage Properties within or near the proposed work sites	Nil
b	**Any impact on a National Heritage place?** There are no National Heritage places within or near the proposed work sites	Nil
c	**Any impact on a wetland of international importance?** There are no wetlands of international importance within or near the proposed work sites	Nil
d	**Any impact on a listed threatened species or communities?** The proposal is unlikely to have any impacts on threatened species or communities. Mitigation measures would be implemented to ensure no impacts to any threatened communities.	Nil
e	**Any impacts on listed migratory species?** The proposed works is would not have any impacts on migratory species	Nil
f	**Any impact on a Commonwealth marine area?** The proposed works would not have any impacts on Commonwealth marine areas	Nil
g	**Does the proposal involve a nuclear action (including uranium mining)?** The proposal does not involve any nuclear action	Nil
h	**Additionally, any impact (direct or indirect) on the environment of Commonwealth land?** The proposal does not involve any direct or indirect impacts to the environment of Commonwealth land	Nil

Appendix B - Statutory consultation checklists

Transport and Infrastructure SEPP

Certain development types

Development type	Description	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
Car Park	Does the project include a car park intended for the use by commuters using regular bus services?	No	N/A	Section 2.110
Bus Depots	Does the project propose a bus depot?	No	N/A	Section 2.110
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No	N/A	Section 2.110

Development within the Coastal Zone

Development type	Description	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	N/A	Section 2.14

Note: See interactive map at ***Planning Portal NSW spatial viewer - find a property***. Note the coastal vulnerability area has not yet been mapped.

Note: a certified coastal zone management plan is taken to be a certified coastal management program.

Council related infrastructure or services

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
Stormwater	Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council?	No	N/A	Section 2.10
Traffic	Are the works likely to generate traffic to an extent that will *strain* the capacity of the existing road system in a local government area?	No	N/A	Section 2.10
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a *substantial*	No	N/A	Section 2.10

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
	impact on the capacity of any part of the system?			
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water?	No	N/A	Section 2.10
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow?	No	N/A	Section 2.10
Road & footpath excavation	Will the works involve more than *minor* or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	N/A	Section 2.10

Local heritage items

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	No	N/A	Section 2.11

Flood liable land

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent?	No	N/A	Section 2.12

Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance?	No	N/A	Section 2.13

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

Public authorities other than councils

Development type	Potential impact	Yes / No	If 'yes' consult with	SEPP (Transport and Infrastructure) Section
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act?	Yes	Environment and Heritage Group, DPE	Section2.15
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	Environment and Heritage Group, DPE	Section 2.15
Navigable waters	Do the works include a fixed or floating structure in or over navigable waters?	No	Transport for NSW - Maritime	Section 2.15
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service (RFS) [Refer to the NSW RFS publication: *Planning for Bush Fire Protection (2006)*]	Section 2.15
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	Section 2.15
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	Secretary of the Commonwealth Department of Defence	Section 2.15
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*?	No	Mine Subsidence Board	Section 2.15

Appendix C – Biodiversity Assessment

Mr Larry Melnick
Environmental Management Representative
ConnectSydney Pty Ltd
[redacted]

14 March 2024

Dear Larry,

BN0390 Galston Timber Bridge, Galston Road – Stage 2 and 3 works - Biodiversity Assessment

1. Introduction and background

At the request of ConnectSydney, on behalf of Transport for NSW ('Transport'), a targeted inspection of the Galston Timber Bridge, Dural, NSW, has been conducted. The inspection was undertaken by Ecologists Chelsea Tiller (B.Soc.Sc) and Mike Fawcett (Cert III Land Conservation Mng) on 23 January 2024 between the hours of 11:45 am and 1:00 pm. For reference, the weather conditions experienced at the time of the inspection were warm temperatures (25ºC), clear skies and still to slight breezes.

The objective of the inspection was primarily to determine if Yangochiroptera (insectivorous bats [hereafter referred to as 'microbats']) were roosting in association with the existing bridge structure. The inspection was required as Transport is proposing to carry out Stage 2 and 3 upgrade and structural refurbishment work on, and below, the existing Galston Timber Bridge, as part of the Sydney Road Asset Performance Contracts (SRAPC). Transport's objectives for these works is to ensure that, should microbats be present, the activities do not have an adverse impact on any roosting individuals.

For these works to occur, removal of vegetation in proximity to the bridge will be required to enable the placement of a temporary platform ladder and provision of access to the below deck bridge abutments. As such, consideration was also given to the occurrence of any threatened flora and Plant Community Types (PCT) in proximity to the existing bridge.

The vegetation that is proposed to be cleared is present immediately adjacent to (northern side) of the western abutment of the existing bridge, the clearing being in the order of (maximum) 5 metres (m) wide by 10 m high. The vegetation to be cleared is dominated by exotic plants that include Privet (*Ligustrum* sp) and Crofton Weed (*Ageratina adenophora*).

Post-work, based on the observation made during the course of the field survey and the predicted viability of the soil seed bank, unassisted natural regeneration of the disturbed areas will occur.

The growth form of those plants present within the construction footprint was determined with reference to DPE's native species by growth form database (DPE undated).

It is noted that no mature native trees, including those that are hollow-bearing, would require removal to permit the Stage 2 or 3 works. As no mature native trees would require removal to permit the bridge remediation works, Transport for NSW is not required to offset the removal of vegetation for this project. A consideration of matters in line with Transport for NSW's *The Tree and Hollow Replacement Program: An implementation plan for payments to and from the Transport for NSW Conservation Fund (2022)* [Tree and hollow replacement guidelines (EMF-BD-GD-0129)] is not required.

Galston Timber Bridge (also known as 'Tunks Creek Bridge', 'Galston Road Truss Bridge' and 'Pearces Creek Bridge'), is located along Galston Road, across Tunks Creek, within the Hornsby Shire Local Government Authority (LGA), about 40 kilometres north of Sydney (Figure 1).

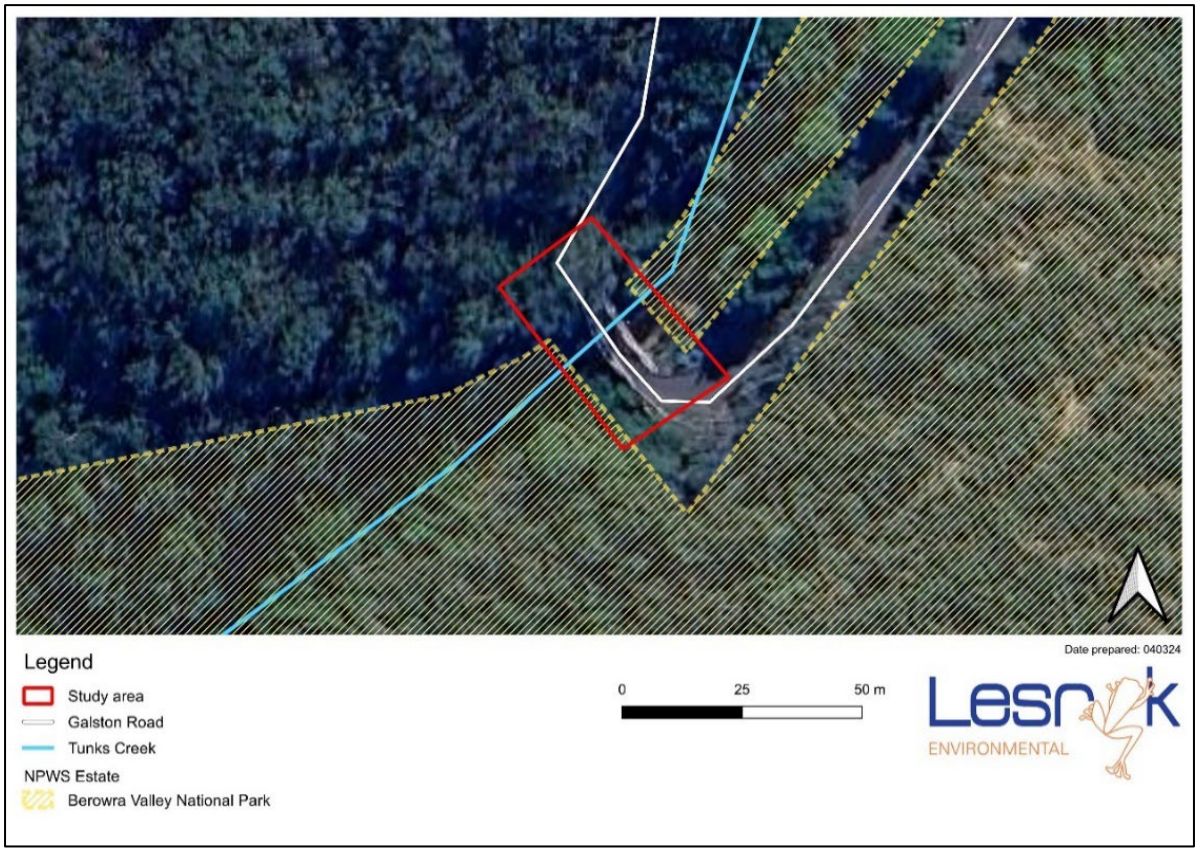


Figure 1 Locality of study area

The document *Galston Timber Truss Bridge Design Report* (Reference #520212) was prepared by Aurecon Australasia Pty Ltd as part of the works, on behalf of ConnectSydney (Aurecon 2023). Reference to the design report revealed the existing condition of Galston Timber Bridge is deteriorating and, as such, the structural integrity of the bridge is compromised, necessitating a structural refurbishment to some elements of the bridge.

Broadly, the scope of works proposed to be undertaken in two Stages, being:

Stage 2:

Installation of a temporary steel beam to support the deteriorated cross-girder no: 4 southern-abutment end and no: 20 northern-abutment end.

Raise the existing concrete plinth higher by a minimum of 600 mm.

Repair of the northern two butting blocks to delay ongoing deterioration. Reinstate the full section by plugging the hole until these components require full replacement.

Application of an appropriate sealant to fill the gaps in ensuring a watertight seal against weathering experiencing and to address timber rot.

Safe access-way to Tunks Creek (northern abutment end of the Galston Timber Bridge)

Stage 3:

Replacement of 7 timber cross girders.

Abutment A and B capwale and capwale temporary braces steel framing.

Replacement of timber deck corbel and deteriorated deck planks and North Abutment (B) timber sheeting partial replacement.

Further details on the scope of works are provided in the project Review of Environmental Factors.

Hereafter, unless a specific aspect of the work is referred to, the proposed scope of works, being the remediation of Galston Timber Bridge, is referred to as the 'proposed works.'

2. Method

2.1 Definitions

For the purpose of this assessment, the following definitions apply:

- **Subject site** is the areas directly affected by the Stage 2 and 3 works (as described in the Review of Environmental Factors prepared for this project), being the remediation works of Galston Timber Bridge. The subject site includes the footprint of the proposal (as per the 'limits' indicated in Figure 1) and any ancillary works: compounds, stockpile sites, facilities, accesses that support the construction or operation of the development or activity (State of NSW and OEH 2018).

- **Study area**: is the subject site and any additional areas that are likely to be affected by the proposal, either directly or indirectly (State of NSW and OEH 2018). For this purpose of this assessment, the study area includes those areas that occur up to 10 m beyond each of the proposed disturbance area.

- **Study region**: is considered to include the lands that surround the subject site for a distance of 10 km (Department of Environment and Climate Change 2007).

2.2 Threatened fauna survey

A review of the BioNet (Atlas of NSW Wildlife) (NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW] 2024; data accessed 30 January 2024) was conducted to identify those threatened species listed under the Schedules of the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), NSW *Biodiversity Conservation Act 2016* (BC Act) and/or NSW *Fisheries Management Act 1994* (FM Act) that have been previously recorded within 10 km of the study area (Attachment A).

Previously recorded threatened flora and fauna species in the vicinity of the study area, as per the BioNet Atlas, are presented in Figure 2 (note: some species' locations overlap due to having the same GPS coordinate on the BioNet where one 'record' may account for several animals/plants).

With reference to the BioNet database, those State and/or Federally listed microbats previously recorded within 10 km of Galston Timber Bridge are the:

- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Eastern Coastal Free-tailed bat (*Micronomus norfolkensis*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

Though not previously recorded within 10 km, reference to Transport's *Microbat Management Guidelines* (Transport for NSW 2023), also identifies the Southern Myotis (*Myotis macropus*) as a microbat species known to use Transport structures as roosting habitat. Therefore, it was considered necessary to also adopt a precautionary approach to the potential presence of this species during the investigation.

All of the identified microbat species are listed as Vulnerable under the BC Act; while the Large-eared Pied Bat is also listed as Endangered under the EPBC Act.

Of these, the Large-eared Pied Bat, Large Bent-winged Bat, Little Bent-winged Bat and Southern Myotis are 'cave-dependant' bats, known to occupy bridge structures; whilst the Yellow-bellied Sheathtail-bat, Greater Broad-nosed Bat, Eastern Coastal Free-tailed Bat and Eastern False Pipistrelle primarily occupy tree hollows (i.e. are hollow-dependent microbats), though have also been known to roost in buildings and similar structures (i.e. bridges).

During the course of the field survey, consideration was given to the presence of these microbats.

The Galston Timber Bridge subject site was accessed and foot traverses conducted across those portions of the bridge that were accessible (i.e. its deck) and the proximate Tunks Creek embankments.

Binoculars and a hand-held torch were used to inspect cavities and suitable crevices within those under-deck portions of Galston Timber Bridge, particularly those areas that could not be physically accessed (i.e., the bridge abutments, trusses). Fissures (i.e., cavities) that were covered by spider webs were not inspected; the existence of these negating the presence of microbats (i.e. if microbats were moving in and out of these sites their actions would prevent the development of spider webs).

In addition, during the course of the site inspection, any evidence that would suggest occupation by microbats (e.g., accumulation of guano, characteristic staining) was sought.

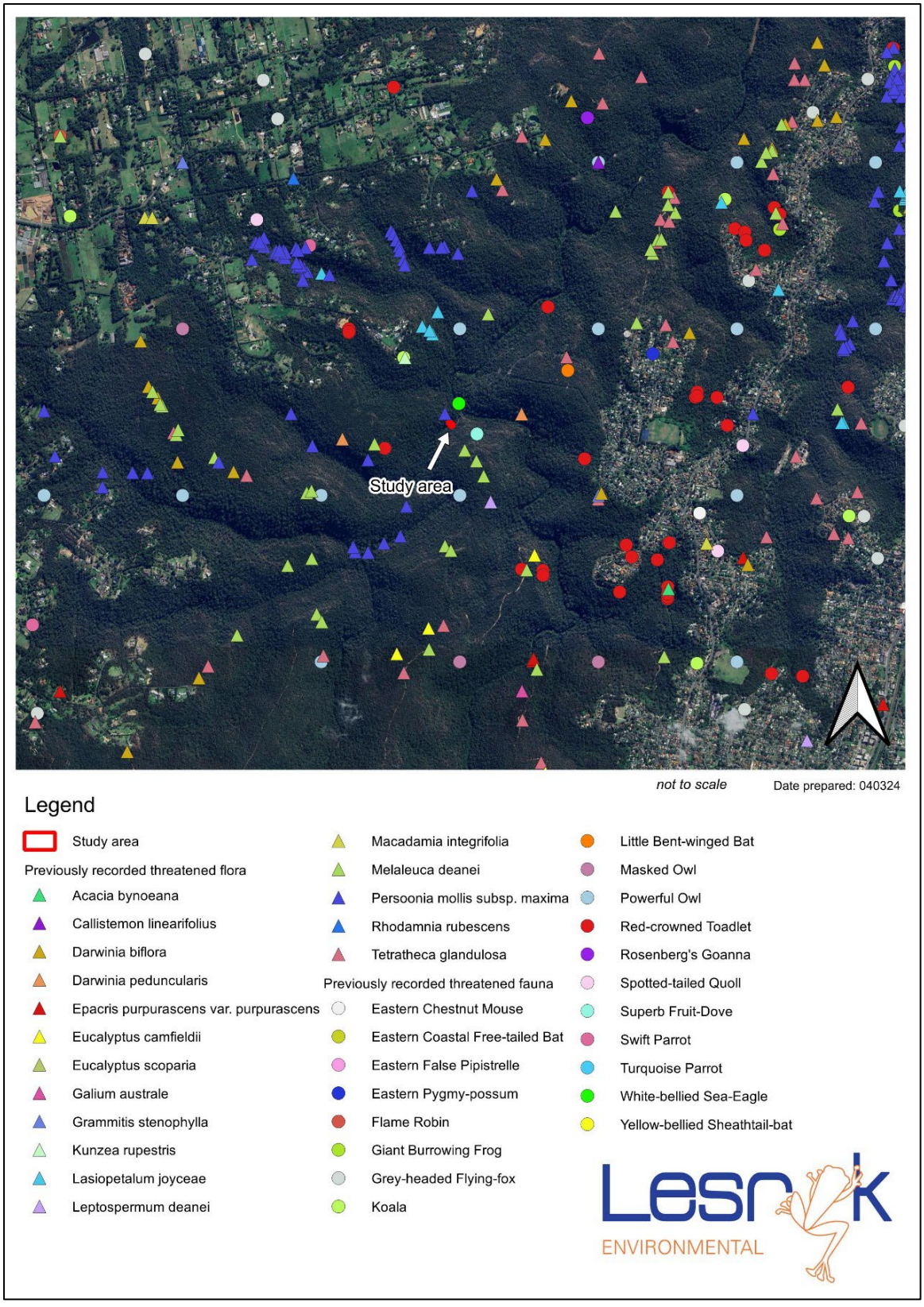


Figure 2 **Previously recorded threatened species (within 10 km) in vicinity to Galston Timber Bridge (NSW DCCCEEW 2024)**

2.3 Vegetation mapping

With reference to the State Vegetation Type Mapping (SVTM) (State Government of NSW and NSW DCCEEW 2022), the following PCTs have been mapped as occurring within the study area (Figure 3):

- PCT 3038 – Sydney Coastal Coachwood Gallery Rain Forest
- PCT 3176 – Sydney Enriched Sandstone Moist Forest
- PCT 3621 – Sydney Hinterland Turpentine-Apple Gully Forest.

2.4 Limitations

Access to closely inspect the underside of the bridge deck was not possible (given its height and presence above an open expanse of water); therefore, to overcome this limitation:

1. A hand torch was used to inspect any possible microbat roosting sites.
2. Searches were carried out below any potential roosting sites, these focusing on locating accumulations of bat guano.
3. A precautionary approach was adopted where applicable (i.e. where suitable microbat roosting habitat was noted).

3. Results

A photographic recorded is provided in Appendix 1.

Fauna Results

By the completion of the investigation, from visual inspections of the identified cavities (cracks and fissures) associated with the timber abutments of Galston Timber Bridge (refer to Appendix 1), although considered and targeted, no microbats were recorded roosting in association with this structure. In addition, no characteristic microbat guano accumulations or associated staining was observed.

Given the depth (~ 50 millimetres [mm]) and nature of the cavities present in association with the existing bridge, these being open and exposed to the elements due to shrinkage of the decking timbers, the identified features would not be suitable for the roosting requirements of cave-dependent microbats.

It is noted that the timber slats present beneath the bridge provided cavities that are to ~80 mm in depth, some of these being protected from the elements; however, as these remain exposed to sunlight during the diurnal period, they are considered unsuitable for the roosting requirements of microbats.

While previously recorded within 10 km of the study area, none of the additional threatened fauna species listed under the EPBC and/or BC Acts were recorded during the inspection. Given the character of the existing disturbed and modified area in association with the bridge, and the structure of the proximate fauna habitats recorded, the species identified in Attachment A are considered to have a low or unlikely likelihood of occurrence within the study area. These species are not considered to be reliant upon the habitats observed within the study area for any of their critical lifecycle requirements.

It is acknowledged that no hollow-bearing trees (suitable roosting habitat for those hollow-dependent microbats previously recorded in the study region) were observed within the study area.

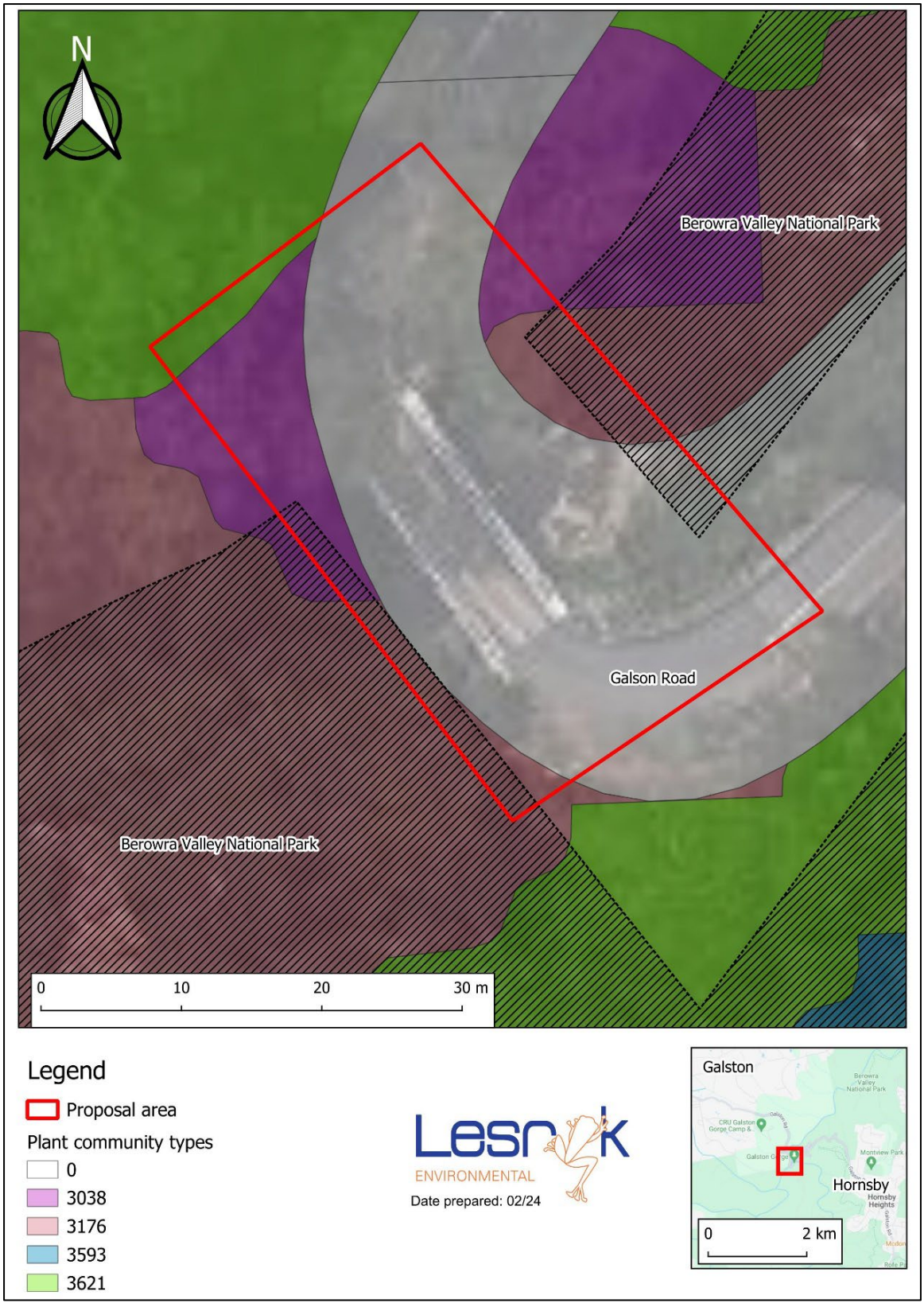


Figure 3 **Vegetation mapping (State Government of NSW and NSW DCCEEW 2022)**

The works proposed will occur above, and in proximity to (on the banks of) Tunks Creek. Reference to the Fisheries NSW Spatial Data Portal (DPI 2024a) indicates that Tunks Creek, and Berowra Creek which occurs downstream of the works site, are identify these as Key Fish Habitat[1] (KFH) [search: Hawkesbury Nepean]. No works are proposed to be undertaken within Tunks Creek, as such there will be no direct impact on this waterway or the receiving waters of Berowra Creek. Indirect impacts due to sediment inputs, chemical spills and so forth may arise; however, these would be addressed through the establishment of erosion and sedimentation control devices prior to the commencement of work.

During the course of the field survey, no State or Federally listed threatened animals, or areas of their documented habitats, were observed. The habitats associated with the existing bridge have been disturbed by past road works and on-going site maintenance. Considering the scope of works required to achieve the objectives of Stage 2 and 3, these including raising of the existing concrete plinth, installing steel beams and providing safe access to the bridge abutments for workers, no habitats significant for the local occurrence of native fauna, particularly those species listed under the EPBC and/or BC Act that have been previously recorded in the surrounding region, would be directly or indirectly affected.

Vegetation results

With reference to the following PCTs—as described in the BioNet Vegetation Classification (NSW Government 2024), the field survey confirmed the vegetation mapping for the study area is accurate as:

PCT 3028 Sydney Coastal Coachwood Gallery Rain Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater).
- Occurs along streams on creek flats and alluvial flats, and sometimes on sheltered lower slopes, in north-east metropolitan Sydney.
- The dominant canopy species were Turpentine (*Syncarpia glomulifera*), Sydney Peppermint (*Eucalyptus piperita*) and Blackbutt (*Eucalyptus pilularis*), which are listed as diagnostic species.
- The midstory was comprised of Coachwood (*Ceratopetalum apetalum*), Blueberry Ash (*Elaeocarpus reticulatus*) and Water Gum (*Tristaniopsis laurina*), which are listed as diagnostic species.
- The mean rainfall of the area is between 1060 – 1250 mm and the site occurs at elevations <90 m Above Sea Level (ASL).

PCT 3176 Sydney Enriched Sandstone Moist Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater)
- The dominant canopy species include Turpentine, Sydney Peppermint and Blackbutt which are listed as diagnostic species.
- The midstory was comprised of Forest Oak (*Allocasuarina torulosa*), Blueberry Ash, Sweet Pittosporum (*Pittosporum undulatum*) and Mock Olive (*Notolaea longifolia*), which are listed as diagnostic species.
- Occurs in low elevation gullies that incise the shale rich landscapes of the north shore of Sydney where rainfall exceeds 1100 mm per annum.

[1] Essentially KFH is defined to include all marine and estuarine habitats up to highest astronomical tide level (that reached by 'king' tides) and most permanent and semi-permanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank. Small headwater creeks and gullies (known as first and second order streams), that only flow for a short period after rain are generally excluded, as are farm dams constructed on such systems. Wholly artificial waterbodies such as irrigation channels, urban drains and ponds, salt and evaporation ponds are also excluded except where they are known to support populations of threatened fish or invertebrates (https://www.dpi.nsw.gov.au/fishing/habitat/protecting-habitats).

PCT 3261 Sydney Hinterland Turpentine-Apple Gully Forest

- Is within a listed IBRA region (Sydney Basin) and Subregion (Pittwater)
- Occurs on Hawkesbury Sandstone (Hawkesbury Soil Landscape) slopes and gullies on the Sydney hinterland plateaus.
- The dominant canopy species were Turpentine and Sydney Peppermint, which are listed as diagnostic species.
- The midstory was comprised of Blueberry Ash, Forest Oak, Christmas Bush (*Ceratopetalum gummiferum*) and Narrow-leaved Geebung (*Persoonia linearis*), which are diagnostic species.
- The groundcover consisted of Grass Tree (*Xanthorrhoea arborea*), Small Rasp Fern (*Doodia caudata*) and Bracken Fern (*Pteridium esculentum*) and Native Sarsaparilla (*Smilax glyciphylla*), which are diagnostic species.

It is acknowledged PCT 3176 – Sydney Enriched Sandstone Moist Forest is associated with the BC Act listed Critically Endangered Ecological Community (CEEC) known as 'Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion'. The NSW Scientific Committee's Final Determination for this CEEC notes that this name is given to the species assemblage of macrofungi present in Lane Cove National Park, the majority of which occur in gallery rainforest centered on the banks of the north-eastern arm of Gore Creek and its tributaries in Lane Cove Bushland Park.

As the proposed works do not occur within, or in proximity to the geographic location of Lane Cove Bushland Park, it was determined that PCT 3176 within the proposed works area was not a component of this threatened ecological community (TEC).

Flora results

During the completion of the field survey, a number of plants were recorded (Appendix 2). It is noted that Appendix 2 is not intended to be a comprehensive list of all of the species present within the study area, and only represents those plants that were recorded whilst undertaking searches for:

- native species and ecological communities of State and/or national conservation concern that are known, or expected to occur, in the locality
- Schedule 3 Weeds of the NSW Biosecurity Regulation 2017 that would require treatment.

Whilst detected within 10 km of the study area, reference to the BioNet database indicates that no threatened flora have been previously recorded within, or in close proximity to, the subject site (Figure 2). The closest recording, being one *Persoonia mollis* subsp. *maxima* (listed as Endangered under the EPBC and BC Acts) individual that was detected in 1999, is located about 70 m north-west of the subject site.

None of the plants recorded during the field investigation are listed, or currently being considered for listing, under the Schedules to the EPBC or BC Acts.

All of the native species recorded are identified as being common and abundant throughout their distribution ranges (Harden 1992-2002, Fairley and Moore 2010). The limited extent of vegetation disturbance required, particularly down the embankment to access to the bridge abutments, is not expected to affect the viability of their local or regional populations.

Under the NSW *Biosecurity Act 2015* 'all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Of those introduced plants recorded, Blackberry (*Rubus fruticosus* agg. spp) is listed:

- Under Schedule 3 of the NSW Biosecurity Regulation 2017
- As Priority weeds for the Greater Sydney (including the Hornsby Shire LGA) (DPI 2024a)
- As a Weed of National Significance (WoNS) (DPI 2024b).

Ludwigia (*Ludwigia peruviana*) was also recorded within the proposed works area and is listed as a priority weed for the Greater Sydney region (DPI 2024a).

It is recommended these species be removed as part of the vegetation clearing works.
As no TECs, threatened flora and fauna species, or significant components of their habitat, were recorded within, or in close proximity to, the construction footprint of the proposed works, and none are considered likely to occur, no assessments referencing the EPBC Act Significant Guidelines or the criteria provided under Section 7.3 of the BC Act are considered necessary.

4. Conclusion

No microbats were recorded roosting in association with Galston Timber Bridge, and no evidence of their potential presence was obtained.

Given the character of the cavities identified in association with the bridge (as detailed in Section 4 of this report), these are not considered to represent suitable roosting habitat for the requirements of cave-dependent microbats.

Furthermore, no suitable roosting habitat for any potentially occurring hollow-dependent microbats (i.e., hollow-bearing trees) was observed within the study area.

No TECs, threatened flora or fauna species were recorded or considered likely to occur within, or in close proximity to, the Stage 2 or 3 works area. Therefore, no assessments referencing the EPBC Act Significant Guidelines or the criteria provided under Section 7.3 of the BC Act are considered necessary.

The Stage 2 and 3 works will not present any barries to the dispersal or movement patterns of native animals or plant propagules.

Where present on-site, it is recommended that the weeds: Blackberry and Ludwigia, be removed.

Beyond the standard procedures that ConnectSydney adopts in regards to incidental fauna encounters, no specific mitigation measures for microbat management are recommended.

If you require any further information on this matter, please contact the under signed on (0408) 258 129.

Yours sincerely,

[redacted]

Director

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Appendix 1: Photographic record (taken 23/01/2024)

Plate 1: Galston Timber Bridge at the time of inspection and its surrounding vegetation. Photo taken facing north-west.

Plate 2: Structure of the northern abutment and bridge underside.

Plate 3: Character of northern abutment.

Plate 4: Structure of eastern abutment. Photo taken facing south-east.

Plate 5: Character of eastern abutment.

Plate 6: Character of surrounding vegetation and Tunks Creek.

Appendix 2: Flora Species List

KEY
- WoNS
– priority weeds
* - weed

FAMILY	Scientific Name	Common Name
FILICOPSIDA		
Blechnaceae	*Doodia caudata*	Small Rasp Fern
Cyatheaceae	*Cyathea cooperi*	Straw Treefern
Dennstaedtiaceae	*Pteridium esculentum*	Bracken Fern
Gleicheniaceae	*Sticherus flabellatus var. flabellatus*	Shiny Fan Fern
Thelypteridaceae	*Cyclosorus dentatus*	Binung
MAGNOLIOPSIDA - DICOTYLEDONS		
Apocynaceae	*Araujia sericifera**	Moth Vine
Asteraceae	*Ozothamnus diosmifolius*	White Dogwood
	Conyza bonariensis *	Fleabane
	Ageratina adenophora *	Crofton Weed
	Ageratina riparia *	Mistflower
	Bidens pilosa *	Farmers Friend
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Cunoniaceae	*Callicoma serratifolia*	Black Wattle
	Ceratopetalum apetalum	Coachwood
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Fabaceae: Mimosoideae	*Acacia longiflora* var. *longifolia*	Sydney Golden Wattle
	Acacia suaveolens	Sweet-scented Wattle
Meliaceae	*Melia azedarach*	White Cedar
Menispermaceae	*Stephania japonica* var. *discolor*	Snake Vine
	Leptospermum trinervium	Paperbark Tea-tree
Moraceae	*Ficus coronata*	Sandpaper Fig
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
	Eucalyptus pilularis	Blackbutt
	Tristaniopsis laurina	Water Gum
	Syncarpia glomulifera	Turpentine
Oleaceae	*Notelaea longifolia*	Mock Olive
	Ligustrum lucidum *	Large-leaved Privet
	Ligustrum sinense *	Small Leaved Privet
Onagraceae	*Ludwegia longifolia**	Primrose Willow
	Ludwigia peruviana *	Ludwigia
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Protaceae	*Hakea salicifolia*	Willow-leaved Hakea

FAMILY	Scientific Name	Common Name
	Persoonia linearis	Narrow-leaved Geebung
Rosaceae	*# Rubus fruticosus* agg. spp. *	Blackberry
Sapindaceae	*Dodonaea triquetra*	Common Hop Bush
Smilacaceae	*Smilax glyciphylla*	Native Sarsaparilla
	Solanum aviculare	Kangaroo Apple
Stylidiaceae	*Stylidium productum*	Trigger Plant
Verbenaceae	*Verbena bonariensis* *	Purpletop
MAGNOLIOPSIDA - MONOCOTYLEDONS		
Asparagaceae	*Chlorophylum comosum**	Spider Plant
	Eustrephus latifolius	Wombat Berry
Asphodelaceae	*Dianella caerulea*	Blue Flax Lily
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge
Juncaceae	*Juncus sp.*	Rush
Lomandraceae	*Lomandra longifolia*	Mat Rush
	Xanthorrhoea arborea	Grass-tree
Poaceae	*Ehrharta erecta* *	Panic Veldt Grass
	Entolasia stricta	Wiry Panic
	Microlaena stipoides	Weeping Grass
	Oplismenus imbecillis	Basket Grass

Attachment A: BioNet Atlas search

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -33.62 West: 151.03 East: 151.13 South: -33.72] returned a total of 3,013 records of 65 species.

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Myobatrachidae	3116	*Pseudophryne australis*		Red-crowned Toadlet	V,P		252
Animalia	Amphibia	Limnodynastidae	3042	*Heleioporus australiacus*		Giant Burrowing Frog	V,P	V	20
Animalia	Amphibia	Hylidae	3166	*Litoria aurea*		Green and Golden Bell Frog	E1,P	V	1
Animalia	Reptilia	Varanidae	2287	*Varanus rosenbergi*		Rosenberg's Goanna	V,P		7
Animalia	Aves	Columbidae	0023	*Ptilinopus superbus*		Superb Fruit-Dove	V,P		2
Animalia	Aves	Apodidae	0334	*Hirundapus caudacutus*		White-throated Needletail	P	V,C,J,K	8
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*		White-bellied Sea-Eagle	V,P		6
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		4
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*		Square-tailed Kite	V,P,3		3
Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*		Sooty Oystercatcher	V,P		3
Animalia	Aves	Scolopacidae	0167	*Limicola falcinellus*		Broad-billed Sandpiper	V,P	C,J,K	1
Animalia	Aves	Cacatuidae	0268	*^^Callocephalon fimbriatum*		Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	E2,V,P,3	E	6
Animalia	Aves	Cacatuidae	0268	*^^Callocephalon fimbriatum*		Gang-gang Cockatoo	V,P,3	E	6

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Aves	Cacatuidae	8862	*^Calyptorhynchus lathami lathami*		South-eastern Glossy Black-Cockatoo	V,P,2	V	36
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*		Little Lorikeet	V,P		5
Animalia	Aves	Psittacidae	0309	*Lathamus discolor*		Swift Parrot	E1,P	CE	3
Animalia	Aves	Psittacidae	0302	*^^Neophema pulchella*		Turquoise Parrot	V,P,3		2
Animalia	Aves	Strigidae	0246	*^^Ninox connivens*		Barking Owl	V,P,3		4
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*		Powerful Owl	V,P,3		220
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*		Masked Owl	V,P,3		14
Animalia	Aves	Tytonidae	9924	*^^Tyto tenebricosa*		Sooty Owl	V,P,3		1
Animalia	Aves	Meliphagidae	0603	*^Anthochaera phrygia*		Regent Honeyeater	E4A,P,2	CE	2
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*		Varied Sittella	V,P		2
Animalia	Aves	Petroicidae	0382	*Petroica phoenicea*		Flame Robin	V,P		1
Animalia	Aves	Estrildidae	0652	*Stagonopleura guttata*		Diamond Firetail	V,P	V	1
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*		Spotted-tailed Quoll	V,P	E	13
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	E1,P	E	14
Animalia	Mammalia	Burramyidae	1150	*Cercartetus nanus*		Eastern Pygmy-possum	V,P		39
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	86
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		4
Animalia	Mammalia	Molossidae	1329	*Micronomus norfolkensis*		Eastern Coastal Free-tailed Bat	V,P		3
Animalia	Mammalia	Vespertilionidae	1353	*Chalinolobus dwyeri*		Large-eared Pied Bat	V,P	E	1
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*		Eastern False Pipistrelle	V,P		4
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*		Greater Broad-nosed Bat	V,P		2
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*		Little Bent-winged Bat	V,P		7

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*		Large Bent-winged Bat	V,P		20
Animalia	Mammalia	Muridae	1466	*Pseudomys gracilicaudatus*		Eastern Chestnut Mouse	V,P		2
Animalia	Gastropoda	Camaenidae	I130	*Pommerhelix duralensis*		Dural Land Snail	E1	E	5
Plantae	Flora	Dilleniaceae	14733	*^Hibbertia spanantha*		Julian's Hibbertia	E4A,2	CE	10
Plantae	Flora	Dilleniaceae	11250	*Hibbertia superans*			E1		6
Plantae	Flora	Elaeocarpaceae	6205	*Tetratheca glandulosa*			V		224
Plantae	Flora	Ericaceae	7752	*Epacris purpurascens var. purpurascens*			V		52
Plantae	Flora	Fabaceae (Mimosoideae)	3728	*Acacia bynoeana*		Bynoe's Wattle	E1	V	10
Plantae	Flora	Grammitidaceae	9471	*^^Grammitis stenophylla*		Narrow-leaf Finger Fern	E1,3		5
Plantae	Flora	Haloragaceae	3257	*Haloragodendron lucasii*			E1	E	3
Plantae	Flora	Malvaceae	6140	*Lasiopetalum joyceae*			V	V	986
Plantae	Flora	Myrtaceae	4007	*^^Callistemon linearifolius*		Netted Bottle Brush	V,3		6
Plantae	Flora	Myrtaceae	4024	*Darwinia biflora*			V	V	313
Plantae	Flora	Myrtaceae	4031	*Darwinia peduncularis*			V		26
Plantae	Flora	Myrtaceae	4067	*Eucalyptus camfieldii*		Camfield's Stringybark	V	V	38
Plantae	Flora	Myrtaceae	4134	*Eucalyptus nicholii*		Narrow-leaved Black Peppermint	V	V	1
Plantae	Flora	Myrtaceae	8907	*Eucalyptus scoparia*		Wallangarra White Gum	E1	V	2
Plantae	Flora	Myrtaceae	4212	*Kunzea rupestris*			V	V	1
Plantae	Flora	Myrtaceae	8314	*Leptospermum deanei*			V	V	6
Plantae	Flora	Myrtaceae	4248	*Melaleuca deanei*		Deane's Paperbark	V	V	79
Plantae	Flora	Myrtaceae	4283	*Rhodamnia rubescens*		Scrub Turpentine	E4A	CE	3
Plantae	Flora	Myrtaceae	4293	*Syzygium paniculatum*		Magenta Lilly Pilly	E1	V	6

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Plantae	Flora	Orchidaceae	4464	*^Genoplesium baueri*		Bauer's Midge Orchid	E1,P,2	E	16
Plantae	Flora	Orchidaceae	9671	*^Genoplesium plumosum*		Tallong Midge Orchid	E4A,P,2	E	2
Plantae	Flora	Proteaceae	5365	*^^Grevillea caleyi*		Caley's Grevillea	E4A,3	CE	1
Plantae	Flora	Proteaceae	9680	*Macadamia integrifolia*		Macadamia Nut		V	11
Plantae	Flora	Proteaceae	5458	*^^Persoonia hirsuta*		Hairy Geebung	E1,P,3	E	4
Plantae	Flora	Proteaceae	8995	*Persoonia mollis subsp. maxima*			E1,P	E	384
Plantae	Flora	Rubiaceae	5680	*Galium australe*		Tangled Bedstraw	E1		7
Plantae	Flora	Thymelaeaceae	6965	*Pimelea curviflora var. curviflora*			V	V	1

Appendix D – Statement of Heritage Impact

Galston Timber Bridge: Refurbishment

Statement of Heritage Impact

Report to Aurecon

March 2024

artefact

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Artefact acknowledges Aboriginal and Torres Strait Islander peoples as the traditional owners and custodians of the lands and waters of Australia.

We acknowledge the Gadigal and Wangal people of Pirrama (Pyrmont) where our Sydney office is located. We pay our respects to them, their culture and their Elders past and present.

Document history and status

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EXECUTIVE SUMMARY

Project background

ConnectSydney, on behalf of Transport for NSW (TfNSW), proposes to upgrade and refurbish the Galston Timber Bridge (the proposal) as part of the Sydney Road Asset Performance Contracts (SRAPC). SRAPC is an initiative to provide a better experience for road users by delivering modern, secure and integrated road infrastructure across the Greater Sydney area.

Galston Timber Bridge is located within the Local Government Authority (LGA) area of Hornsby Shire, about 40 kilometres north of Sydney Central Business District (CBD). Galston Timber Bridge is located on Main Road 161, Galston Road and is an historic McDonald timber truss road bridge. The bridge is owned by Hornsby Shire Council, however management control of and responsibility for the bridge fall to TfNSW. Galston Timber Bridge is heritage listed on the following statutory heritage registers:

- State Heritage Register (SHR), *Bridge over Tunks (Pearces) Creek*, Listing No. 01478
- Roads and Maritime Services (now Transport for NSW) Section 170 Heritage and Conservation Register (S170), *Pearces Creek Bridge, Galston Gorge*, Listing No. 4300009
- Hornsby Local Environmental Plan 2013, *Galston Gorge timber bridge*, Item No. A46.

In its current condition, Galston Timber Bridge has been assessed to have severe deterioration of the following timber elements:

- Cross girders supporting the deck
- Paint deterioration
- Truss end block rot
- Timber piles and abutment deterioration.

To maintain the significance of Galston Timber Bridge, the proposal has been staged to provide a targeted approach to the repair and conservation of the bridge, as described in the sections that follow. The works that form the focus of this SOHI and associated Section 60 application are in bold text for emphasis.

Stage 1 - Routine maintenance activities

- Tightening of loose bolts, replacement of missing bolts
- Removal of leaves and debris from the abutment shelf and between deck planks. Increasing the regular maintenance to 6 months for debris removal at deck level, along the truss and abutments will improve drainage and reduce water ponding

- Monitoring of abutment sheeting for movement and further crushing or support failure
- Local application of protective treatment where approved.

The above activities are to be undertaken as part of the bridge's "routine" maintenance which are typically on an annual basis. It is noted these works form exempt activities and are not subject to detailed assessment within this report.

Stage 2 - Short term (within 1 year) (2024)

- Cleaning and repainting of the truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris. A paint assessment has determined the extent of the paint failure and need for repainting. Cleaning and repainting of all existing timber truss elements is required
- Repair of the northern two butting blocks to delay ongoing deterioration. Reinstate the full section by plugging the hole until these components require full replacement
- **Raise the existing concrete plinth higher by a minimum of 600 mm**
- **Improve pile durability by filling gaps around the base and sloping the concrete shelf to allow water to drain off**
- **Partial replacement of deck corbel if deteriorated including bolt connections**
- **Install temporary steel cross girders.**

Stage 3 - Medium term (within 3 years) (2025)

- **Replace 7 timber cross girders**
- **North Abutment (B) timber sheeting partial replacement**
- **Replacement of timber deck corbel and deteriorated deck planks**
- **Abutment A and B capwale and wale temporary braces steel framing**
- **Geotechnical investigations for design parameters regarding redesign of North Abutment (B).**

Stage 4 - Long term (within 5 years) (2029)

- **Replacement of North Abutment (B) with concrete soldier piles, setout to follow the original 1893 abutment alignment**
- **The external timber sheeting, wale, capwale and piles will be reinstated with timber members to match the construction of the existing abutment for aesthetic purposes only. This requires significant excavation and will impact adjacent dry-stone slope and extensive temporary truss support will be required**
- **Subsurface drainage can be undertaken in conjunction with the abutment replacement, due to the extent of excavation**
- **Full replacement of capwale/wale at South Abutment (A)**

- **Replacement of North Abutment (B) truss butting blocks, with full truss support to enable access.**

Artefact Heritage (Artefact) has been engaged by Aurecon, on behalf of ConnectSydney, to provide a Statement of Heritage Impact (SOHI) to assess the potential heritage impacts of the above proposal on Galston Timber Bridge and provide the relevant mitigation measures and recommendations to avoid or reduce the heritage impacts of the proposal on the Bridge.

Conclusion

This report concludes the following:

- The proposed works would result in a **Minor Adverse** impact (Physical) and a **Minor Adverse** impact (Visual) on the 'Bridge over Tunks (Pearces) Creek' heritage item (SHR Listing No. 01478)
- All nearby heritage items which are not the timber truss bridge are unlikely to be impacted by the proposed works.

Recommendations

General recommendations

The following management guidelines should be followed for all aspects of the proposed works:

- All works are to be undertaken in accordance with the principles and objectives of the *Burra Charter: the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (the *Burra Charter)*
- The works have been designed to minimise and avoid impacts on highly significant fabric in accordance with the guidelines, *How to Carry Out Work on Heritage Buildings & Sites* (NSW Heritage Office 2002).
- Works to be undertaken on fabric that is of high significance (as identified in Section 5.2.3 of this report) should only be undertaken by tradespersons with experience in working with heritage materials
- The methods, tools and materials used should not cause inadvertent damage to fabric that is of high significance (as identified in Section 5.2.3 of this report). Should unexpected damage to significant historic fabric occur, the advice of a heritage specialist must be sought before repairs are made
- Should further deterioration of significant historic fabric occur, the advice of a heritage specialist and experienced structural engineer must be sought before repairs are made

- Where options exist for alternative installation methodologies and materials, that achieve the desired functional outcome, preference should be given to the option that has the least impact on significant heritage fabric
- A Photographic Archival Recording (PAR) should be undertaken of all areas proposed for maintenance and repair activities in accordance with Policy 11 of the NSW Timber Truss Road Bridges Overarching CMP 2018. The PAR should be undertaken prior to, during and following completion of works. This PAR should be undertaken in accordance with the Heritage Council of NSW guidelines *Photographic Recording of Heritage Items using Film or Digital capture* (Revised 2006). A digital copy of the PAR would be provided to Heritage NSW, Hornsby Shire Council and TfNSW
- A site wide interpretation strategy should be developed and implemented after the proposed works to ensure the ongoing interpretation of the historical development of the bridge (subject to Transport for NSW approval and funding),
- TfNSW *Unexpected heritage items procedure* must be implemented (EMF-HE-PR-0076) for all excavation works. In the event of any unexpected archaeological finds being encountered, all works must cease immediately and a suitably qualified heritage consultant must be contacted for advice. In the unlikely event that 'relics' of local or State significance are discovered, further archaeological permits may be required
- If TfNSW have a protocol for liaising with National Trust of Australia (NSW) about prospective works to listed items, then TfNSW should be action this prior to carrying out any major works on the bridge.

Design recommendations

The following elements of design should be issued to a qualified heritage specialist for review prior to their finalisation to mitigate and minimise potential impact on the heritage significance of the Galston Timber Bridge:

- The finalised detailed design of the temporary support works
- The finalised constructability report for the project.

Protection of heritage fabric during works

The following recommendations and mitigation measures are provided to minimise potential physical impact to original and highly significant fabric of the study area:

- A Construction Heritage Management Plan (CHMP) should be produced and reviewed by a suitably qualified heritage specialist prior to the commencement of work. The CHMP should set out appropriate fabric protection to be installed to all adjacent significant fabric for the duration of the works and the proposed noise and vibration monitoring which will be implemented for the duration of the works.

The following recommendations and mitigation measures are provided in order to minimise potential indirect impact to the heritage items in the vicinity:

- If any inadvertent damage occurs to heritage items located in the vicinity of the study area due to the proposed works (including the locally listed Galston Gorge culvert, Galston Gorge sandstone buttressing, and Galston Gorge water troughs), the damage must be reported immediately to the Project Manager and the relevant heritage specialists. Damage is to be made good in accordance with specialist heritage advice.

Mitigation measures

Before works

- The detailed design of temporary support works will be determined by the contractor for TfNSW. Further heritage review of the temporary works design by an experienced heritage specialist prior to construction is required before works can commence
- A Construction Environmental Management Plan (CEMP) containing heritage input and advice from a heritage specialist is required for the contractor to implement on site.

During works

- All works are to be conducted in line with the conservation policies outlined in the *NSW Timber Truss Road Bridges Overarching Conservation Management Plan* (Roads and Maritime Services [RMS], 2018)
- Vibration monitoring of the bridge must occur during the construction phase of the works. in accordance with the Construction Heritage Management Plan.
- All contractors are to participate in a heritage induction and toolbox talk prior to commencing works to ensure they understand the significance of the Galston Timber Bridge, and areas to avoid. This must be prepared and delivered by a heritage specialist.

After works

- The site is to be made good following completion of maintenance and repair works
- A heritage interpretation specialist should prepare a Heritage Interpretation Strategy for the bridge (subject to Transport for NSW approval and funding), including recommendations for appropriate interpretation of the history and significance of the bridge in the nearby laydown / car park areas and nearby bushwalks. This could include (but is not limited to) updated signage on the approaches to the bridge, outlining the key stories, themes and cultural significance of Galston Timber Bridge
- The SHI database entries for the Galston Timber Bridge should be updated to record the latest repair works.

Heritage approval

Section 60

A Section 60 application is required for this project, and specifically for the Stage 2-4 works that are highlighted in bold text in the proposal description in Section 6.2.

. The Section 60 application does not include those Stage 1 and Stage 2 works (including routine cleaning and maintenance activities) which would be subject to Standard Exemptions from Heritage NSW approval.

ConnectSydney, on behalf of TfNSW, would be required to seek Land Owner's Consent and lodge a Section 60 application for Heritage NSW review. Approval of the Section 60 application must be received prior to commencement of construction.

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LIST OF ABBREVIATIONS

Artefact	Artefact Heritage Services Pty Ltd
BHI	Bridge Health Index
Burra Charter	*Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance* (2013) guide to caring for heritage places in Australia, available online from Australia ICOMOS
c.	Circa (about)
CEMP	Construction Environmental Management Plan
CHMP	Construction Heritage Management Plan
CMP	Conservation Management Plan
DCP	Development Control Plan (a Council guideline for development which accompanies and elaborates on the Council's Local Environmental Plan)
DP	Deposited Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Heritage Act	*Heritage Act 1977*
Heritage NSW	Heritage New South Wales (the office of the Heritage Council of New South Wales, NSW Department of Climate Change, Energy, the Environment and Water. Previously also known as the Heritage Branch, the NSW Heritage Office and the Heritage Division of the Office of Environment and Heritage—OEH)
ICOMOS	International Council of Monuments and Sites
km	Kilometre
LGA	Local Government Area
LEP	Local Environmental Plan (made by local government Councils)
m	Metre
NSW	New South Wales
PAR	Photographic Archival Recording
S170	Section 170 of the NSW *Heritage Act 1977* which requires government agencies to keep a Heritage & Conservation Register of the heritage places they own and manage
SHI	State Heritage Inventory (Heritage NSW's response to requirement to keep a publicly accessible list of all statutory-listed heritage places under *NSW Heritage Act 1977*)
SHR	State Heritage Register
SOHI	Statement of Heritage Impact
Study area	Area designed within the report of the potential impact of the proposed works
TfNSW	Transport for New South Wales

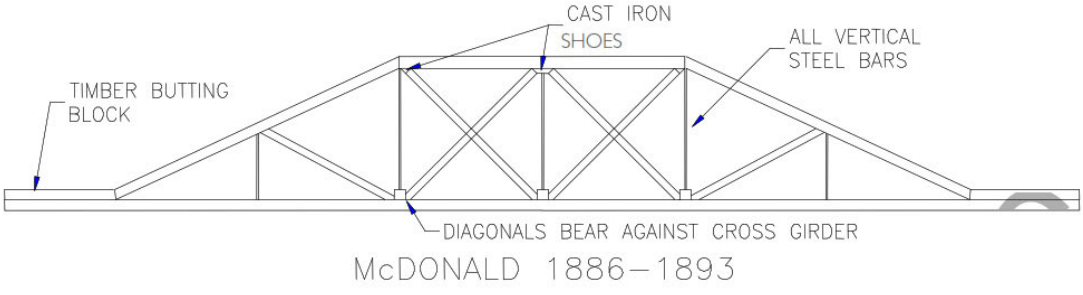

Figure A-1: McDonald Truss. (Source: Timber Bridge Manual, 2008)

1.0 INTRODUCTION

1.1 Project background

ConnectSydney, on behalf of Transport for NSW (TfNSW), proposes to upgrade and refurbish the Bridge on Galston Road over Pearces (Tunks) Creek, Galston (the proposal) as part of the Sydney Road Asset Performance Contracts (SRAPC). SRAPC is an initiative to provide a better experience for road users by delivering modern, secure and integrated road infrastructure across the Greater Sydney area.

Galston Timber Bridgeis located within the Hornsby Shire Local Government Authority (LGA), about 40 kilometres north of Sydney. Galston Timber Bridge is located on Main Road 161, Galston Road and consists of a McDonald timber truss road bridge (BN390). Galston Timber Bridge is listed on the following statutory heritage registers:

- State Heritage Register (SHR), 'Bridge over Tunks (Pearces) Creek', Listing No. 01478
- Roads and Maritime Services (now Transport for NSW) Section 170 Heritage and Conservation Register (S170), 'Pearces Creek Bridge, Galston Gorge', Listing No. 4300009
- Hornsby Local Environmental Plan (LEP) 2013, 'Galston Gorge timber bridge', Item No. A46.

The single span bridge has a current Bridge Heath Index rating of "Poor", initially due to the condition of the abutment wale braces. A detailed inspection conducted by Aurecon found that the cross-girders, butting blocks and abutment sheeting are deteriorating, bringing these components also into Poor condition. The existing condition may impact on the structural integrity of the bridge, necessitating further structural assessment. Wet weather in March 2022 caused slope failure adjacent to the Northern abutment, as overland flows eroded the fill behind the abutment embankment. A staged refurbishment and repair works have been nominated for this bridge.

Artefact Heritage (Artefact) has been engaged by Aurecon, on behalf of ConnectSydney, to provide a Statement of Heritage Impact (SOHI) to assess the potential heritage impacts of the above proposal on Galston Timber Bridge. This SOHI provides the relevant mitigation measures to avoid or reduce the heritage impacts of the proposal on the bridge, and recommendations on approval pathways.

1.2 Study area

The study area is located on Main Road 161, Galston Road, Hornsby, 2077 within the Hornsby Shire LGA (Figure 1-**1**). The timber truss bridge is situated along the steep descent into Galston Gorge. Galston Road links the suburbs of Galston, Hornsby Heights and Hornsby. The surrounds of the study area are steep sandstone escarpments with mature bushland forming part of the Berowra Valley National Park. The bridge provides a road crossing over Tunks Creek (historically known as

Pearces Creek), which intersects with Berowra Creek nearby. The creeks form tributaries of the Hawkesbury River.

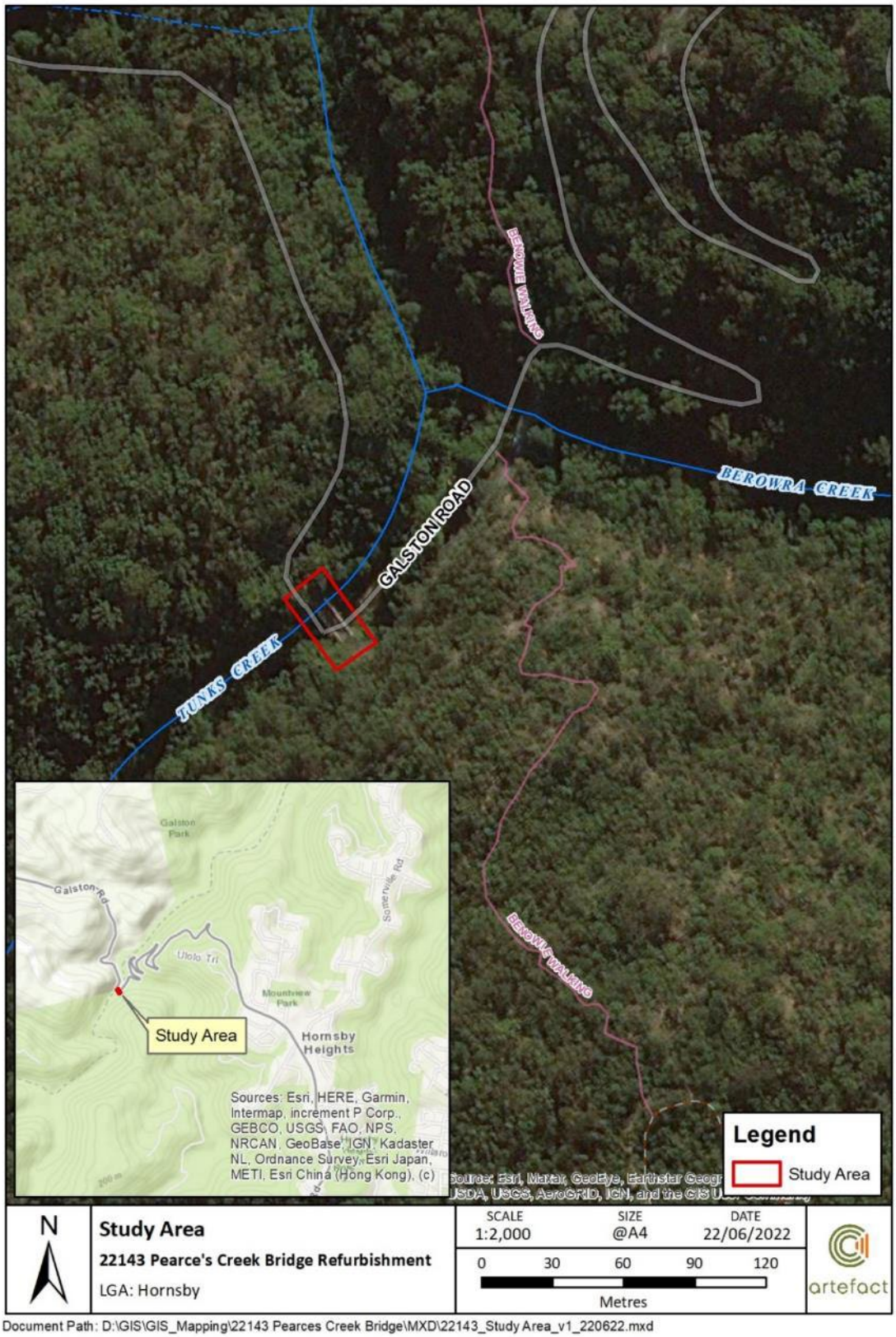

Figure 1-1: Map of study area. (Source: Artefact, 2022)

1.3 Report methodology

The following SOHI has been prepared in accordance with the following guidance documents:

- *Assessing Heritage Significance*, Department of Planning and Environment, 2023
- *Guidelines for preparing a Statement of Heritage Impact*, Department of Planning and Environment, 2023
- *Design in Context: Guidelines for Infill Development in the Historic Environment*, NSW Heritage Office and Royal Australian Institute of Architects, 2005
- *The Burra Charter*, Australia ICOMOS (The International Council on Monuments and Sites), 2013.

1.4 Report limitations

This report assesses the built heritage (non-Aboriginal) impacts of the proposal to Galston Timber Bridge. Aboriginal cultural heritage is not assessed as part of this report. This SOHI has been informed by, and should be read in conjunction with, the following reports:

- *BN0390 Galston Road Truss Bridge: Galston Timber Truss Bridge Design Report* (Aurecon, 2023)
- *NSW Timber Truss Road Bridges Overarching Conservation Management Plan.* (RMS, 2018)
- *Pearces Creek Bridge, Galston Gorge – Conservation Management Plan* (GHD and Austral Archaeology, 2002)
- *Timber Truss Bridge Conservation Strategy – Submissions Report and Revised Conservation Strategy* (Futurepast Heritage Consulting and RMS, 2012)
- *The Timber Truss Bridge Book* (TfNSW, 2021) https://roadswaterways.transport.nsw.gov.au/about/environment/protecting-heritage/timber-trussbridge/index.html.

1.5 Authorship

This report was prepared by Jess Mauger (Senior Heritage Consultant) with updates by Charlotte Simons (Senior Associate) and review by Scott MacArthur (Principal) and Jayden van Beek (Technical Specialist), all of Artefact Heritage Services.

2.0 STATUTORY CONTEXT

2.1 Overview

This section discusses the relevant heritage management framework applicable to the proposed works and to the study area. This overview includes information about all statutory and non-statutory registers and planning instruments relevant to heritage management at all three levels of government.

2.2 Identification of heritage listed items

There are several items of legislation relevant to the study area. Heritage items within and adjacent to the study area were searched on the following relevant state and federal statutory heritage registers:

- World Heritage List (WHL)
- Commonwealth Heritage List (CHL)
- National Heritage List (NHL)
- State Heritage Register
- Hornsby LEP 2013
- Section 170 Heritage and Conservation Registers.

Non-Statutory registers were also searched, including:

- Register of the National Estate (RNE)
- Australian Institute of Architects Register of Significant Architecture
- Engineering Heritage Australia Register
- The National Trust (NSW).

Refer to Section 2.2.1 and Table 2-1 and for details of statutory and non-statutory heritage listings applicable to the items, and items in the vicinity of the study area.

2.1 Relevant legislation

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) provides a legislative framework for the protection and management of matters of national environmental significance, that is, flora, fauna, ecological communities, and heritage places of national and international importance. Heritage items are protected through their inscription on the WHL, CHL, or the NHL. The EPBC Act stipulates that a person who has proposed an action that will, or is likely to, have a significant impact on a World, National or Commonwealth Heritage site must refer the action to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and Minister for the Environment and Water (hereafter the Minister). The Minister will then determine if the action

requires approval under the EPBC Act. If approval is required, an environmental assessment would need to be prepared. The Minister would approve or decline the action based on this assessment. A significant impact is defined as “an impact which is important, notable, or of consequence, having regarded to its context or intensity.” The significance of the action is based on the sensitivity, value and quality of the environment that is to be impacted, and the duration, magnitude, and geographic extent of the impact. If the action is to be undertaken in accordance with an accredited management plan, approval is not needed, and the matter does not need to be referred to the Minister.

The study area is not listed on the WHL, CHL or NHL.

2.1.2 NSW Heritage Act 1977

The *NSW Heritage Act 1977* (Heritage Act) is the primary legislation affording protection to heritage items in NSW. Under the Heritage Act, ‘items of environmental heritage’ include places, buildings, works, relics, moveable objects, and precincts identified as significant. Significance is based on historical, scientific, cultural, social, archaeological, architectural, natural, or aesthetic values. State significant items can be listed on the NSW SHR and are given automatic protection under the Heritage Act against any activities that may damage an item or affect its heritage significance. The Heritage Act also protects 'relics', which can include archaeological material, features, and deposits.

2.1.2.1 State Heritage Register

The SHR was established under Section 22 of the Heritage Act. It is a list of places and objects of importance to the people of NSW, including archaeological sites. It is administered by Heritage NSW and includes a diverse range of over 1,500 items, in both private and public ownership. To be listed, an item is deemed to be of heritage significance for the whole of NSW. To carry out activities within the curtilage of an item listed on the SHR, approval must be gained from the Heritage Council through a Section 60 application. In some circumstances, under Section 57(2) of the Heritage Act, a Section 60 application may not be required if works are undertaken in accordance with Standard Exemptions for Works Requiring Heritage Council Approval, through agency specific exemptions or site-specific exemptions in an endorsed Conservation Management Plan (CMP), or as part of the gazettal of the item where works are minor and have minimal or no impact on the heritage significance of the place.

Galston Timber Bridge is listed as an item of State significance on the SHR:

- ‘Bridge over Tunks (Pearces) Creek’ (Listing No. 01478).

Figure 2-1: State Heritage Register curtilage for 'Bridge over Tunks (Pearces) Creek'. (Source: Heritage NSW)

2.1.2.2 Section 170 Heritage and Conservation Register

Under the Heritage Act all government agencies are required to identify, conserve, and manage heritage items in their ownership or control. Section 170 (S170) requires all government agencies to maintain a Heritage and Conservation Register listing all heritage assets. They must ensure that all items inscribed on its list are maintained with due diligence in accordance with State Owned Heritage Management Principles approved by the Government on advice of the NSW Heritage Council.

Galston Timber Bridge is listed as an item of State significance on the RMS (now TfNSW) S170 Register:

- 'Pearces Creek Bridge, Galston Gorge' (Item No. 4300009).

2.1.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land using planning and development consent processes. The EP&A Act requires that environmental impacts be considered prior to land development; including impacts on cultural heritage items and places, and archaeological sites and deposits. The proposal is subject to assessment under Part 5 of the EP&A Act. The EP&A Act also requires that local governments prepare planning instruments (such as LEPs and Development Control Plans [DCPs]) in accordance with the EP&A Act to provide guidance on the level of environmental assessment required.

The following items are listed as a mix of built, moveable and archaeological items on the Hornsby LEP 2013 and are located within or in the vicinity of the study area:

- 'Galston Gorge timber bridge' (Item No. A46) – within the study area
- 'Galston Gorge sandstone buttressing' (Item No. A43) – outside the study area
- 'Galston Gorge water troughs' (Item No. A45) – outside the study area
- 'Galston Gorge culvert' (Item No. A44) – outside the study area.

2.2 Non-statutory registers

2.2.1 Register of the National Estate

Galston Timber Bridge is listed on the RNE:

- 'Galston Gorge Road Bridge' (Database No. 015924).

The RNE citation for the listing describes the bridge as being "a significant technical accomplishment…it is one of the oldest remaining timber truss bridges of the McDonald type."

The RNE was closed in 2007 and is no longer a statutory list. The RNE is maintained on a non-statutory basis as a publicly available archive and educational resource. There are no specific obligations which arise from this listing.

2.2.2 National Trust Register

The National Trust of Australia (NSW) maintains registers of significant heritage items. Although the National Trust Register does not provide statutory protection, it is an active lobbying force that brings places of cultural significance to the attention of the general public through its listing and classification.

Galston Timber Bridge is **not** listed on the National Trust of Australia (NSW) register. Galston Timber Bridge is, however, listed on the National Trust of Australia (NSW) Industrial Heritage Sites Index List.

There are no statutory obligations that arise from this type of index listing. If TfNSW have a protocol for liaising with National Trust of Australia (NSW) about prospective works to listed items, this should be actioned by TFNSW prior to carrying out any major works on the bridge.

2.3 Heritage listings

2.3.1 Statutory heritage listings – summary

A search of all relevant registers was undertaken in June 2022. This search found six items listed on statutory heritage registers within the study area or in the vicinity of Galston Timber Bridge.

The results of the statutory heritage register search are provided in Table 2-1 and in Figure 2-2.

Table 2-1: Statutory heritage listings for Galston Timber Bridge and heritage items in the vicinity

Item	Address	Significance	Listing	Place ID (Listing/Item No.)	Distance from Study area
Galston Timber Bridge					
Bridge over Tunks (Pearces) Creek	Main Road 161, Galston NSW 2159	State	SHR	01478	Within study area
Pearces Creek Bridge, Galston Gorge	Galston Road (MR 161), Hornsby NSW 2077	State	Roads and Maritime (now Transport for NSW) S170 Register	4300009	Within study area

Item	Address	Significance	Listing	Place ID (Listing/Item No.)	Distance from Study area
Galston Gorge timber bridge	Galston Road, Galston NSW 2159	State	Hornsby LEP 2013	A46	Within study area
Items within the vicinity					
Galston Gorge culvert	Galston Road (under road curve at Lookout), Galston NSW 2159	Local	Hornsby LEP 2013	A44	280m (north)
Galston Gorge sandstone buttressing	Galston Road, Galston NSW 2159	Local	Hornsby LEP 2013	A43	95m (north-east)
Galston Gorge water troughs	Galston Road (S side), Galston NSW 2159	Local	Hornsby LEP 2013	A45	250m (north-east)

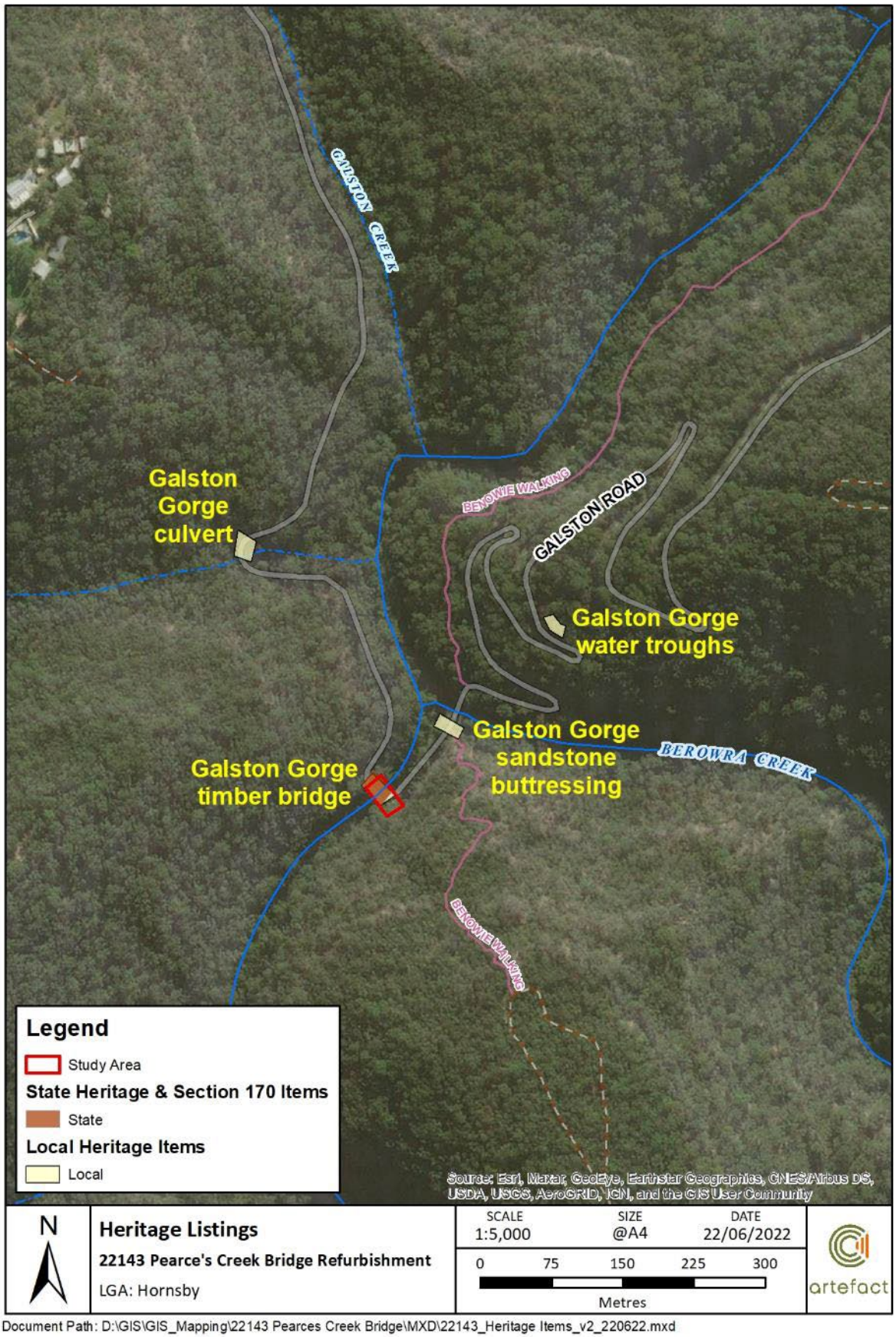

Figure 2-2: Map of relevant heritage listings. (Source: Artefact, 2022)

3.0 HISTORICAL BACKGROUND

3.1 History of the Hornsby area

European settlement around the area of Hornsby dates from the 1830s and 1840s. By the mid-19th century, the Hornsby district was recorded as cultivating grapes, stone fruit and citrus fruits. The area, stretching north from Carlingford on the western side of the Pacific Highway, was generally associated with orange growing and orchards and this industry continued into the early decades of the 20th century.[1]

Transportation in the district was largely along the Old North Road, which passed through Dural, until supplemented in 1886 by the opening of the Main Northern Railway line through Hornsby. The Peats Ferry Road (constructed in the 1850s as an alternative northerly route to the Old Northern Road) also passed through Hornsby.[2] Commercial expansion of the western areas of the district (now known as Galston and Dural) were not enhanced by the improved road and rail infrastructure, as they were separated by the narrow and steep valley known as Galston Gorge.[3]

Between 1891 and 1893, a road was formed to provide access across Galston Gorge where previously only a foot track had existed. The track through the gorge had linked the residents of Galston with Hornsby railway station since the opening of the railway line, but it was steep and the two fallen logs which served as creek crossings were difficult to negotiate. During this time, Galston residents returning from Sydney were advised to allow sufficient daylight to traverse the 5 mile track.[4]

3.2 Timber truss bridges in NSW

Timber truss road bridges played an important role in the expansion of the NSW road network since the mid-19th century. River crossings were often dangerous in the early days of the Colony, making it difficult and expensive to transport goods from isolated regions of the Colony to the ports of Sydney. Majority of timber truss bridges within NSW were initially built and later perfected for the expanding railway network. While the design of railway bridges was backed by strong political and monetary influences, this was not the case with road bridges in the Colony, where funding was always harder to secure. In conjunction with a lack of funding, costs generally to construction masonry or iron bridges was prohibitive even though they would have presented as more durable options. Also the cessation of convict transportation in the 1840s meant the supply of cheap, skilled stonemasons disappeared and the size of NSW and the scale of public works required in the mid-1850s meant the colony had to borrow heavily from Britain in order to fund the works. An 1861 parliamentary decree seeking to minimise expenditure where possible made it a requirement that local materials be used wherever possible. When the demand for road bridges became a priority for the Public Works Department by

[1] *Pearces Creek Bridge, Galston Gorge – Draft Conservation Management Plan*, See Section 2.5 (GHD and Austral Archaeology, 2002).
[2] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.5.
[3] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.5.
[4] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.5.

the late 19th century, the need for a cheap but durable way to construct crossings for the citizens of NSW was paramount.[5]

The earlier timber truss bridges, designed between the 1850s and the 1880s, made use of the forests of robust NSW hardwoods, such as blackbutt and ironbark. The timber from these forests was reasonably durable and was suited to the construction of bridges, particularly at a relatively low cost. Once the comparative strength and durability of these hardwoods became known around the world, so much timber was exported that these earlier types of timber truss bridges could no longer be built. Between 1856 and 1936 over 400 timber truss road bridges were built in NSW, all of them designed by engineers of the Department of Public Works. Timber truss bridges, and timber bridges generally were so common that NSW was known to travellers as the "timber bridge state". Of approximately ninety McDonald Truss bridges built in NSW between 1886 and 1894, four remain in NSW as of 2018.[6]

Early timber bridges were built with hand tools, the broad axe, the adze, the hand auger and chalk line. Road gangs were employed by successful tenderers to fell trees and prepare the timber for the construction of a bridge. The most substantial piece of equipment used by bridge builders was a piling derrick (or pile driver), which consisted of an iron ram which was raised by a rope running over the top of the framework and attached to a winch. A log was stood upright and the operator released a clutch that let the ram drop to drive the pile. Steam-driven winches typically operated the pile driver, though horses were also used. It was often the most dangerous stage of bridge building with a number of fatalities recorded in the early days of bridge building in NSW.[7]

3.3 Galston Timber Bridge

Engineer John McDonald (see Figure 3-1) joined the Public Works Department in 1879, and although he specialised in metal bridges, he updated the standard timber truss design for heavier design loads. Large, long, quality hardwoods were still plentiful during the latter part of the 19th century, and permanent stone or iron bridges were not considered economical. McDonald's design changes were informed by the growing knowledge of timber as a structural material, with extensive testing at the University of Sydney in 1886. It was McDonald's truss design which would form an intrinsic link for commuters between the suburbs of Hornsby and Galston.[8]

[5] *The Timber Truss Bridge Book* (TfNSW, 2021). Chapter 2: Timber Truss Road Bridges. Retrieved from: https://roadswaterways.transport.nsw.gov.au/about/environment/protecting-heritage/timber-trussbridge/index.html; *Pearces Creek Bridge, Galston Gorge – Draft Conservation Management Plan*, See Section 2.3 (GHD and Austral Archaeology, 2002).
[6] *The Timber Truss Bridge Book* (TfNSW, 2021). Chapter 2: Timber Truss Road Bridges.; State Heritage Inventory. 'Pearces Creek Bridge, Galston Gorge'. Retrieved from: https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=4300009; *Pearces Creek Bridge, Galston Gorge – Draft Conservation Management Plan*, See Section 2.3 (GHD and Austral Archaeology, 2002).
[7] The Timber Truss Bridge Book (TfNSW, 2021). Chapter 6: Bridge Building.
[8] The Timber Truss Bridge Book (TfNSW, 2021). Chapter 2: Timber Truss Road Bridges.

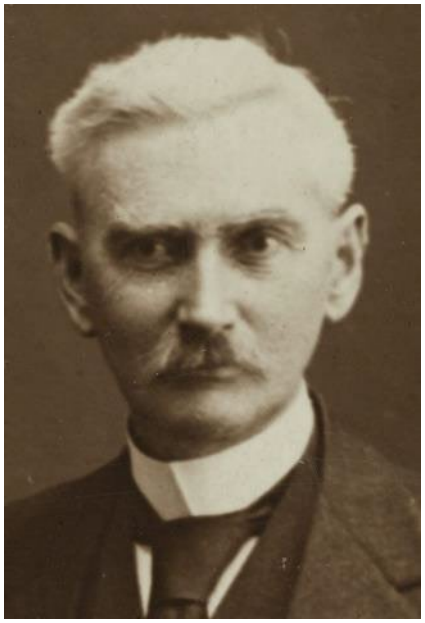

Figure 3-1: John McDonald, chief engineer for bridges 1889-1893.(Source: Tairawhiti Museum, New Zealand', Timber Truss Book)

Agitation for the construction of a road between Galston and Hornsby began in the late 1880s, but not all local residents were convinced of its worth believing that the steep grades would make transporting produce impossible. Boland, the successful tenderer, inspected the proposed bridge locations in late 1892 and stated that he would commence construction early the next year. During the construction of the bridge, it is believed the construction crew camped in the Galston Gorge. The Cumberland Argus and Fruitgrowers Advocate described the scene:

> *All the preliminary work in connection with this great advancing work for Galston is being done rapidly, and everything speaks well for the energy and undeniable pluck of the contractors. The preparations for getting into the bed of the creek all building material and plant are nearly complete. Here, now, in the bed of a wild and dense creek, which has always heretofore been the shelter of the dingo, wild cats, flying foxes and numberless other pests, are to be seen a number of tents, bark mansions, the whole forming quite a little township, and the wonder is still further strengthened when one sees emerging from these roving dwellings of calico and bark some four or five little youngsters…The scenery from the bridge is equal to some of the best which can be viewed in New South Wales.*[9]

The bridge, and later road construction provided employment to a number of men. During the depression of the 1890s, however, there was a surplus of workers and the works attracted a number seeking employment.[10]

[9] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.6.
[10] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.6.

Work on the Galston Timber Bridge and the former Berowra Creek Bridge on Galston Road commenced in February of 1893. The successful contractor was a Mr Francis Boland who quoted £2,651 10s 6d for the construction of the two bridges and whose tender was the lowest of the 13 received. Work on the bridges was finished by early 1894.[11]

Galston Road itself was not finished until 1895 and was officially opened in March of that year by Mr. J. H. Young, the then Minister for Works. The opening of the road was expected to shorten the distance to market for the fruit growers of the Galston area who, as a result of this new route, were now within six miles (9.5 km) of Hornsby railway station.[12]

Galston Timber Bridge is a single span, timber truss bridge approximately 20m long and 6.4m wide (see Figure 3-3) and the former bridge over Berowra Creek was also a single span, timber truss bridge which was over 27m long (see Figure 3-2). A concrete bridge replaced the longer bridge over Berowra Creek in the 1930s after it was washed away during a flood. This left Galston Timber Bridge one of the last remaining examples of the shortest of the standard McDonald Truss designs. Records that it is one of four remaining in NSW as of 2018.[13]

A full description of Galston Timber Bridge, including an overview of the maintenance and repair activities that have been undertaken on the bridge over time, is included below in Section 4.

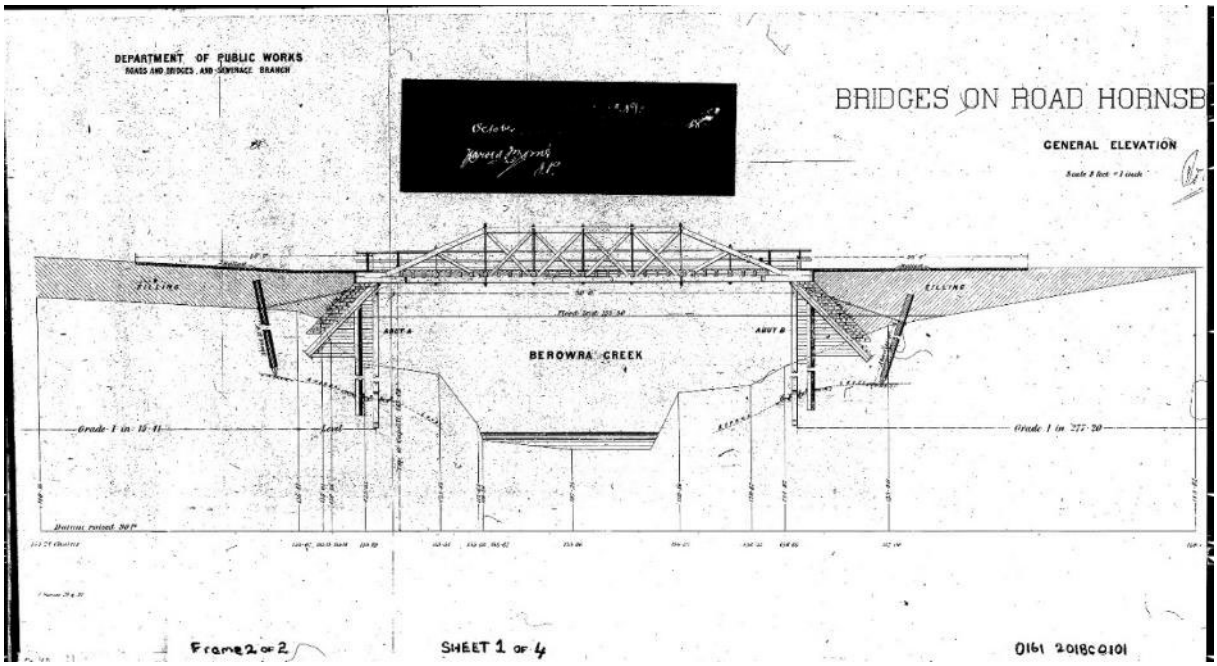

Figure 3-2: Elevation of the former bridge over Berowra Creek. (Source: Bridges on Road Hornsby to Galston, Department of Public Works, Roads and Bridges and Sewerage Brand, c.1892. RTA 161.201.BC.0101)

[11] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.6.
[12] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.6.
[13] The Timber Truss Bridge Book (TfNSW, 2021). Chapter 2: Timber Truss Road Bridges; State Heritage Inventory. 'Pearces Creek Bridge, Galston Gorge'.

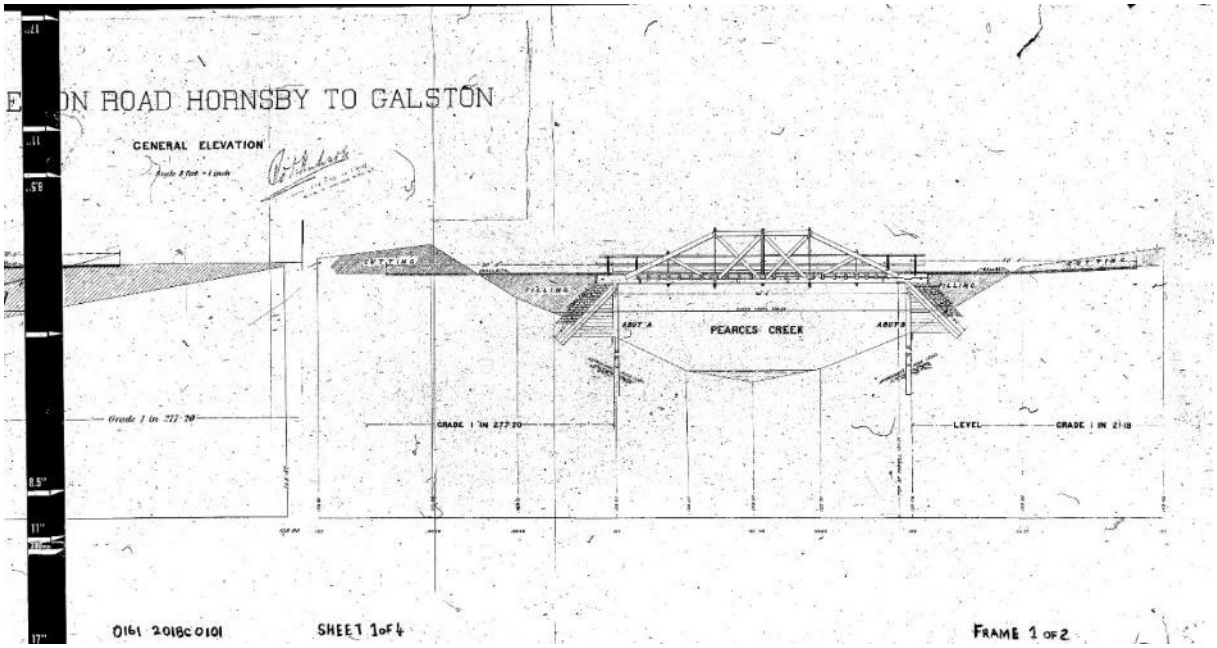

Figure 3-3: Elevation of the bridge over Pearces (Tunks) Creek. (Source: Bridges on Road Hornsby to Galston, Department of Public Works, Roads and Bridges and Sewerage Brand, c.1892. RTA 161.201.BC.0101)

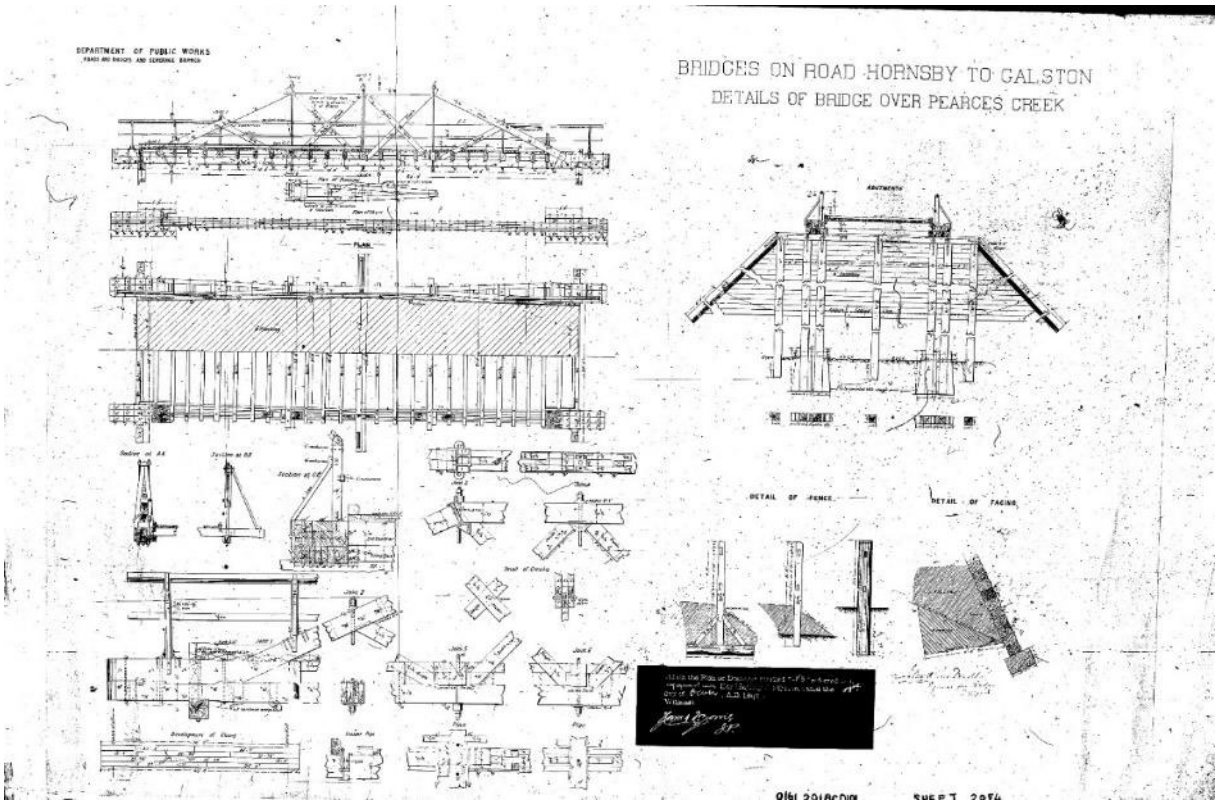

Figure 3-4: Details of Galston Timber Bridge, showing sections of the bridge abutments, fencing, planking and timber members. (Source: Bridges on Road Hornsby to Galston, Department of Public Works, Roads and Bridges and Sewerage Brand, c.1892. RTA 161.201.BC.0101)

Figure 3-5: Two McDonald Truss bridges at Galston Gorge provided examples of the longest and shortest of the standard McDonald Truss designs, the former Berowra Creek Bridge at 90 feet (bottom) and the remaining Galston Timber Bridge (Tunks Creek Bridge) at 65 feet (27.4 m and 19.8m). (Source: WF Hall photo, Australian National Maritime Museum. Retrieved from: Timber Truss Book)

Figure 3-6: *Galston Gorge, crossing bridge, 1920s*. (Source: Hornsby Shire Recollects, https://hornsbyshire.recollect.net.au/nodes/view/1162)

Figure 3-7: *Galston Gorge, 1930* showing former Berowra Creek Bridge. Robert Green Collection. (Source: Hornsby Shire Recollects, https://hornsbyshire.recollect.net.au/nodes/view/2601)

Figure 3-8: Galston Gorge, crossing McDonald truss bridges (Berowra Creek Bridge in foreground, Galston Timber Bridge/Tunks Creek Bridge in distance), 1938. (Source: Hornsby Shire Recollects, https://hornsbyshire.recollect.net.au/nodes/view/1141)

Figure 3-9: Galston Timber Bridge (Tunks Creek Bridge) Galston Gorge, undergoing repairs between 1960 and 1962. (Source: Hornsby Shire Recollects, https://hornsbyshire.recollect.net.au/nodes/view/1030)

4.0 DESCRIPTION AND PHYSICAL EVIDENCE

4.1 Site and context

Galston Timber Bridge is located on Main Road 161, Galston Road in Hornsby, about 40km north of Sydney. The bridge serves as a road crossing for Galston Road across Tunks Creek (originally known as Pearces Creek), which intersects nearby with Berowra Creek. The creeks form tributaries of the Hawkesbury River. The surrounding landscape consists of mature bushland and steep escarpments, providing a distinctive and isolated setting for the bridge.

4.2 Item description

Galston Timber Bridge is a single span, timber truss bridge approximately 20m long and 6.4m wide. The truss consists of 6 bays, with the bottom chord divided up into 6.2m lengths at each end and 3.2m within the two middle bays. The diagonal timber decking is supported on 27 cross girders of two widths, the larger being used where vertical rods pass through the section. Lateral bracing is provided at the centre of the bridge, connecting the top chord with an extended cross girder. It is presumed that cast iron steel shoes and mild steel tie rods have been adopted.[14]

The bridge accommodates a single lane of vehicular traffic; there is no designated access for pedestrians. There is a restriction on the maximum vehicle length of 7.5m for Galston Road and across the bridge.[15] A detailed description of the Galston Timber Bridge is found in the CMP 2002.

The State Heritage Inventory (SHI) database entry for the SHR listing of the bridge provides the following summary description:

> *The bridge consists of one 65' (19.96m) truss span supported at each end on timber abutments which also retain the road earthworks. The bridge width is 4.57m (15ft) between kerbs and at both ends the approach road turns sharply at right angles… Original condition assessment: 'Currently good condition following major repairs between November 2001 and February 2002' (Last updated: 15/07/2002.) 2007-08 condition update: 'Good.' (Last updated: 17/4/09.)…1958 - Centre pile replaced; 1961-63 - Some cross girders and truss members replaced. Two timber piles and short timber headstock erected against Hornsby side abutment.; 1978 - replacement of some girders, decking and steel plating;c1980 - some struts and deck planks replaced.*[16]

[14] *Galston Timber Truss Bridge Load Rating Report*. (Aurecon for ConnectSydney, May 2022). Section 2.1.
[15] *Galston Timber Truss Bridge Load Rating Report*. (Aurecon, 2022). Section 2.1.
[16] State Heritage Inventory. 'Pearces Creek Bridge, Galston Gorge'. Retrieved from: https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=4300009

4.3 Site inspection

The study area was inspected on 23rd June 2022 by Jess Mauger (Senior Heritage Consultant) of Artefact Heritage. The inspection was undertaken on foot and a photographic record was made.The following photographs were taken by Artefact on the day of the site inspection. These show the visual surrounds and the current state of the study area.

Figure 4-1: Setting shot of the bridge from a nearby embankment, facing south west

Figure 4-2: Example view of Galston Road approach to the bridge, facing north east

Figure 4-3: View of the concrete bridge over Berowra Creek, formerly also a truss bridge, facing south west

Figure 4-4: View of Pearces (Tunks) Creek Bridge and the road approach, facing north west

Figure 4-5: Overall span view of the bridge, facing south west

Figure 4-6: Overall underside shot of the bridge, facing south west

Figure 4-7: View of Tunks Creek and example of sandstone escarpments, facing north east

Figure 4-8: View of the principal timbers and trusses, and steel tie rods, facing south west

Figure 4-9: View of the principal timbers and trusses, and steel tie rods, facing south west

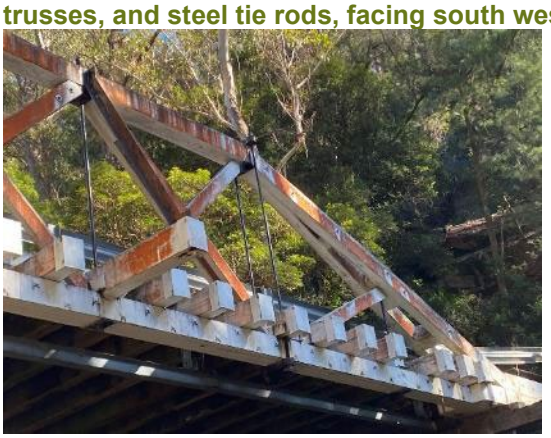

Figure 4-10: View of the principal timbers and trusses, and steel tie rods, facing south west

Figure 4-11: View of underside of the deck, facing south west

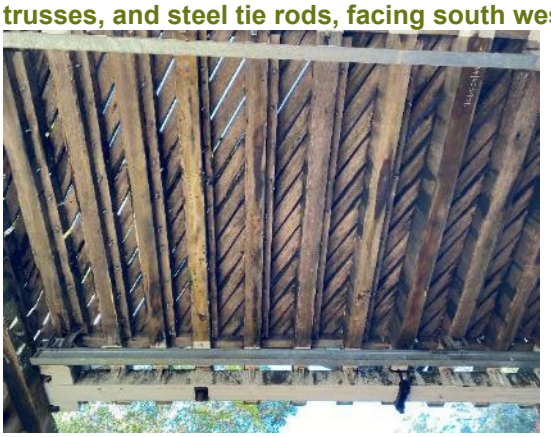

Figure 4-12: Closer view of underside of the deck, facing south west

Figure 4-13: View along the top of the deck and of the trusses, facing south east

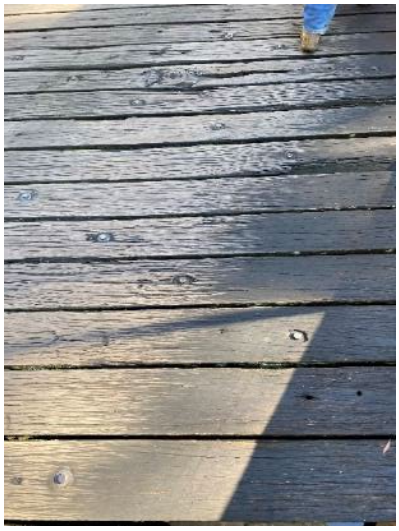

Figure 4-14: View of the condition of the transverse timber decking

Figure 4-15:Another view of the transverse timber decking including spacing

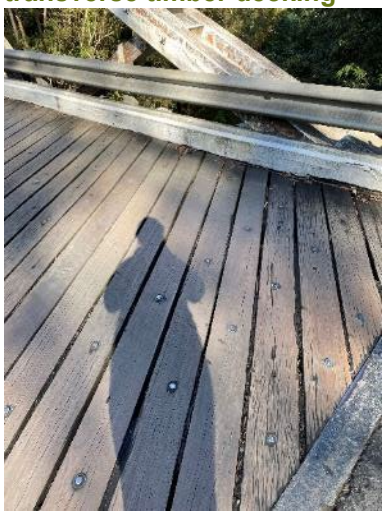

Figure 4-16 Another view of the transverse timber decking including concrete infill between road surface, facing south east

Figure 4-17: View of timber principals and timber trusses, facing south east

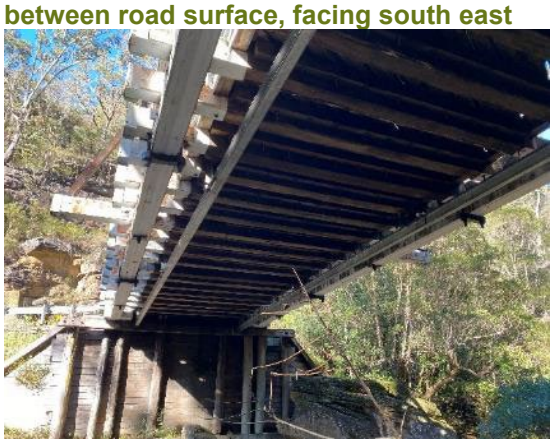

Figure 4-18: View of underside of the deck and bottom chords, facing south east

Figure 4-19: View of butting timber block to be repaired, on eastern side of bridge attached to North Abutment (B)

Figure 4-20 View of butting timber block to be replace, on western side of bridge attached to North Abutment (B)

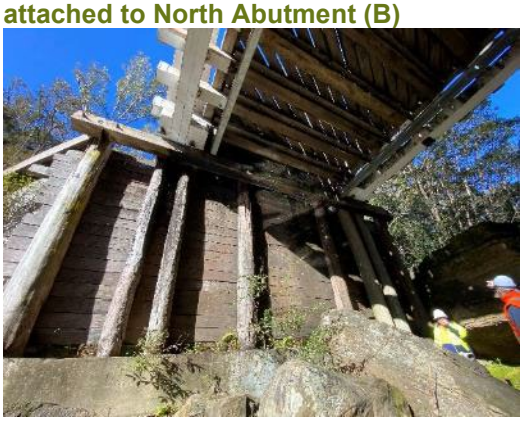

Figure 4-21: South Abutment (A), facing south east

Figure 4-22: North Abutment (B), facing south west

Figure 4-23: Example of pile encased in concrete, experiencing timber rot

Figure 4-24: Example of spliced piles, top section of two piles in foreground of North Abutment (B)

Figure 4-25: Example of timber displacement where previously replaced in wings of North Abutment (B)

Figure 4-26: Closer view of spliced piles, top section of two piles in foreground of North Abutment (B)

Figure 4-27: Example of concrete casing below piles with brick retaining under the timber sheeting of North Abutment (B)

Figure 4-28: Eastern side view of North Abutment (B), facing north west

Figure 4-29: Example view of concrete casing experiencing cracking directly beneath each pile

Figure 4-30: Example view of dry stone walls on either side of the abutments of the bridge

Figure 4-31: Historic graffiti 'S Rogers 1959' on sandstone rock cutting adjacent to eastern approach to the bridge

Figure 4-32: Historic graffiti 'T D B' on sandstone rock cutting adjacent to eastern approach to the bridge

Figure 4-33: Historic graffiti 'J S P' with possible '1940' below, on sandstone rock cutting adjacent to eastern approach to the bridge

4.4 Maintenance

Galston Timber Bridge has undergone numerous maintenance and repair activities since its construction. The earliest maintenance records for Galston Timber Bridge held by TfNSW date from 1957. Maintenance works have generally involved routine replacement of rotting timber, repainting, etc., although at various times there have been suggestions that the bridge be replaced or moved. The Berowra Creek Bridge, built at the same time as the Galston Timber Bridge, was replaced by a concrete bridge in 1937.[17]

The summary below provides an overview of the maintenance of the Galston Timber Bridge, extracted from the draft CMP 2002.

[17] *Pearces Creek Bridge – Draft Conservation Management Plan*, See Section 2.6.

Table 4-1: Summary of maintenance of Galston Timber Bridge. Source: Information from RTA (now TfNSW) file 201.1714

Date	Description	Cost
1958	Hornsby side abutment strengthened by installing a new pile to replace the centre pile. Temporary strengthening of faulty cross girders. If bridge is not replaced within a year or two, extensive repairs may be required. Arrangements made for the investigation of a site for a new bridge.	Undertaken by Council
1960	Alternative road alignments using a new bridge proposed and discussed. Recommended that the design for a new bridge be proceeded with 'with view to its construction being provided for in the 1962/63 programme.'	N/A
1961-1963	Replacement of a number of cross girders, some truss members. Two timber piles and short timber headstock erected against the Hornsby side abutment.	Cost of £6,626 18s 1d up to 31/3/1963
1970	Abutments in poor condition, suggested by Hornsby Shire Council that new abutments be built downstream and the existing truss transferred to them – proposal rejected by DMR.	N/A
1971-72	Urgent repairs to abutments (new to be built in front of old). Some delay experienced as headstock timber was not readily available.	Final cost $11,087
1978	Replacement of a number of girders, part of the upstream truss bottom chord, some decking and steel plating both sides of the bottom chords of the trusses. Bailey truss temporary support system hired for use during repairs.	Est. cost $32,200
1980	Also some painting and replacement of sheeting planks required.	Est. $2,000
1987	Two struts on upstream truss and 2 deck planks to be replaced	Est. cost to restore the structure to a fully serviceable condition $52,800
2001-02	Major repairs carried out	-
2007	Replacement of 8 timber piles at abutments	-

5.0 ASSESSMENT OF HERITAGE SIGNIFICANCE

5.1 Significance assessment criteria

Determining the significance of heritage items or a potential archaeological resource is undertaken by utilising a system of assessment centred on the Burra Charter of Australia ICOMOS. The principles of the charter are relevant to the assessment, conservation and management of sites and relics. The assessment of heritage significance is outlined through legislation in the Heritage Act and implemented through the NSW Heritage Manual, the *Archaeological Assessment Guidelines* and the 2009 *Assessing Significance for Historical Archaeological Sites and 'Relics'*.

If an item meets one of the seven heritage criteria, and retains the integrity of its key attributes, it can be considered to have heritage significance. The significance of an item or potential archaeological site can then be assessed as being of local or state significance.

'*State heritage significance'*, in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.

'*Local heritage significance*', in relation to a place, building, work, relic, moveable object or precinct, means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.

Table 5-1: NSW heritage assessment criteria

Criteria	Description
A – Historical Significance	An item is important in the course or pattern of the local area's cultural or natural history.
B – Associative Significance	An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history.
C – Aesthetic or Technical Significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.
D – Social Significance	An item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons.
E – Research Potential	An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history.
F – Rarity	An item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history.
G - Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area).

Grading of significant elements

This assessment of significant elements was based on the standard grades of significance set out in the NSW Heritage Office publication *Assessing Heritage Significance*. The following table lists the different grades of significance in line with the relevant NSW Heritage guidelines.

Table 5-2: Grades of significance

Grading	Justification	Status
Exceptional	Rare or outstanding element directly contributing to an item's local and State significance	Fulfils criteria for local or state listings
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alternations do not detract from significance.	Fulfils criteria for local or state listings
Moderate	Elements of typical representative quality. Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or state listings
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfill criteria for local or State listing
Intrusive	Damaging to the item's heritage significance	Does not fulfill criteria for local or State listing

5.2 Significance of Galston Timber Bridge

5.2.1 Assessment of significance

Galston Timber Bridge is a recognised item of both State and local heritage significance. The significance assessment contained in the SHR listing is presented in Table 5-3.

Table 5-3: Significance assessment for Galston Timber Bridge[18]

Criterion	Explanation
A – Historical Significance	*McDonald truss bridges have historical significance because timber truss bridges were developed and refined in Australia to achieve the highest level of timber bridge construction for the time of their design and the McDonald truss is an important recognisable design in the evolution of timber truss bridges in NSW.* *The bridge is a relic of the NSW government's policies of the late nineteenth century which focussed on the provision of access to land areas to facilitate increased production and trade throughout the state. It is also important as part of a road that was an important link between the Great North Road and the Pacific Highway which expedited the movement of goods and provided flexibility in road movements that ultimately helped to service Sydney.* *Significant for its association with John A McDonald, designer of the McDonald Truss bridge style and a significant figure in the area of bridge design and construction in NSW.* *Is an example of depression relief schemes of the 1890s.*
B – Associative Significance	*N/A*
C – Aesthetic or Technical Significance	*McDonald truss bridges have aesthetic significance because they are evocative of Australian methods of bridge construction, in their materials, scale and configuration they reflect and express nineteenth century technologies and experiences and for the time of their design and construction they demonstrate the best quality design available.* *It is an excellent, original example of an important and seminal design that was considered a technical achievement in its day.*
D – Social Significance	*McDonald truss bridges have social significance because their size and location contribute directly to the local area and they are a strong element in the local address.* *The bridge is a landmark on the Great North Road Walk. Its unobtrusive scale, natural timbers and other materials allow it to meld with the surrounding landscape* *Is an important feature of the historic Galston Road which linked local residents with the railway line as a track from the 1860s and a road from the 1880s.*
E – Research Potential	*McDonald truss bridges have technical/research significance because they exhibit advanced technical use of Australian hardwoods and economical bridge construction of the period.* *Is an example of a design which led to a rapid expansion of bridge construction in NSW.*
F – Rarity	*Believed to be the only timber truss road bridge in NSW to survive with its original style deck still in use.*
G – Representativeness	*As a McDonald truss it is representative of the first truss design which can be considered uniquely Australian due to its local design and utilisation of native timbers.*

[18] State Heritage Inventory. 'Pearces Creek Bridge, Galston Gorge'. Retrieved from: https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=4300009

5.2.2 Statement of Significance

The following Statement of Significance is extracted from the SHI database for the SHR listing of the bridge:

> *This bridge is a McDonald timber truss road bridge. Timber truss road bridges were extensively used in New South Wales because of the high quality of local hardwoods and the shortage of steel during the early decades of settlement of the state. The timber truss was highly developed for bridges in New South Wales, perhaps more so than anywhere else in the world at that time. The McDonald truss is a significant evolutionary link in the development of timber road bridges in New South Wales and has three standard span lengths, 65'/19.96m, 75'/22.86m and 90'27.43m. At* (sic) *March 1998 there were seven McDonald truss road bridges remaining in New South Wales, Pearces Creek Bridge is a rare example of a 65' 19.96m truss span. It has been assessed as having State significance.*[19]

5.2.3 Significance gradings of components

The following provides an overview of the gradings of significance of each of the individual components of the Pearce's Creek Bridge. These gradings have been adapted from the *Pearce's Creek Bridge, Galston Gorge: Conservation Management Plan* prepared for the item in 2002 and have been updated where required.

Table 5-4: Significance gradings of bridge components

Element	Details	Grading
Truss span	The truss type employed in this bridge is the McDonald Design. The bottom chord of each half-truss is vertically laminated, consisting of four pieces of timber placed side by side, sandwiched between two 18mm steel plates. The timber laminate is true to the original design, however, outer steel plates were installed in 1962 to strengthen the bottom chords. When further work was carried out in June 1978, the steel plate stiffeners on the bottom chords were also replaced. The frequency of horizontal bolting across the laminated pieces is as in the original. The truss members are in good condition.	**High**

[19] State Heritage Inventory. 'Bridge over Tunks (Pearces) Creek'. Retrieved from: https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5051382

Cross girders	The cross girders on the bridge are located at and between the panel points. Those placed at the panel points are approximately 270 x 300 millimetres in section and are drilled to allow the steel hangers to pass through for connection to the bottom chord. The three intermediate cross girders between each panel point are approximately 170 x 300 millimetres in section. These intermediate girders are sometimes referred to as stringers in bridge files and reports. All cross beams are supported directly on the bottom chord, however, the cross beams at the panel points directly support the diagonal members of the truss which bear on each side of the cross beam as described above. This is an important point because it makes it difficult to replace these cross beams as the diagonal members must be de-stressed in order to remove the cross beams. The timber cross girders are in good condition, except for those 7 cross girders that have deteriorated and are subject to investigation of their structural integrity as part of this project.	**High**
Decking	The bridge is decked with timber planking laid diagonally across the cross girders in accordance with the original configuration. The existing transverse decking is approximately 125 millimetres deep, which is likely to be of a similar depth to that of the original timbers. The entire surface of the deck has been flush sealed to provide a better travelling surface and to improve its waterproofing qualities by reducing the effects of rapid moisture changes. Timber kerbing of 250 millimetres square is situated along the edges of the deck that represents a change from the original 150 x 150 millimetre kerbs (6 x 6 inches). The kerbing forms part of the railing system that is discussed in the following section. The timber used in both longitudinal and transverse bridge decking was typically blackbutt, ironbark, grey box brush box or tallowwood. However, the decking represents one of the primary maintenance features and it is likely that it has been replaced numerous times since the bridge was constructed. In this regard, due to the diminishing availability of the higher quality timbers the existing decking is probably not comprised of timber from one of the previously mentioned high durability species. Although longitudinal sheeting is almost a universal feature on timber bridges today, the bridge does not have longitudinal timber sheeting placed over the transverse sheeting. Bridges of this era were usually designed with transverse decking only.	**High**
Abutments	The design of the abutments is common to that of almost every timber road bridge throughout the state. The two bridge abutments, South Abutment (A) on the Hornsby side and North Abutment (B) on the Galston side, comprise vertical timber piles socketed into off-form concrete sill beams founded on rock at or close to the surface. The piles are sheeted on the rear with horizontal timbers. Above the piles on each abutment is a timber headstock. The function of the abutments is to retain the fill material of the approach embankments in addition to supporting the truss span. Documentary material indicates that both abutments were rebuilt in the early 1970s. The new abutments were built immediately in front of the existing abutments, following the original configuration apart from the use of the concrete sill beams. The bridge plans show that the piles of the original abutments were socketed into rock a short distance below the creek bed. The original abutments remain behind the new. The original abutments were of standard design that was used in the majority of timber road bridges (both truss and beam designs) constructed in NSW. The replacement abutments are not overly visually intrusive, are clearly recognisable as new fabric and do not detract from the overall significance of the bridge.	**Moderate**

6.0 ARCHAEOLOGICAL ASSESSMENT

6.1 Introduction

This section discusses the Study Area's potential to contain historical archaeological resources. The potential for the survival of archaeological remains is significantly affected by activities which may have caused ground disturbance. This assessment is therefore based on consideration of current ground conditions, and analysis of the historical development of the Study Area.

'Archaeological potential' refers to the likelihood that an area contains physical remains associated with an earlier phase of occupation, activity or development of that area. This is distinct from 'archaeological significance' and 'archaeological research potential'. These designations refer to the cultural value of potential archaeological remains and are the primary basis of the recommended management actions included in this document.

6.2 Archaeological potential

The archaeological potential of each site is presented in terms of the likelihood of the presence of archaeological remains, considering the land use history and previous impacts at the site. This evaluation is presented using the following grades of archaeological potential:

Table 5: Grading of archaeological potential

Grading	Rationale
Nil	No evidence of historical development or use, or where previous impacts would have removed all archaeological potential
Low	Research indicates little historical development, or where there have been substantial previous impacts, disturbance and truncation in locations where some archaeological remains such as deep subsurface features may survive
Moderate	Analysis demonstrates known historical development and some previous impacts, but it is likely that archaeological remains survive with some localised truncation and disturbance
High	Evidence of multiple phases of historical development and structures with minimal or localised twentieth century development impacts, and it is likely the archaeological resource would be largely intact

6.2.1 Land use summary

The European occupation of the Study Area has been divided into two general phases of historical activity, which are outlined in Table 6 below:

Table 6: Land use summary

Phase	Discussion
Phase 1: First bridge (pre-1894)	– Construction of timber log creek crossing – Early foot track linking Galston with Hornsby Railway Station[20]
Phase 2: Construction of Galston Timber Bridge (c1894 - present)	– Establishment of temporary camp for bridge construction contractors – Construction of current timber truss bridge: constructed on timber piles, with timber bridge abutments and planking – Formalisation of Galston Road approaches (c.1895), including cutting down of the landform and in-filling behind the timber abutments to meet new bridge deck level (see Figure 3-3 for construction detail)

6.2.2 Relevant investigations

6.2.2.1 Hornsby Shre Heritage Study

A heritage study of the Hornsby Shire was prepared by e. Higginbotham and Perumal Murphy Wu \in 1993.[21] This Document identified the bridge as being an historical archaeological site (item 061).

The inventory sheet for the item, however, does not speak to archaeological potential, and instead described the significance of the fabric of the current Galston Timber Bridge.

6.2.2.2 Galston Timber Bridge, Galston Gorge

The CMP for the Galston Timber Bridge prepared by Gutteridge Haskins and Davey (GHD) and Austral Archaeology Pty Ltd[22] includes the following reference to an earlier log crossing:

> *The Bridge is in the same position as the original log crossing of Pearces Creek, which it replaced.*[23]
>
> *….if during future works any remnants of the original log crossing of Pearces Creek are encountered, all work is to cease until a qualified historical archaeologist is able to assess the situation and the appropriate permits etc are obtained.*[24]

6.2.3 Summary of historical archaeological potential

6.2.3.1 Phase 1

It assumed that no formal or recognised road corridor existed in this location prior to the establishment of Galston Road in 1895, as community agitation for the construction of a road between Galston and Hornsby did not begin until the late 1880s.

[20] Higginbotham, E. & Perumal Murphy Wu Pty Ltd, *Hornsby Heritage Study* prepared for Hornsby Shire Council, 1993, Inventory Sheet 061
[21] Perumal Murphy Wu Pty Ltd, *Hornsby Heritage Study* prepared for Hornsby Shire Council, 1993
[22] Gutteridge Haskins and Davey (GHD) and Austral Archaeology Pty Ltd, *Pearces Creek Bridge, Galstone Gorge Conservation Management Plan* prepared for RTA, 2002
[23] GHD and Austral Archaeology 2002, p. 23
[24] *ibid* p.39

Artefact have been unable to verify the existence of a former log crossing as referenced in the Pearces Creek CMP,[25] or the informal track pre-dating Galston Road referenced in inventory sheet 061.[26] Historical resources suggest that prior to the construction of the current bridge, the study area was unoccupied, with newspapers stating:

> *Here, now, in the bed of a wild and dense creek, which has always heretofore been the shelter of the dingo, wild cats, flying foxes and numberless other pests*[27]

Should a log crossing pre-dating the current Galston Timber Bridge exist, it is therefore likely to have been a fairly informal structure, making use of the topography at the time and constructed without considerable earthworks or deep piling.

Archaeological evidence associated with the former log bridge crossing may take the form of remnant buried timbers, timber and/or stone abutments/retaining walls and buried timber piles. However, the historical occurrence of considerable flooding in the region, in combination with the earthworks required for the construction of the current Galston Timber Bridge c.1894, makes survival of these elements unlikely. The potential archaeological resource is unlikely to retain sufficient integrity to be able to convey its significance.

Overall, based on the review of the information obtained from historical sources and the current condition of the site, it can be concluded that the Study Area has nil-**low potential** to contain intact historical archaeological remains associated with Phase 1 including:

- timber and/or stone abutments/retaining walls
- buried timber piles.

6.2.3.2 Phase 2

It is likely that the temporary camp associated with bridge building contractors was located within the study area. Workers camps generally consisted of huts and shanties, constructed from calico and other light-weight materials.

Archaeological remains associated with this use may include:

- postholes
- informal brick or rubble footings
- rubbish pits
- evidence of temporary/informal toileting such as privies and/or cesspits and artefact scatters.

Fabric associated with the current Galston Timber Bridge (Phase 2) remains extant. Remains associated with the current Pearce's Creek Bridge are not considered to be archaeological.

[25] *ibid* p.39
[26] Higginbothan, E. & Perumal Murphy Wu Pty Ltd, sheet 061.
[27] *Cumberland Argus and Fruitgrowers Advocate*, 18 March 1893

6.3 Archaeological significance

The significance assessment of historical archaeological sites and items requires a specialised framework in order to consider the range of values associated with each site/item. This because of the challenges associated with the often unknown nature and extent of buried archaeological remains and judgment is usually based on anticipated attributes. To facilitate assessment of archaeological significance, the NSW Heritage Branch (now Heritage NSW) arranged the seven heritage criteria into four groups (see below). The value of archaeological sources primarily lies in their research potential or the ability to provide additional information about site/item that is not contained in historical records. The assessment of archaeological research potential is augmented by additional three questions posed by Bickford and Sullivan[28]. The following significance assessment of the Study Area's potential archaeological remains has been carried out by using these criteria as outlined in the *Assessing Significance for Historical Archaeological Sites and 'Relics'*.

6.3.1 NSW Heritage criteria for assessing significance related to archaeological sites and relics

The study area has low potential to contain archaeological remains associated with Phase 1. The potential significance of these remains is outlined below.

6.3.1.1 Archaeological research potential (NSW Criterion E)

Any remnant bridge/crossing elements associated with Phase 1 are likely to consistent with informal creek crossings of this period. The timber used is likely to have been locally sourced, simply finished, and potentially not intended to be *in situ* for a long period of time.

Therefore, the potential archaeological resource associated with this phase is unlikely to reach the local significance threshold under this criterion.

Archaeological remains of the workers camp have the potential to provide information about the lives of the contractors and their families. Although it is unlikely that any specific residents could be identified, artefact deposits may identify who occupied that space, and the activities undertaken within them.

The potential archaeological resource associated with Phase 2 may reach the local significance threshold under this criterion.

6.3.1.2 Association with individuals, events or groups of historical importance (Criteria A, B & D)

Should archaeological evidence of the first timber log crossing in the area survive intact, these remains may be representative of an early attempt to connect Galston with Hornsby. The formal

[28] Anne Bickford and Sharon Sullivan, 'Assessing the Research Significance of Historic Sites', in *Site Surveys and Significance in Australian Archaeology*, ed. Sharon Sullivan and Sandra Bowdler (Canberra: Research School of Pacific Studies, ANU, Canberra, 1984), 19–26.

opening of the Galston Road in 1895 shortened the distance to Hornsby Railway Station for the fruit growers of the region.[29]

Should intact archaeological evidence of the workers camp survive, these may be historically significant as a class of accommodations for bridge contractors and their families able to demonstrate the lives of the workers who constructed the current bridge.

Should archaeological remains of the log crossing and construction camp survive with a sufficient degree of integrity, they may reach the local significance threshold under criterion A.

6.3.1.3 Aesthetic of technical significance (Criterion C)

The location is described in several historical travel accounts included in newspapers from the first half of the 20th century.[30] The site, and the current bridge, are likely to have formed tourist route due to the scenery. Archaeological remains of the first crossing, however, would not contribute to the aesthetic significance of the study area.

Any remnant bridge/crossing elements associated with Phase 1 are likely to consistent with informal creek crossings of this period. The timber used is likely to have been locally sourced, simply finished, and potentially not intended to be *in situ* for a long period of time.

Archaeological evidence associated with the workers camp is unlikely to demonstrate technological or aesthetic significance.

The potential archaeological resource is unlikely to reach the local significance threshold under this criterion.

6.3.2 Bickford and Sullivan's questions

- *Can the site contribute knowledge that no other resource can?*

The site is unlikely to contribute knowledge that no other resource can.

- *Can the site contribute knowledge that no other site can?*

If the site contains an intact archaeological resource, this may provide additional information on the development of the region that no other site can.

- *Is this knowledge relevant to general questions about human history or other substantive questions relating to Australian history, or does it contribute to other major research questions?*

[29] Perumal Murphy Wu 1993 Vol 4 p.11
[30] For Example, 'Round Trip Through Galston Gorge,' The Sun, February 9 1930

The site is unlikely to contribute knowledge that no other resource can.

6.3.3 Summary statement of archaeological significance

The study area has limited potential to contain an archaeological resource associated with earlier crossings or bridges. The study area has been subject to flood events and it is unlikely the first stage of the bridge was of robust construction.

Archaeological remains associated with Phase 1, if demonstrating a high degree of integrity, may reach the local significance threshold through their ability to contribute to our understanding of the development of the road network in the region, and the importance of early creek crossings and tracks to early farmers, with records indicating fruit growing was a significant local industry from the 1860s.

The potential archaeological resource associated with historical Phase 1 may reach the local significance threshold under Criterion A – the remains may be important in the course, or pattern, of the local area's cultural history. Overall, the significance of the potential archaeological resource lies in the historical connection of any remains to the development of the creek crossing site and the wider road network, rather than in the remains themselves.

Archaeological remains of the workers camp (Phase 2), if demonstrating a high degree of integrity, may reach the local significance threshold through it ability to contribute to our understanding of the lives of construction workers and their families, predominantly through artefactual remains. These remains may reach the local significance threshold under Criterion A – the remains may be important in the course, or pattern, of the local area's cultural history, and Criterion E - A place or object has potential to yield information that will contribute to an understanding of the local area's cultural history.

6.4 Summary of historical archaeological potential and significance

This archaeological assessment has identified that the study area has low potential to contain intact historical archaeological remains associated with the original log crossing to reach the local significance threshold. These remains are summarised in Table 7.

Table 7: Historical archaeological potential and significance

Phase	Anticipated remains	Potential for survival	Significance
Phase 1: First bridge (pre-1894)	- timber and/or stone abutments/retaining walls - buried timber piles.	Low	Local

Phase 2: Construction of Galston Timber Bridge (c1894 - present)	- postholes - informal brick or rubble footings - rubbish pits - evidence of temporary/informal toileting such as privies and/or cesspits and artefact scatters.	Low	Local

7.0 PROPOSED WORKS

7.1 Background

Aurecon prepared a Load Rating report in May 2022 for ConnectSydney which details the load capacity assessment of the timber truss bridge in its current condition and the dimensions and specifications of components nominated to be replaced. The Aurecon report provided recommendations on repairs from the load rating outcomes. The design scope is defined by these recommendations as well as the review of the existing survey and paint system.

The following is a summary of the report's findings:

- The bridge has adequate capacity in the current condition for vehicle loads across the bridge that are limited to less than 12t
- The stability of the truss is dependent on the lateral bracing connected to the central cross girder. The noted decay in the main cross girder support is around 40% of the width and is concentrated towards the support for the lateral brace. This reduces the load rating significantly for that member. Temporary cross girders are recommended until girder replacement is completed
- The base of all abutment piles are performing adequately, considering the deterioration is concentrated at the top section of the piles where there is minimal loading. It is recommended that the 300mm and 350mm diameter timber piles be monitored at the base for further deterioration. All pile interfaces should be cleared and filled with an appropriate sealant to remove water ponding, which accelerates decay
- The northern abutment capwale was nominated to be replaced due to the existing condition of the connection and timber. It is recommended to be replaced (in part or whole) with F27 timber for increased durability and strength. The capwale in its current form is insufficiently fixed to the pile and wales to provide retaining support, resulting in the piles carrying higher loads. This redistribution of load has been reviewed and is currently not critical
- Over time the fungal growth will have a detrimental effect on the paint system. Periodic wash-down to remove the growth is recommended. Repainting of the entire truss is recommended as part of the rehabilitation works to increase the durability of the existing timbers and prevent steel corrosion
- The slope stability at the Northern abutment was compromised by heavy rainfall in 2022. The flow eroded the fill behind the timber sheeting, predominantly affecting the dry-stone wall. Temporary measures have been put in place to stabilise the embankment using a combination of anchors, diversion of pavement flows, improved drainage at the embankment interface and stabilised sand/cement bags for the facing. The reduced fill on the abutment has reduced the loading behind the abutment sheeting and has not introduced instability to the abutment structure. However, the existing condition of the wale member is poor. If the timber support were to fail, this may have an effect on the embankment. Wale replacement is

nominated along with abutment sheeting repairs with like for like timbers, utilising similar techniques as provided in the TfNSW timber manual.

7.2 Overview of works

To achieve the above recommendations from the Load Rating Report and future conservation requirements of the heritage listed bridge, the proposed works would be undertaken within the following stages outlined below. Some of the works within Stage 1 and Stage 2, including maintenance and repair works, would be covered under heritage exemptions. The works that form the focus of this SOHI and associated Section 60 application are bolded for emphasis.

7.2.1 Stage 1 - Routine maintenance activities

The following activities are to be undertaken as part of the “routine” maintenance which are typically on an annual basis: The details of these scope of works are excluded in this design report, as these proposed works are consistent with the regular routine maintenance actions for the bridge.

- Tightening of loose bolts, replacement of missing bolts
- Removal of leaves and debris from the abutment shelf and between deck planks. Increasing the regular maintenance to 6 months for debris removal at deck level, along the truss and abutments will improve drainage and reduce water ponding
- Monitoring of abutment sheeting for movement and further crushing or support failure
- Local application of protective treatment where approved.

7.2.2 Stage 2 - Short term (within 1 year) (2024)

To reduce ongoing deterioration and future replacement of timber elements the following are proposed:

- Cleaning and repainting of the truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris. A paint assessment has determined the extent of the paint failure and need for repainting. Cleaning and repainting of all existing timber truss elements is required
- Repair of the northern two butting blocks to delay ongoing deterioration. Reinstate the full section by plugging the hole until these components require full replacement
- **Raise the existing concrete plinth higher by a minimum of 600 mm**
- **Improve pile durability by filling gaps around the base and sloping the concrete shelf to allow water to drain off**
- **Partial replacement of deck corbel if deteriorated including bolt connections adjacent to girder Nos. 4 and 20**
- **Install temporary steel cross girders adjacent to girder Nos. 4 and 20**

7.2.3 Stage 3 - Medium term (within 3 years) (2025)

Replacement of the worst critical timber elements are required to maintain the nominated bridge capacity and result in the bridge having an overall Bridge Health Index (BHI) of Fair, meeting SRAPC performance requirements. These works include the planning, heritage and design aspects.

- **Replacement of 7 timber cross-girders subject to investigation, engineering advice and replacement if found to be required**
- **North Abutment (B) timber sheeting partial replacement**
- **Replacement of timber deck corbel and deteriorated timber deck planks**
- **Abutment A and B capwale and wale temporary braces steel framing**
- **Undertake geotechnical investigation to advise the design parameters for redesigning North Abutment (B).**

7.2.4 Stage 4 - Long term (within 5 years)

The following elements are designated for long term solutions due to the extensive temporary works and unfeasibility within the medium term. These items are the anticipated maintenance requirements to maintain a BHI of “Fair” in coming years. This stage of works is at concept design and is subject to further geotechnical investigation works as stated in 7.2.3 - Stage 3.

- **Replacement of North Abutment (B) with concrete soldier piles, setout to follow the original 1893 abutment alignment**
- **The external timber sheeting, wale, capwale and piles will be reinstated with timber members to match the construction of the existing abutment for aesthetic purposes only. This requires significant excavation and will impact adjacent dry stone slope and extensive temporary truss support will be required**
- **Subsurface drainage can be undertaken in conjunction with the abutment replacement, due to the extent of excavation**
- **Full replacement of capwale/wale at South Abutment (A)**
- **Replacement of North Abutment (B) truss butting blocks that requires full truss support to enable access.**

The following project drawings have been prepared by Aurecon to describe the Scope of Work described above. The drawings are included in Appendix A.

DRAWING NUMBER	TITLE
520212TP-AURC-B00390-ST-DRG-000001	COVER SHEET
520212TP-AURC-B00390-ST-DRG-000011	GENERAL ARRANGEMENT
520212TP-AURC-B00390-ST-DRG-000012	SECTIONS
520212TP-AURC-B00390-ST-DRG-000013	SECTIONS
520212TP-AURC-B00390-ST-DRG-000020	CONSTRUCTION METHODOLOGY - STAGE 2
520212TP-AURC-B00390-ST-DRG-000031	ABUTMENT PLAN AND ELEVATIONS - STAGE 2 AND STAGE 3
520212TP-AURC-B00390-ST-DRG-000032	ABUTMENT BUTTING BLOCK REPAIR DETAILS - STAGE 2 AND STAGE 4
520212TP-AURC-B00390-ST-DRG-000033	ABUTMENT SHEETING REPAIR DETAILS - STAGE 3
520212TP-AURC-B00390-ST-DRG-000034	ABUTMENT PLAN AND ELEVATIONS - STAGE 4 (CONCEPT DESIGN)
520212TP-AURC-B00390-ST-DRG-000035	ABUTMENT BUTTING BLOCK REPLACEMENT DETAILS - STAGE 4
520212TP-AURC-B00390-ST-DRG-000041	GIRDER LAYOUT
520212TP-AURC-B00390-ST-DRG-000042	GIRDER DETAILS - STAGE 2
520212TP-AURC-B00390-ST-DRG-000043	GIRDER DETAILS - STAGE 3 - SHEET 1
520212TP-AURC-B00390-ST-DRG-000044	GIRDER DETAILS - STAGE 3 - SHEET 2
520212TP-AURC-B00390-ST-DRG-000051	PAINT SPECIFICATION AND METHODOLOGY - STAGE 2
520212TP-AURC-B00390-ST-DRG-000052	PAINT SCOPE - PLAN, SECTION AND ELEVATION - STAGE 2

7.3 Repainting

All existing members are to be cleaned with high pressure water and treated for mould. Upon completion of mould treatment, the existing timber surface will be abraded to aid in the adhesion of the new paint system. This can extend over selected areas or across the full truss. The new paint system provides a thicker coating and increased durability characteristics.

For damaged timber elements, the timber surface would be repaired, cleaned and have Flexiseal applied to fill all gaps and cracks. Priming may be required to ensure suitable paint adhesion is reached. Final adhesion testing of the proposed full coating system is recommended prior to painting commencing. The timber coating recommendations are listed in the table below.

Table 7-1: Coating details for timber elements

Layer	Product	Typical Products
Spot Coat	Acrylic wood primer for coating any bare timber such as may be found when cracks are repaired of new timber is installed.	Dulux 1 Step Primer/Sealer/Undercoat Water Taubmans Advanced Adhesion Primer & Mould Blocker
First Coat	Acrylic adhesion promoting primer	Dulux Maximum adhesion primer Taubmans Advanced Adhesion Primer and Mould blocker
Second Coat	High build acrylic coating	Armawall Armashield Low Gloss Acratex Acrashield Advance
Third Coat	Gloss Acrylic	All Weather Gloss with Nanoguard Dulux Weathershield Gloss
Fourth Coat	Gloss Acrylic	All Weather Gloss with Nanoguard Dulux Weathershield Gloss

Fifth Coat	Weathershield High Gloss	All Weather Gloss with Nanoguard Equivalent product

To refurbish the paint of metal elements, perform a preliminary clean including removing mud, mould, moss, lichen, dirt and other loose contaminants by scraping, mechanical cleaning and washing using low pressure water. Upon completion, remove all existing oil and grease. The existing paint layer and rust is then to be removed through abrasive cleaning prior to the coating application. The painting layers are detailed in the table below.

Table 7-2: Coating details for metal

Layer	Typical Product	Thickness
Surface Coat	The surface profile of bare metal must be 40 to 75 µm measured in accordance with AS 3894.5	N/A
First Coat	Dulux Protective Coatings Zincanode 402 Green-Grey Advance (or equivalent)	75- 125µm
Second Coat	Dulux Protective Coatings Duremax GPE Colour: R63 Red Oxide to AS 2700 (or equivalent)	75-100 µm
Third Coat	Dulux Protective Coatings Duremax GPE MIO Colour: Natural Steel Grey (or equivalent)	125- 250µm
Fourth Coat	Dulux Protective Coatings Weathermax HBr MIO Colour Bridge Grey (or equivalent)	75- 125µm

7.4 Superstructure

7.4.1 Cross girders

The decaying timber cross girders require replacement, this being the critical component for load capacity. Seven cross girders are nominated for replacement, predominantly the primary cross girders which are more susceptible to deterioration due to the tension rods running through the centre.

Stage 2 – Short Term (within 1 year) (2024)

In the interim, temporary steel cross girder on either side of the damaged girders, placed as close to the existing member as possible, is recommended.

It is recommended to design the temporary steel cross girder to achieve the same load capacity of the existing timber cross girder in as new condition.

Stage 3 – Medium Term (within 3 years) (2025)

Replacement of 7 primary cross girders (Nos. 4, 5, 10, 12, 14, 19 and 20). Temporary support of the truss is required for the cross girders removal and installation, typically utilising a Bailey truss across the full span. Refer Figure 7-1 and Figure 7-2.

The durability Class 1 ensures that the timber has the best properties to resist decay in this shaded environment. Consideration should be made to utilise F27 grade to obtain additional strength and durability.

Timber species can be chosen on availability of timber in the required dimensions. The dimension of timbers is to be increased by 5% to allow for shrinkage. The following F27 timber species adhere to the TfNSW requirements for the replacement cross girders:

- Box Grey Coast
- Gum Grey
- Ironbark Grey
- Stringy Blackdown
- Turpentine
- Tallowwood.

The proposed cross girders for replacement are highlighted in red in Figures 7.1 and 7.2 that follow.

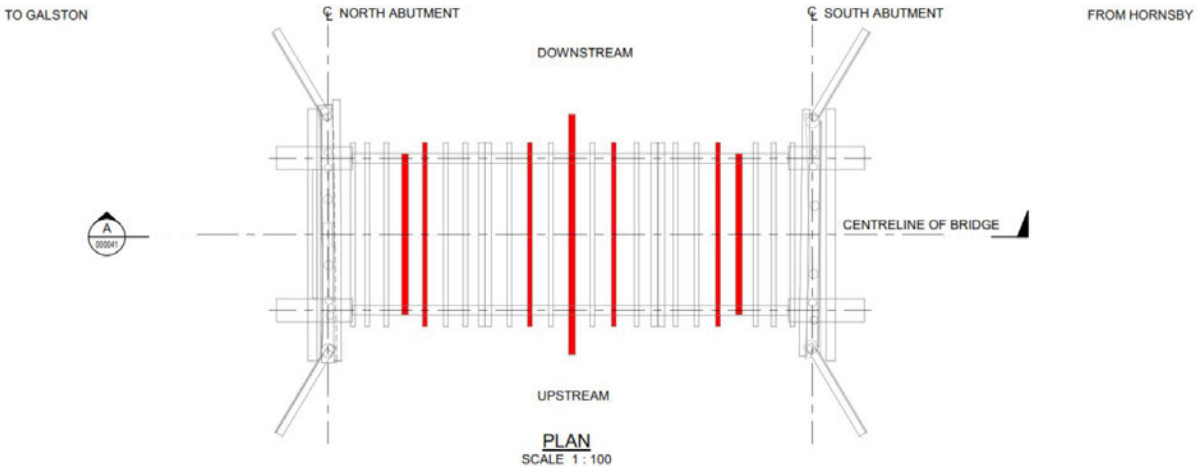

Figure 7-1: Plan indicating cross girders for replacement shaded red. (Source: 520212TP-AURC-B00390-ST-DRG-000041, 100% Design drawings, Aurecon 2023)

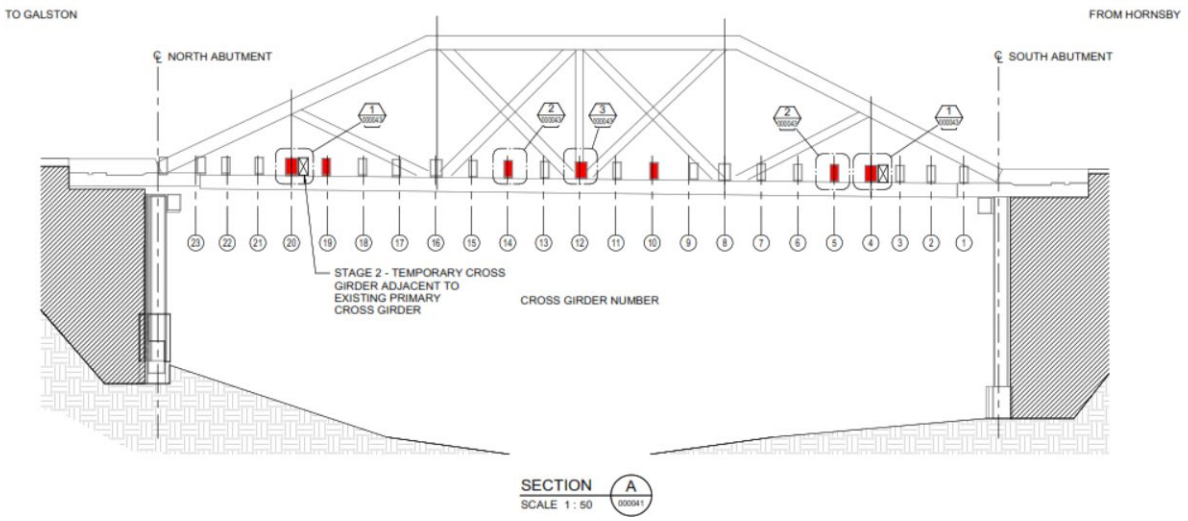

Figure 7-2: Section indicating cross girders for replacement shaded red. (Source: 520212TP-AURC-B00390-ST-DRG-000041, 100% Design drawings, Aurecon 2023)

7.4.2 Temporary cross girders

To address the immediate concern about the capacity of the deteriorated cross girders, temporary steel cross girders are proposed as a short-term refurbishment action to supplement the timber cross girders until such time as new timber cross girders are sourced and put in place. Temporary members are required to be installed adjacent to the damaged cross girders. Grade 450 350x250x8 RHS hot dipped galvanised steel sections have been chosen for these temporary girders.

7.4.3 Timber deck planks

There are 84 off deck planks, of which 65 are full size across the deck. Approximately 50 off these timber deck planks (which is 60% of all planks) have defects and are proposed to be replaced.

Section 4.5.1.4 of RTA Timber Bridge Manual 4 states that, if more than 30-40% of timber sheeting requires replacement, all the sheeting shall be replaced. Following the same principle, it is proposed to replace all timber deck planks on the bridge.

Blackbutt, Gum Spotted, Ironbark Red, Ironbark Red Narrow Leaved and Tallowwood are identified in the Design Report as being suitable grade F17 timber species for deck planks, which would match existing.

7.4.4 Timber deck corbel and timber ties

Based on the inspection completed, there is evidence of defects, decay and rotting in the 130 x 90 sacrificial timber member (corbel) where the timber deck planks are fixed into. Similar defects were noted in the 101.6 x 152.4 timber ties shown below.

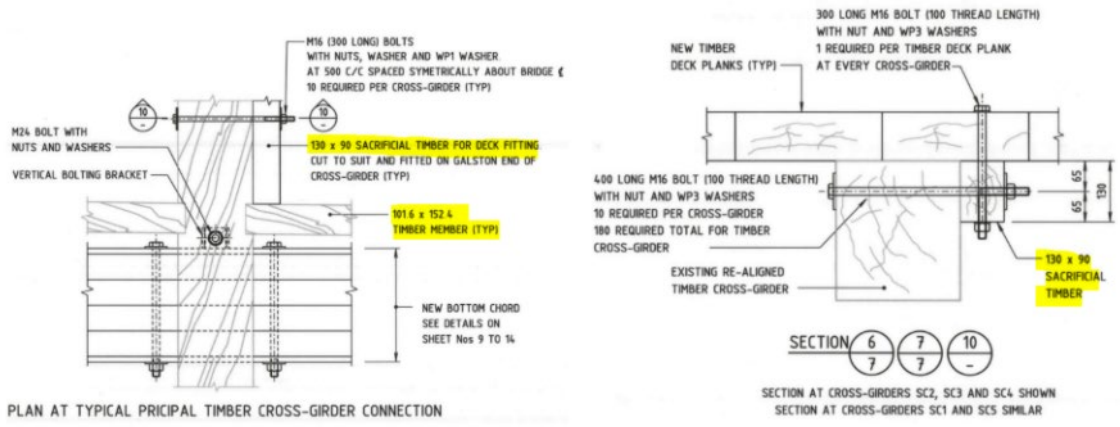

Figure 7-3: Detail and section showing corbel and timber ties in the bridge. (Source: Design Report and 520212TP-AURC-B00390-ST-DRG-000044, Aurecon 2023)

It is proposed to confirm the extent of the defects in these elements once all the deck planks are removed during refurbishment works. The contractor would allow to replace at least 5 corbel elements and 10 timber ties that would be cut on site to suit.

7.4.5 North Abutment (B) butting block element replacement

A hole in the North Abutment (B) butting blocks has been identified, with extensive section loss on the upstream end. Prevention of water ingress around and above the butting block and additional protective coatings would assist in reducing further decay. Epoxy repairs are not recommended as a permanent solution.

Replacement of the butting block elements would require extensive truss support to enable full access to the bolts and removal of load distribution through the truss. Short and long-term repairs are proposed to be undertaken to extend the life of the existing timber.

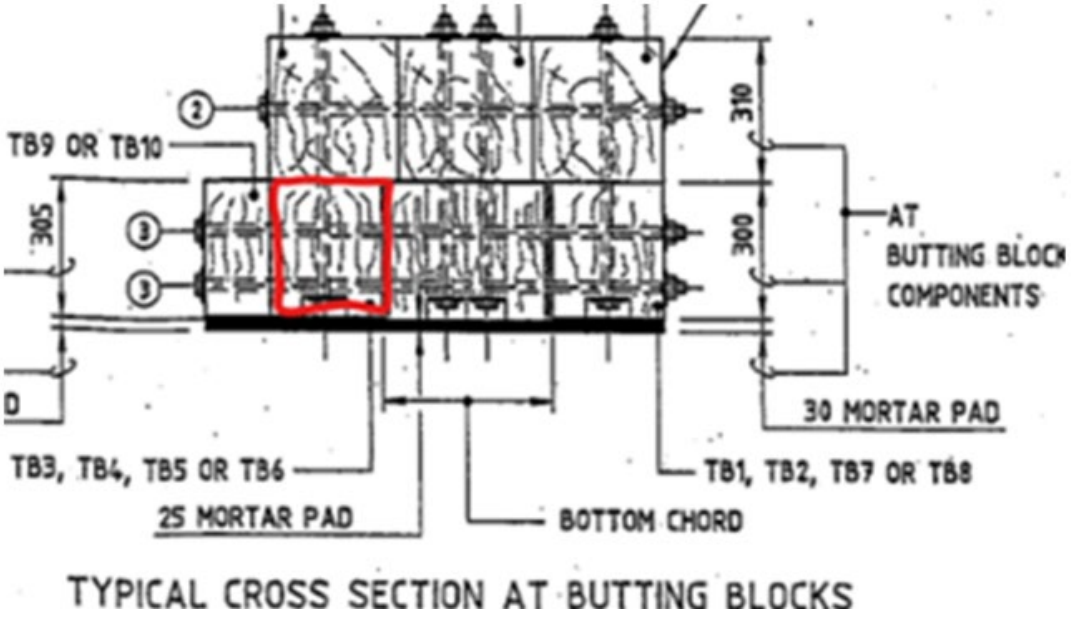

Figure 7-4: Butting block section. (Source: Design Report, Aurecon 2023)

Stage 2 – Short term (within 1 year) (2024)

The existing hole in the butting block is proposed to be treated with diffusing preservative then plugged and sealed. This is the same repair methodology adopted for patching up boring test holes in a timber bridge nominated in the RTA Timber Bridge Manual.

Stage 4 – Long term (within 5 years) (2029)

Replacement of the damaged butting block element. This is best undertaken in conjunction with the cross girder replacement, as full truss support is required to unbolt the existing connection. Replacement timber would be F22 or F27 grade timber.

7.5 Substructure

7.5.1 Timber abutment sheeting

Stage 1 - Routine maintenance activities

As part of the routine maintenance at every 6 months, the abutment sheeting is proposed to be monitored for significant movement. Photographic evidence and/or monitoring gauge is proposed to be installed to monitor the movement in the abutment sheeting.

Stage 2 – Short term (within 1 year) (2024)

If monitoring of the sheeting has indicated structural failure or ongoing movement, temporary repair would be undertaken on the timber sheeting. This could be undertaken by installing a wedge shaped timber behind the pile adequately enough to support a temporary beam (see Figure 7-5). The timber blocks with tapered ends would be fitted with bolts and then driven tightly between the pile and the sheeting (and held in place by toe nailing to the sheeting if necessary). The timber beam would be drilled to match the bolts in the blocks, fitted and bolted tightly. Small jacks or other means would then be used to engage the beam and put pressure on the damaged sheeting. Blocking would then be driven between the beam and sheeting to maintain pressure.

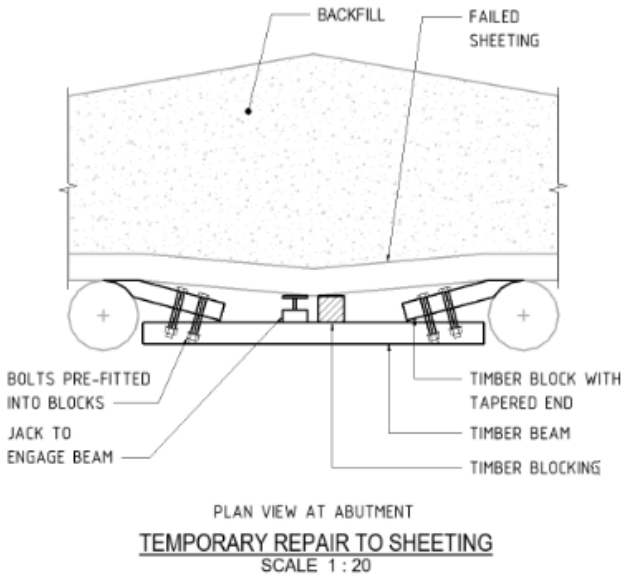

Figure 7-5: Temporary repairs to timber sheeting. (Source: 520212TP-AURC-B00390-ST-DRG-000033 and Design Report, Aurecon 2023)

Stage 3 – Medium term (within 3 years) (2025)

From the monitoring data gathered in Stage 1, if the timber sheeting defects have progressed, localised replacement is proposed.

The sloping embankment at the top third of the abutment could be removed locally to expose the edge of sheeting, to determine the condition and need for additional sheeting panels, which may be placed behind the crushed sections. A number of methodologies are provided within the TfNSW Timber bridge manual as a reference. The sections that are worst affected by crushing are situated in the location of the recent embankment erosion.

Stage 4 – Long term (within 5 years) (2029)

Full replacement of timber sheeting together with the piles is proposed as a long term repair. Provision for adequate backfill drainage through a geotextile wrapped drainage layer is required, in conjunction with improvements to the slope face and existing subsurface drainage.

The design intent it to build the proposed new North Abutment (B) behind the replaced timber sheeting. These works in Stage 4 are at concept design and are subject to further geotechnical investigation works as stated in 7.2.3 - Stage 3.

The only visible section of the new concrete abutment will be top section of the capping beam highlighted in blue below (see Figure 7-6).

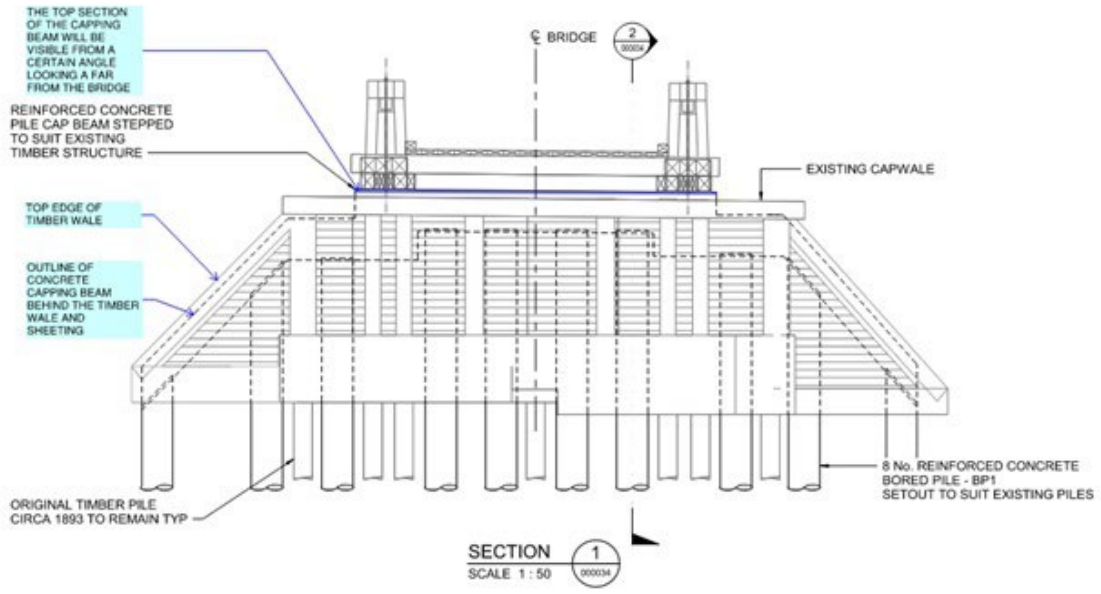

Figure 7-6: Proposed extent of concrete behind North Abutment (B) sheeting. (Source: Aurecon markup of 520212TP-AURC-B00390-ST-DRG-000034 and Design Report, Aurecon 2023)

7.6 Concrete plinth

At Stage 2, to improve pile durability and delay the deterioration of the timber piles, it is proposed to infill the existing gaps around the base and raise the existing concrete plinth at North Abutment (B) by a minimum of 600mm (see Figure 7-7).

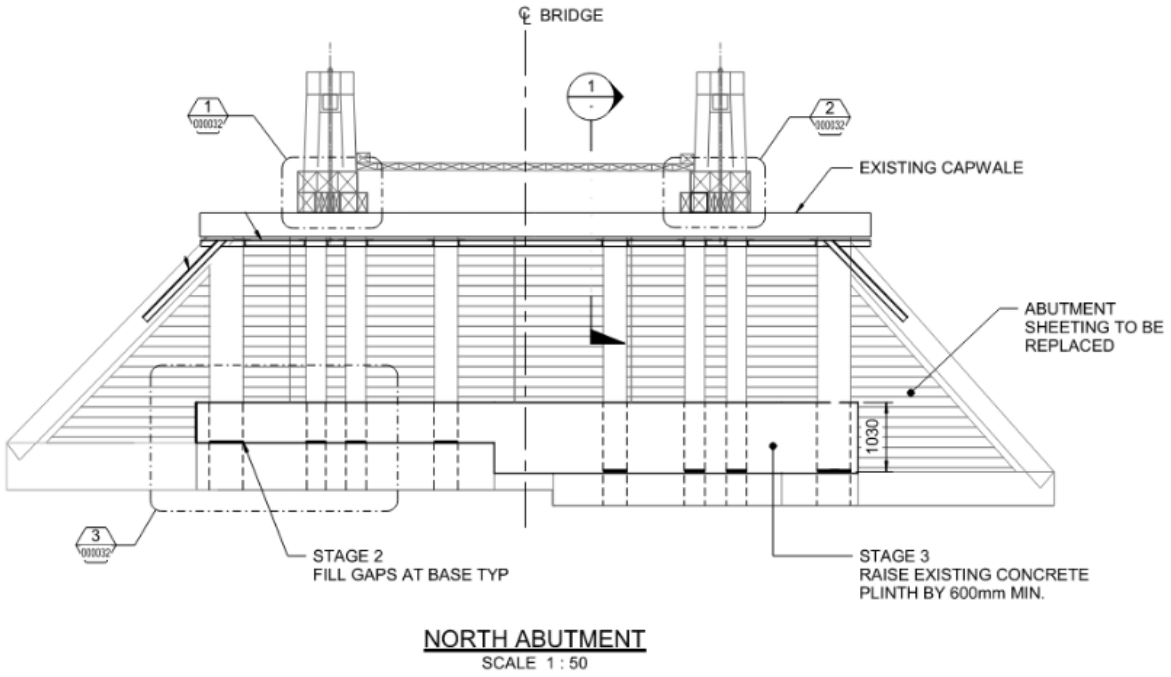

Figure 7-7: Proposed concrete plinth raising. (Source: 520212TP-AURC-B00390-ST-DRG-000034 and Design Report, Aurecon 2023)

7.6.1 Abutment A and B wale braces

At Stage 3, it is proposed to install a temporary steel angle that would be screw fixed to the existing capwale and timber to ensure the stability of the piles. It is anticipated that the temporary steel angle would be replaced within 5 years from the commencement of the Project and pending the completion of the stage 3 works.

7.6.2 Drainage

Remediation of the subsurface drainage on the approach roadways could be undertaken in conjunction with the abutment sheeting replacement, due to the extent of excavation. The purpose of the drainage system would be to divert ground water away from the bridge abutment into the creek. Reducing the presence of water would improve the timber durability. This scope would require road closures.

8.0 HERITAGE IMPACT ASSESSMENT

8.1 Introduction

The objective of a SOHI is to evaluate and explain how a proposed development or other change would affect the heritage values of a heritage place. A SOHI should also address how the heritage values of a place can be retained, and how any impacts be minimised or avoided, or be enhanced by the proposed works.

8.2 Methodology

This assessment has been prepared using the Statements of Heritage Impact 2023,[31] prepared by the NSW Heritage Office, contained within the NSW Heritage Manual, as a guideline.

8.2.1 Impact terminology

A detailed assessment is provided for physical, visual and indirect impacts. Each type of impact is described in Table 8-1.

Table 8-1: Terminology for describing the types of potential heritage impacts

Impact	Definition
Physical	An impact resulting from works which injures significant fabric of the place in any way.
Visual	An impact resulting from works which adversely affects the setting of the heritage place, or views to or from the place.
Potential Indirect	An impact resulting from works which results in temporary or permanent increased noise or vibrations.

Specific terminology and corresponding definitions are used in this assessment to consistently identify the magnitude of the project's impacts on heritage items or archaeological remains. The terminology and definitions are based on those contained in guidelines produced by the International Council on Monuments and Sites (ICOMOS)[32] and the Heritage Council of NSW[33] and are shown in Table 8-2.

Table 8-2: Heritage impact rankings

Grading	Definition
Major adverse	Actions that would have a severe, long-term and possibly irreversible impact on a heritage item. Actions in this category would include partial or complete demolition of a heritage item or addition of new structures in its vicinity that destroy the visual setting of the item. These actions cannot be fully mitigated.

31 NSW Heritage Office 2023
32 Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS, January 2011.
33 https://www.environment.nsw.gov.au/resources/heritagebranch/heritage/material-threshold-policy.pdf

Grading	Definition
Moderate adverse	Actions that would have an adverse impact on a heritage item. Actions in this category would include removal of an important part of a heritage item's setting or temporary removal of significant elements or fabric. The impact of these actions could be reduced through appropriate mitigation measures.
Minor adverse	Actions that would have a minor adverse impact on a heritage item. This may be the result of the action affecting only a small part of the place or a distant/small part of the setting of a heritage place. The action may also be temporary and/or reversible.
Negligible	Actions that are so minor that the heritage impact is considered negligible.
Neutral	Actions that would have no heritage impact.
Minor positive	Actions that would bring a minor benefit to a heritage item, such as an improvement in the item's visual setting.
Moderate positive	Actions that would bring a moderate benefit to a heritage item, such as removal of intrusive elements or fabric or a substantial improvement to the item's visual setting.
Major positive	Actions that would bring a major benefit to a heritage item, such as reconstruction of significant fabric, removal of substantial intrusive elements/fabric or reinstatement of an item's visual setting or curtilage.

8.3 Physical heritage impacts

The proposed works would have a **Minor Adverse** physical impact on the 'Bridge over Tunks (Pearces) Creek' heritage item (SHR Listing No. 01478). The proposal would involve staged and targeted removal and replacement of deteriorating bridge fabric.

Short term proposed works within Stage 2 of the proposal (within 1 year) (2024) would include repair of the northern two butting blocks, installation of temporary steel cross girders, and maintenance works around the base of timber piles involving application of an appropriate sealant to fill the gaps to ensure a watertight seal and raising the existing concrete plinth higher by a minimum of 600mm. These works are temporary in nature or involve repairs, and are considered negligible given they will be undertaken on a like-for-like basis. The temporary steel cross girders would be readily reversible and would be removed by Stage 3.

The main focus of this assessment is for new works within Stage 3 and Stage 4. Medium term proposed works within Stage 3 of the proposal (within 3 years) (2025) would include refurbishment of abutments and associated timber sheeting, installation of temporary supports across the bridge using non-invasive methods (i.e. clamping), refurbishment of the superstructure, replacement of three primary cross girders, assessment and installation of new corbel and timber ties, and replacement of timber deck planks. Long term proposed works with in Stage 4 of the proposal (within 5 years) (2029) would include replacement of North Abutment (B), designed to follow the original 1893 abutment

alignment. Concrete soldier piles would be added. External timber sheeting, wale and capwale and piles would be replaced with timber members that are visually matched to existing, along with replacement of truss butting blocks. The capwale/wale of South Abutment (A) would also be replaced. Replacement of North Abutment (B) would result in substantial excavation, and would likely be undertaken in conjunction with subsurface drainage.

Whilst the above elements and associated new works that form the focus of this assessment are important to the significance of the bridge, it is noted that these existing elements are unlikely to be original fabric. Timber typically has a limited lifespan of 20-30 years, and therefore it is likely that the timber elements have been replaced multiple times on the bridge. The proposed new works are limited in scope, involve reversible elements, and otherwise mainly affect the northern abutment (North Abutment (B)) that constitutes a small part of the overall bridge. Within this context, it is considered the proposed works are minor in nature. It is noted the bridge has significance as one of four remaining McDonald Truss bridges still operating as a road connection within NSW. The proposed new works would enhance the significant use by safeguarding the bridge's longevity as an active road asset. Proposed replacement timber elements and members would use high-quality timbers that adhere to TfNSW requirements.

The direct physical impacts can be mitigated through measures outlined in Section 9.3. If these impacts are mitigated appropriately, the proposed works could potentially result in a **Positive** impact to the State heritage values of the bridge. It is noted that routine maintenance and repair works, including bolt tightening, cleaning of debris, localised paint touch-ups, repainting of timber elements and localised repairs, would not result in any adverse direct (physical) heritage impact.

The proposed construction and piling works to North Abutment (B) associated with Stage 4 of the proposal would involve excavations to an area containing fill that is contemporary with the construction of the Galston Timber Bridge. It is considered there is nil-low potential for dispersed artefacts to be uncovered within the fill, although these finds would not reach any significance thresholds.

8.4 Potential indirect heritage impacts

The proposal would involve construction works on and adjacent to the heritage item. Construction activities around or on the bridge include excavation works adjacent to the bridge structure and on the approaches, movement of plant on, beneath and around the bridge vicinity, the installation of a temporary support system for the bridge during removal and replacement activities. These activities would generate general vibration related impacts caused by plant and equipment such a jack hammers, rollers, excavators, cranes and drills. Works and any associated/anticipated vibration impacts would be in accordance with industry standard best practices and would be confirmed/detailed in the Construction Heritage Management Plan (CHMP) prepared for the project.

However, it is noted that generally construction-based activities can be appropriately mitigated to ensure no negligent or unanticipated impacts occur to the bridge. Some recommendations and construction specific mitigations are outline in Section 9.0.

8.5 Visual heritage impacts

The proposed works would have a **Minor Adverse** visual impact on the 'Bridge over Tunks (Pearces) Creek' (SHR Listing No. 01478).

The proposal would involve some temporary adverse visual impacts to the bridge during construction, however, this would be limited to the period of the road closure. These temporary adverse visual impacts are anticipated to be very short in timeframe given the high user demand for the bridge, which is a critical asset within the local road network. New works would not result in any drastic changes to the visual character of the bridge. The temporary steel cross girders would be entirely reversible and would be removed by Stage 3 of the proposed works (within 3 years) (2025). The reconstruction of North Abutment (B) would follow the original 1893 alignment, which is considered a positive heritage outcome, and have new timber members visually matched to existing. Proposed concrete elements, including raising the existing concrete plinth to the base of timber piles, would introduce new features to the bridge although these would not be visually prominent within the overall context of the bridge and would be balanced by the enhanced longevity and structural stability of the bridge.

The overall unique McDonald Truss design would remain legible and intact, and impacts would be limited to the areas where new timber is already present. It is also noted that some timber elements would be painted as part of the proposal, including repainting of all timber elements to the truss structure, and as such it would not be easily distinguishable by a casual observer which elements constitute new works. It is noted that timber fades with time and weathering, so non-painted elements would eventually blend in with the surrounding non-painted timber.

8.6 Archaeological impacts

The proposal would involve staged and targeted removal and replacement of deteriorating bridge fabric. As the construction of the bridge originally involved significant groundworks, it is not anticipated that an intact archaeological resource survives in those locations currently containing bridge elements i.e. the bridge approaches, piles and abutments. The proposed works are therefore unlikely to result in impacts to significant archaeological resources.

8.7 Cumulative impacts

Galston Timber Bridge has been maintained diligently since it was constructed between 1893 and 1894, and upgraded multiple times in the past. It is clear that the bridge has shifted in location slightly, with the abutments having been relocated since the original construction, and many timber elements

have been replaced over the course of the 20th century. When considering the cumulative impacts to this bridge, this proposal, along with many other maintenance initiatives in the past, have seen both large scale and small scale changes to the physicality and materiality of the bridge.

It is noted there has already been a high degree of cumulative impacts to McDonald Truss bridges across NSW, with only 4 out of about 90 remaining. The proposed works, involving critical maintenance and repairs that would maintain the operability and longevity of the bridge, would assist in ensuring that the broader cumulative impacts to McDonald Truss bridges do not increase.

The cumulative impact within this context would therefore be considered **Minor Adverse** in this instance, given there is likely to be minimal (if any) original elements impacted as part of this proposal. Maintenance exercises such as this proposal occur frequently for the durability, operability, and safety of the historic timber truss bridge and its road users. Overall, the cumulative impact is considered Minor to the State heritage values of 'Bridge over Tunks (Pearces) Creek' (SHR Listing No. 01478), as the design intent and uniqueness would remain clearly intact and the bridge would be retained as a functioning and significant road connection between the suburbs of Galston and Hornsby.

8.8 Heritage impact assessment

This section assesses the potential direct impacts of the proposed development on the heritage item based on the questions included in the Heritage NSW guideline Statements of Heritage Impacts.

Table 8-3. Heritage impact assessment

Impact	Discussion
What aspects of the proposal respect or enhance the heritage significance of the study area?	The replacement of deteriorating timber elements and future proofing the bridge through repair and upgrade works will see the heritage significance of this place maintained. The significance of the bridge lies in its unique McDonald Truss design, its setting, its functionality as a road connection, and its association to the depression relief schemes of the 1890s. All of these key themes and its intrinsic value as a McDonald Truss bridge would be maintained and enhanced by this proposal, which would allow for the ongoing conservation, use and longevity of the bridge.
What aspects of the proposal could have a detrimental impact on the heritage significance of the study area?	It is not expected that any elements of the proposal would have a substantial detrimental impact on the place. Whilst the proposal does introduce changes to the bridge's fabric and finishes, such as the staged introduction of new timber decking, girders and corbels and changes to the abutments including new piling, capwale/wale and sheeting, and temporary steel cross girders, these are all intended to protect the overall heritage fabric of the bridge and ensure its longevity into the future. The design of fabric replacement within a staged approach has been carefully developed to adopt a conservative approach of "doing as much as necessary and as little as possible".

Impact	Discussion
Have more sympathetic options been considered and discounted?	Leaving the timber transverse decking, abutment piles and other deteriorating elements as existing was discounted as unsafe. Where feasible, the general principal of replacing on a like-for-like basis was pursued as the most sympathetic option for the bridge repairs. However, in some cases, as with the introduction of concrete bored piles and temporary steel cross girders, it is recommended to introduce non-original elements to increase the overall structural longevity of the Bridge and durability of timber elements in a manner that safeguards the future use and operability of the bridge, in careful coordination with relevant heritage guidance and input.
Alterations and additions	
Do the proposed works comply with Article 22 of The Burra Charter, specifically Practice note article 22 — new work (Australia ICOMOS 2013b)?	The proposed works comply with this guiding principal, which would ensure that new works would respect and maintain the cultural significance of the Pearce's Creek Bridge, and would not detract from its interpretation and appreciation. The proposed repair works and localised replacement of fabric would be sympathetically designed in a manner that is in keeping with the original design of the truss bridge, whilst being identifiably new.
Are the proposed alterations/additions sympathetic to the heritage item? In what way (e.g. form, proportion, scale, design, materials)?	The proposed conservation and repair works have been carefully developed with heritage guidance and input and are sympathetic in design. The works retain fabric of particular significance, including the truss structure itself. The form, proportion, design and materiality of new works is consistent with the existing design and appearance of the McDonald Truss bridge, with the majority of works being undertaken on a like-for-like basis. Additions proposed within the staged works include new timber decking, primary cross girders, corbels and timber ties, along with replacement of timber elements to abutments including timber piles, capwale and timber sheeting. Temporary steel cross girders will have a transient adverse visual impact, and no adverse physical impact as the girders would be entirely reversible and would be removed by Stage 3 of the proposed works (within 3 years) (2025). Works to be undertaken on a long-term basis within Stage 3 and 4 involve raising the existing concrete plinth to the base of timber piles and the reconstruction of North Abutment (B). These works have been developed as far as possible to respect the original design intent of the bridge, whilst importantly ensuring its structural safety and longevity to maintain its ongoing use as a functioning road asset. These are all in line with appropriate methodologies to ensure the lifespan of a timber truss bridge is extended. These works are expected to maintain the heritage significance of the bridge while ensuring the continued safe operation of the bridge and its important role in the road network.
Will the proposed works impact on the significant fabric, design or layout, significant garden setting, landscape and trees or on the heritage item's setting or any significant views?	There would be no substantial changes to the wider landscape setting of the Pearce's Creek Bridge. Any impacts would be mainly associated with construction activities, which would be temporary in nature.
How have the impact of the alterations/additions on the heritage item been minimised?	The proposal has been developed with ongoing heritage advice and input to ensure that impact of the additions/alterations to the Galston Timber Bridge and its significance is kept to a minimum. The targeted/staged approach of the works would ensure the proposal is carried out in a sympathetic manner that does "as much as necessary and as little as possible".
Physical changes to fabric identified as significant	

Impact	Discussion
Has the fabric that will be impacted by the proposed works been assessed and graded according to its significance?	The fabric of the bridge that will be affected by the project has been assessed according to gradings of significance for individual components. Fabric of 'high' significance would be directly impacted and replaced by the proposed works, including cross girders and timber decking. Impact to this fabric has been sensitively developed and would be implemented only as required to maintain the use and functionality of the truss bridge.
Has specialist advice from a heritage professional, architect, archaeologist or engineer been sought?	Yes, the proposal has involved ongoing heritage advice and input.
Partial demolition	
Is the partial demolition essential for the heritage item to function?	Yes, the proposed partial demolition including replacement of fabric and the reconstruction of North Abutment (B) within the staged works are required to ensure the structural stability and longevity of the bridge and safeguard its ongoing use as a functioning road asset - which is an essential part of the item's heritage significance.
If partial demolition is proposed because of the condition of the fabric, can the fabric be repaired?	Most elements for retention are assessed to be viable and justification for retention was sound. Whereas elements assessed to be experiencing failure or deterioration that are proposed for partial demolition must be replaced for safety and operability concerns. It is noted the majority of the elements which make the bridge significant are being kept, including the superstructure of the McDonald Truss span itself.
Are important features and elements of the heritage item affected by the proposed partial demolition (e.g. fireplaces in buildings)?	The proposed repair and conservation works would involve localised impact and partial demolition/replacement of deteriorated structural components of the Pearce's Creek Bridge.
Will the proposed partial demolition have a detrimental effect or pose a risk to the heritage item and its significance? If yes, what measures are proposed to avoid/mitigate the impact?	The proposal would repair and where necessary replace deteriorating fabric and structural components of the Pearce's Creek Bridge. While some of these elements, including the decking and cross girders, are of high significance to the heritage item, the proposed repair and conservation works are essential to maintaining the longevity, structural integrity and operability of the bridge as a functioning road asset. Continuation of the bridge's original use is a fundamental aspect of its significance.
Identify and include advice about how significant elements, if removed by the proposal, will be salvaged and reused.	The proposal removes elements within the bridge which, although of high significance, are unlikely to be original fabric. Timber typically has a relatively short life span, and the majority of the bridge's components have likely been replaced and repaired over time. As such, requirement to salvage and re-use deteriorated elements is not considered necessary in this instance.
Painting	
Will repainting affect the conservation of the significant fabric of the heritage item? Does the existing colour scheme contribute to the heritage significance of the heritage item?	The proposal includes repainting of the existing timber and metal elements of the bridge, following the existing colour scheme. This will not affect conservation of significant fabric. The existing white colour scheme directly supports and enhances the significance of the bridge and its historic aesthetic qualities. The new paint system would provide a thicker coating and increased durability characteristics, which is considered a positive heritage outcome. Details on the timber coating recommendations and painting layers is provided in Section 7.3 of this report

Impact	Discussion
Is the proposed paint type chemically compatible with existing materials?	The new paint system has been developed to maintain the existing colour scheme, whilst ensuring increased durability and longevity in a manner that would not adversely impact the bridge's materials. Coating details for timber and metal elements are provided in Section 7.3.
Will it affect the breathability of the heritage fabric?	Timber truss bridges in NSW have been historically painted white. The proposed new paint scheme has been developed to maintain the condition of underlying timbers whilst also increasing the durability of paintwork.
Cumulative impacts	
Are the proposed works part of a broader scope of works?	The proposal comprises staged works that would be carried out on a short to long term basis as required to facilitate targeted works that would maintain the upkeep, useability and operability of the Galston Timber Bridge.
Does this proposal relate to any previous or future works? If so, what cumulative impact (positive and/or adverse) will these works have on the heritage significance of the item?	Galston Timber Bridge has been upgraded multiple times in the past. The bridge has shifted in location slightly, with the abutments having been relocated since the original construction, and many timber elements having been replaced over the course of the 20th century. Within this context, it is not considered the proposal would generate any substantial adverse cumulative impact. The proposal forms part of the ongoing evolution and maintenance of the bridge as a functioning road asset.
How do the proposed works contribute to the cumulative impact/effect of works to the heritage item?	When considering the cumulative impacts to Galston Timber Bridge, this proposal, along with many other maintenance initiatives that have been undertaken in the past have involved both small-scale and large-scale changes to the bridge's materiality and composition. The proposal forms part of the ongoing upkeep and conservation of the heritage item.
Historical archaeology	
Is the development sited on any known, or potentially significant historical archaeological deposits?	It is not anticipated that an intact archaeological resource survives in those locations currently containing bridge elements i.e. the bridge approaches, piles and abutments, as the construction of the bridge originally involved significant groundworks. The proposed works are therefore unlikely to result in impacts to significant archaeological resources.
Setting views and vistas	
Do the proposed works affect the setting of the heritage item, including views and vistas to and from the heritage item and/or a cultural landscape in which it is sited?	The proposed maintenance and repair works to the Galston Timber Bridge would not result in any immediately discernible visual change to the appearance and design of the bridge. Where possible, proposed repair works and replacement fabric has been developed to be consistent with the original design of the bridge. There would be no changes to the setting and cultural landscape of the bridge.
Can the impacts be avoided and/or mitigated?	Visual impacts would be mainly associated with construction activities during works, which would be temporary in nature. The scale of impact could be mitigated by ensuring timeliness of works and through use of appropriate materials.
Conservation areas and nearby heritage	
Will the proposed works affect the heritage significance of the adjacent heritage item or the heritage conservation area?	The proposal is not considered to result in any impact to heritage items located in the vicinity. There are no new structures proposed within or near the site. The other heritage items are located a substantial distance from the proposed works, and as such any indirect impact by way of vibrations are unlikely if works are in accordance with industry standard best practices as confirmed and detailed in the CHMP prepared for the project.

Impact	Discussion
Will the proposed works affect views to, and from, the heritage item? If yes, how will the impact be mitigated?	There is no new development and no new structures proposed within or near to this site. The proposal would largely maintain the existing appearance and presentation of the heritage listed truss bridge. As such, it is not considered the wider setting and views to and from nearby heritage items would be affected by the proposal.
How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?	There is no new development/structures proposed within or near the Pearce's Creek Bridge and its curtilage. No changes to the heritage curtilage are proposed.
How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?	The proposed maintenance and repair works to the Galston Timber Bridge would not result in any immediately discernible visual change to the appearance and design of the bridge. The majority of impacts to views to and from the heritage item would be mainly associated with construction activities, which would be temporary in nature. There would be no change to the setting and views to and from nearby heritage items.
Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?	As the construction of the bridge originally involved significant groundworks, it is not anticipated that an intact archaeological resource survives in those locations currently containing bridge elements i.e. the bridge approaches, piles and abutments that are proposed for refurbishment.
Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)?	There is no new development and no new structures proposed within or near to this site. The proposed works, which involve maintenance and repairs, are in keeping with the existing design of the bridge.
Will the additions visually dominate the heritage item? How has this been minimised?	The proposed maintenance and repair works to the Galston Timber Bridge would not result in any immediately discernible visual change to the appearance and design of the bridge. Where possible, proposed repair works and replacement fabric has been developed to be consistent with the original design of the bridge.
Will the public, and users of the item, still be able to view and appreciate its significance?	The proposed maintenance and repair works to the Galston Timber Bridge would not result in any immediately discernible visual change to the appearance and design of the bridge. The majority of impacts to views for the public and users of the bridge would be mainly associated with construction activities for the duration of works, which would be temporary in nature.
Interpretation	
Will the proposed works contribute to a continued understanding of the heritage item's history and significance?	By allowing for the bridge's maintenance, repair and ongoing use, the proposal would contribute to continued understanding of the Pearce's Creek Bridge's history and significance.
Can interpretive features be integrated into the design?	This report includes recommendation for preparation of a Heritage Interpretation Strategy by an appropriately experienced heritage interpretation specialist as part of the future program of works for the Pearce's Creek Bridge to communicate the significance and history of the bridge to site users and wider audience (subject to Transport for NSW approval and funding).

8.8.1 Assessment against CMP policies

8.8.1.1 NSW Timber Truss Road Bridges Overarching CMP 2018

The *NSW Timber Truss Road Bridges Overarching CMP 2018* has been endorsed by the Heritage Council of NSW and as such works in accordance with policies contained in the CMP are eligible for Standard Exemptions from Heritage NSW approval (in *particular Standard Exemption 1: Maintenance and cleaning* and *Standard Exemption 2: Repairs to non-significant fabric*). [34]

The following table records the policies that are assessed as being directly relevant to the proposed works. A full list of policies can be found in the *NSW Timber Truss Road Bridges Overarching Conservation Management Plan 2018*:[35]

Table 8-4: Assessment of proposal against CMP policies

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
1	Retention of cultural significance of the timber truss bridge population	b) Timber truss bridges are places of exceptional cultural significance and will be maintained and conserved in such a way which protects or enhances their cultural significance. c) Conservation of timber truss bridges will accord with the definitions and principles of *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance* and include all significant components and attributes of the place and its setting. e) The conservation management of the timber truss bridges will be undertaken in consultation with heritage practitioners with relevant expertise and experience working in collaboration with structural engineers with relevant expertise and experience as required.	Yes	b) The proposed works protect the State heritage values and cultural significance of Galston Timber Bridge. The works would ensure this functioning road bridge, as one of four remaining McDonald Truss timber bridges in NSW, is safeguarded from further deterioration. c) The Burra Charter principal of “doing as much as necessary and as little as possible” is utilised by this proposal to ensure only fabric which must be replaced is impacted. This principal is also reflected in the staged approach of the proposed works, which seek to carry out small-scale repairs and refurbishment works within the near future and facilitate more direct impacts on a long-term basis as required. e) The proposal has been undertaken in consultation with heritage specialists and structural engineers with relevant experience to ensure the proposed works to Galston Timber Bridge are carried out in a manner that ensures the significance of the timber truss bridge is retained and conserved.

[34] *Standard Exemptions. (Heritage NSW, 2020).*
[35] *NSW Timber Truss Road Bridges Overarching Conservation Management Plan. (RMS, 2018).*

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
6	Use of the bridges	b) Timber truss bridges to be retained will be used for vehicular traffic. The continued usage of these bridges as functioning crossing for both commercial (freight, farming machinery and buses) and private passenger vehicles is integral to their cultural significance.	Yes	b) The proposal and associated staged works would ensure that the Galston Timber Bridge remains open and usable for vehicular traffic. Continuation of this original use is a key element of the timber truss bridge's identified heritage significance.
7	Maintenance and repair	a) Ongoing repair and maintenance will be carried out to ensure that the minimum standards of maintenance under the *Heritage Act* are met, and that each significant element in each bridge retains its level of significance. Works will be undertaken by suitably skilled workers with proven expertise in the relevant field under adequate supervision. b) Roads and Maritime will develop a forward program to ensure that sufficient suitable high quality timber is made available for identified conservation works on timber truss bridges. e) Timber elements in trusses will be replaced as required before deterioration affects the safety or serviceability of a bridge. New timbers will be cut to the original design dimensions as shown on original design drawings (unless modified dimension are approved by the Heritage Council of NSW as required for strength or due to availability of timbers) and original detailing using NSW hardwood of suitable strength and durability.	Yes	a) This proposal ensures the ongoing repair and maintenance of the Galston Timber Bridge. The works would retain specific elements of significance such as the trusses and truss span. The works would protect the overall significance level of the bridge by ensuring it remains in situ, operational and durable. This SOHI includes a mitigation measure to ensure suitably skilled workers with proven heritage experience in timber truss bridges would be engaged to carry out the works. b) It is noted a sustainable and realistic strategy to procure high quality timber is being carried out by the project team in consultation with TfNSW. e) Timber has a life span of 20-30 years and depending on the environment of the bridge, timber can show signs of decay quicker than others. Tunks (Pearces) Creek is one of these sites, where the bridge's setting is generally damp. As part of the proposed repair works, new timbers would be cut to the original design dimensions. Under Stage 3 and Stage 4 of the proposed works, timber elements experiencing failure, rot or deterioration are proposed to be replaced.

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
8	New work	a) Elements of the bridges will be conserved in accordance with their level of significance. b) Timber truss bridges will continue to carry traffic appropriate to their place in the road network. They may be adapted to ensure their continued serviceability provided this does not compromise their heritage significance. Subject to relevant approvals, this may include introducing new materials to meet load, safety and durability requirements in order to enable the bridge to remain as a vital part of the NSW road network, strengthening truss spans to ensure loads can be carried safety and to ensure effective traffic barriers can be installed. c) Roads and Maritime will match the excellence of the originals in the quality of design and construction of any modifications or new works. d) Roads and Maritime will continue to explore and develop means by which these bridges may continue to effectively fulfil their required function. This may include the use of new methods and materials to strengthen the structure, extend their usable life, ensure their operability and achieve conservation objectives where this can be done in a subtle and sympathetic way and where this is reasonable and feasible. Such changes are subject to the standard approval process of the *Heritage Act 1977* for those bridges on the SHR. e) For works not covered by Standard or Specific Exemption of by exemptions identified in an endorsed bridge specific CMP, applications to the Heritage Council for approval for specific works will be submitted, accompanied by a statement of heritage impact (SOHI) and, if required, the relevant statutory application under the *Heritage Act*.	Yes	a) Elements of specific heritage significance to the Galston Timber Bridge, including the timber truss span and materiality of the bridge along with the general setting, would be maintained and conserved by the proposed works. Direct impact to fabric of significance has been carefully developed and would be implemented only as required to maintain the use and functionality of the truss bridge. b) This proposal ensures that Galston Timber Bridge remains open and usable for vehicular traffic and as a vital part of the local road network, which is a key element of the timber truss bridge's heritage significance. c) This proposal has been carefully developed with ongoing specialist heritage guidance and input to ensure the works would match the excellence of the original design and construction of the timber truss bridge. d) The proposed works would ensure the operability of the bridge by introducing new elements such as new timber, splicing methodologies and new decking finishes to protect the bridge fabric, strengthen the bridge and to ensure its longevity as a key historic asset within the local road network. e) This SOHI is intended to support a Section 60 application to Heritage NSW for approval. Routine maintenance works would be covered by relevant exemptions.

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
9	Interpretation	a) The heritage significance of the timber truss bridge population and each of the timber truss bridges to be retained will be communicated through effective heritage interpretation. b) Interpretation of the timber truss bridges will be based on the historical themes and historical analyses documented in the bridge specific CMPs and this overarching CMP. d) Interpretation will conform to the Heritage Division's Interpreting Heritage Places and Items Guidelines and with Roads and Maritime's Heritage Interpretation Guideline.	Yes	a) This SOHI includes a mitigation measure and recommendations for appropriate heritage interpretation to be developed for the Galston Timber Bridge. b) d) Any heritage interpretation carried out for this site as part of this project would be prepared in accordance with the relevant historical themes and interpretive guidelines by an appropriately experienced heritage interpretation specialist.
10	Protection and enhancement of visual setting	a) Any development proposed for the land adjacent to the bridge, whether inside or outside the curtilage, should be considered carefully to ensure that it does not have an unacceptable visual impact which could cause a reduction in the aesthetic significance of the bridge. b) Signage in the vicinity of the bridges should be minimised to what is necessary for safety and identification so that it does not create visual clutter or block views. c) Vegetation in the vicinity of the bridges should be kept to a minimum. Weeds should be removed, and vegetation clearance should be taken with a view to improving the visual setting, and to reduce the risk of fire creating a cleared area that acts as a fire break.	Yes	a) The proposal does not involve any works or development to land beyond the immediate curtilage of Galston Timber Bridge. b) The existing signage around Galston Timber Bridge is minimalistic and limited in scope. This proposal does not introduce any new signage. c) The proposed works would not result in any impact to the surrounding bushland. Vegetation around Galston Timber Bridge is generally far enough away as to not block or impede the bridge's visual setting. It is noted that the setting of the bridge has always been characterised by bushland, and as such the surrounding vegetation of the Berowra Valley National Park contributes to the visual appeal of Galston Timber Bridge.

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
11	Archival recording	b) Immediately before, during and after any works being undertaken, an inspection will be completed, detailing and photographing the condition and defects of all elements. d) All methods and materials used during any work done to any timber truss bridge (whether it is to be retained or demolished) will be fully documented with written information and appropriate photographs. Records, reports and photographs of any work carried out on the bridge will be placed in a permanent archive to enable retrieval of information afterwards. f) Information recorded will be used to promote and enhance interpretation both of individual bridges and of the timber truss bridge population in general to the communities of NSW.	Yes	b) This SOHI includes a mitigation measure and recommendations for appropriate archival recording for the Galston Timber Bridge before, during and after works. d) Any heritage archival recording carried out for the site as part of this project would be prepared in accordance with the relevant guidelines by an appropriately experienced heritage specialist. f) Copies of the archival recording would be made available to Heritage NSW, Hornsby Shire Council and other relevant stakeholder groups to ensure the information is used to promote and enhance interpretation and understanding of the truss bridge and its evolution.

8.8.1.2 Galston Timber Bridge, Galston Gorge CMP 2002

The following table records the policies that are assessed as being directly relevant to the proposed works, that are in addition to the above policies provided in the Overarching Timber Truss Bridge CMP. A full list of policies can be found in the Draft Pearces Creek Bridge, Galston Gorge Conservation Management Plan 2002:[36]

Table 8-5: Assessment of proposal against Draft Pearces Creek Bridge CMP policies

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
7.1.6	Treatment of fabric elements of different levels of significance	The following provides a guide to the grading of significance of items or places of heritage value and is directly derived from the NSW Heritage Office Heritage Manual and should be used in conjunction with the information contained in Section 4.5 in the management of Pearces Creek Bridge. **Grading: Exceptional** **Justification:** Rare or outstanding element directly contributing to an item's local or State significance. **Status:** Retain all fabric. Like for like replacement only for items that require periodic renewal (ie timber truss members). If adaptation is necessary for the	Yes	The proposed works would retain specific elements of high significance such as the truss span, cross girders and decking. The works would protect the overall significance level of the bridge by ensuring it remains in situ, operational and durable. Direct impact to fabric of significance has been sensitively developed and would be implemented only as required to maintain the use and functionality of the truss bridge. The targeted nature of the proposed works, which would be carried out in stages, ensures only fabric which must

[36] *Draft Pearces Creek Bridge, Galston Gorge: Conservation Management Plan (Austral Archaeology, April 2002)*

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
		continued functioning of the Bridge, minimise changes. Also, minimise any changes likely to remove or obscure significant fabric. Preference is to be given to actions and changes that are reversible. **Grading: High** **Justification:** High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance. **Status:** Aim to retain all fabric. Like for like replacement only for items that require periodic renewal (ie timber truss members). If adaptation of fabric is necessary for the continued functioning of the Bridge, minimise changes. Also, minimise any changes likely to remove or obscure significant fabric. Preference is to be given to actions and changes that are reversible. **Grading: Moderate** **Justification:** Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item. **Status**: Aim to retain most fabric. If adaptation is necessary, more changes are permissible than for fabric of considerable significance. However the same principles apply. **Grading: Little** **Justification:** Alterations detract from significance. Difficult to interpret. **Status:** Fabric of little significance may be retained or removed as required for the future use of the Bridge, provided that its removal would cause no damage to more significant fabric. **Grading: Intrusive** **Justification:** Damaging to the item's heritage significance. **Status:** Intrusive fabric should be removed or altered to reduce its intrusion and negative impact upon the significant fabric when the opportunity arises. These activities must occur in such a manner so as to minimise damage to the adjacent significant fabric.		be replaced is impacted. The proposal would involve small-scale repairs and refurbishment works within the near future, and would also facilitate more direct impacts on a long-term basis as required to conserve the bridge, significant fabric and use.

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
7.1.7	Heritage curtilage	The RTA (TfNSW) has established a heritage curtilage around the bridge that covers approximately 516m2. A sketch showing the heritage curtilage is included in Appendix I. This curtilage includes the bridge its abutments and approaches. Due to property ownership and management constraints, the buffer zone surrounding the structure is of minimal nature and should be increased in size should the opportunity arise. Within this curtilage every effort should be made to maintain the physical and visual aspects of the current bridge. In addition, if during future works any remnants of the original log crossing of Pearces Creek are encountered, all work is to cease until a qualified historical archaeologist is able to assess the situation and the appropriate permits etc are obtained.	Yes	The proposal does not involve any works or development to land beyond the immediate curtilage of Galston Timber Bridge. Within the curtilage of the bridge, minimal works would occur beyond the bridge itself. This assessment includes recommendations of an Unexpected Finds Procedure, which would cover discovery of any original log crossing of the creek if encountered.
7.3.1	Retain the unique characteristics of the McDonald truss	Pearces Creek Bridge is an extremely rare example of the McDonald truss bridge type. These bridges were once a common sight on the roads of rural NSW and were the first to represent a truly novel approach to timber bridge building in Australia. The McDonald truss is very much a stepping stone between the earlier, difficult to maintain PWD type trusses and the following, simpler to construct and maintain truss types. There are many design elements specific to this truss design that are not found in the later truss designs. The Pearces Creek Bridge is unique in retaining its original type diagonal planking for the decking surface, without the presence of additional, longitudinal timber planking. Therefore, it is of considerable importance to the retention of the design integrity of this structure that all elements of the structure, with particularly emphasis on the decking arrangement are retained.	Yes	The proposal, which provides staged and targeted maintenance, repair and conservation works, would ensure the ongoing longevity and use of the significant McDonald timber truss bridge, which is a significant typology within NSW. The existing timber planking would be replaced on a like-for-like basis, using high quality timber elements matched to existing.
7.4.2	Colour scheme	The Bridge is painted in what is believed to be its original colour scheme. While it has not been possible to find any photos of the Bridge at the time it was opened, it is known that the timber components of timber truss bridges of this era were painted white, with steel verticals and shoes picked out in black. It is not possible to undertake paint scrapes of bridge members in	Yes	The proposal includes repainting of the existing timber and metal elements of the bridge, following the existing colour scheme. The new paint system would provide a thicker coating and increased durability characteristics, which is considered a positive heritage outcome. Details on the timber coating recommendations and

Policy No.	Overarching policy	Policy detail	Are works consistent with CMP policy? (Yes/No?)	Comments
		order to search for evidence of earlier colour schemes as the Bridge is 107 years old. The effective life span of timber elements is usually in the range of 20 to30 years, therefore, no materials which possess original paint remnants are likely to exist. Whilst a bridge painted white does require cleaning more often to retain a neat appearance than one painted in a darker shade, the appearance and context of the Bridge is greatly enhanced. If it is decided to install a metal flashing to protect the truss members, this should also be painted white to blend in with the rest of the Bridge.		painting layers is provided in Section 7.3 of this report.

8.9 Summary of heritage impacts

The following table identifies any potential impacts of the proposal on the nearby heritage items which are set out in Section 2.2.1 above.

Table 8-6: Summary of heritage impacts

Item	Significance	Proposal impact Y/N	Discussion
Galston Timber Bridge, Galston Gorge SHR Listing No. 01478 Roads and Maritime (now TfNSW) S170 Register Listing No. 4300009, Hornsby LEP 2013, Item No. A46, Hornsby LEP 2013, Item No. A44	State	Y	The proposed works would result in a **Minor Adverse** impact (Physical) and a **Minor Adverse** impact (Visual). Enhancement of the bridge's operability, longevity and ongoing use is considered to represent a **positive** heritage outcome.
Galston Gorge culvert	Local	N	The proposed works would have a **neutral** heritage impact on this item, as it is located 300 m north-west from the proposal.
Galston Gorge sandstone buttressing Hornsby LEP 2013, Item No. A43	Local	N	The proposed works would have a **neutral** heritage impact on this item, as it is located 105 m north-east from the proposal.
Galston Gorge water troughs Hornsby LEP 2013, Item No. A45	Local	N	The proposed works would have a **neutral** heritage impact on this item, as it is located 260 m north-east from the proposal.

9.0 CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

This report concludes the following:

- The proposed works would result in a **Minor Adverse** impact (Physical) and a **Minor Adverse** impact (Visual) on the 'Bridge over Tunks (Pearces) Creek' heritage item (SHR Listing No. 01478)
- All nearby heritage items which are not the timber truss bridge are unlikely to be impacted by the proposed works.

9.2 Recommendations

9.2.1 General recommendations

The following management guidelines should be followed for all aspects of the proposed works:

- All works are to be undertaken in accordance with the principles and objectives of the Burra Charter
- The works have been designed to minimise and avoid impacts on highly significant fabricin accordance with the guidelines, *How to Carry Out Work on Heritage Buildings & Sites* (NSW Heritage Office 2002). Works to be undertaken on fabric that is of high significance (as identified in Section 5.2.3 of this report) should only be carried out by tradespersons with experience in working with heritage materials
- The methods, tools and materials used should not cause inadvertent damage to fabric that is of high significance (as identified in Section 5.2.3 of this report). Should unexpected damage to significant historic fabric occur, the advice of a heritage specialist must be sought before repairs are made
- Should further deterioration of significant historic fabric occur, the advice of a heritage specialist and experienced structural engineer must be sought before repairs are made
- Where options exist for alternative installation methodologies and materials, that achieve the desired functional outcome, preference should be given to the option that has the least impact on significant heritage fabric
- The Transport for NSW *Unexpected heritage items procedure* (July 2022) should be implemented for all excavation works
- A Photographic Archival Recording (PAR) should be undertaken of all areas proposed for maintenance and repair activities in accordance with Policy 11 of the NSW Timber Truss Road Bridges Overarching CMP 2018. The PAR should be undertaken prior to, during and following completion of works. This PAR should be undertaken in accordance with the Heritage Council

of NSW guidelines *Photographic Recording of Heritage Items using Film or Digital capture* (Revised 2006). A digital copy of the PAR would be provided to Heritage NSW, Hornsby Shire Council and TfNSW

- A site wide interpretation strategy should be developed and implemented after the proposed works to ensure the ongoing interpretation of the historical development of the bridge (subject to Transport for NSW approval and funding),
- TfNSW *Unexpected heritage items procedure* must be implemented (EMF-HE-PR-0076) for all excavation works. In the event of any unexpected archaeological finds being encountered, all works must cease immediately and a suitably qualified heritage consultant must be contacted for advice. In the unlikely event that 'relics' of local or State significance are discovered, further archaeological permits may be required
- If TfNSW have a protocol for liaising with National Trust of Australia (NSW) about prospective works to listed items, this should be actioned prior to carrying out any major works on the bridge.

9.2.2 Design recommendations

The following elements of design should be issued to a qualified heritage specialist for review prior to their finalisation to mitigate and minimise potential impact on the heritage significance of the Galston Timber Bridge:

- The finalised detailed design of the temporary support works
- The finalised constructability report for the project.

9.2.3 Protection of heritage fabric during works

The following recommendations and mitigation measures are provided to minimise potential physical impact to original and highly significant fabric of the study area:

- A Construction Heritage Management Plan (CHMP) should be produced and reviewed by a suitably qualified heritage specialist prior to the commencement of work. The CHMP should set out appropriate fabric protection to be installed to all adjacent significant fabric for the duration of the works and the proposed vibration monitoring which will be implemented for the duration of the works.

The following recommendations and mitigation measures are provided in order to minimise potential indirect impact to the heritage items in the vicinity:

- If any inadvertent damage occurs to heritage items located in the vicinity of the study area due to the proposed works (including the locally listed Galston Gorge culvert, Galston Gorge sandstone buttressing, and Galston Gorge water troughs), the damage must be reported immediately to the Project Manager and the relevant heritage specialists. Damage is to be made good in accordance with specialist heritage advice.

9.3 Mitigation measures

9.3.1 Before works

- The detail design of temporary support works will be determined by the contractor for TfNSW. Further heritage review of the temporary works design by a heritage specialist prior to construction is required before works can commence
- A Construction Heritage Management Plan (CHMP) containing heritage input and advice from a heritage specialist is required for the contractor to implement on site.

9.3.2 During works

- All works are to be conducted in line with the conservation policies outlined in the *NSW Timber Truss Road Bridges Overarching Conservation Management Plan* (RMS, 2018)
- Vibration monitoring of the bridge must occur during the construction phase of the works in accordance with the Construction Heritage Management Plan.
- All contractors are to participate in a heritage induction and toolbox talk prior to commencing works to ensure they understand the significance of the Galston Timber Bridge, and areas to avoid. This must be developed in consultation with a heritage specialist.

9.3.3 After works

- The site is to be made good following completion of maintenance and repair works
- A heritage interpretation specialist should prepare a Heritage Interpretation Strategy for the bridge, including recommendations for appropriate interpretation of the history and significance of the bridge in the nearby laydown / car park areas and nearby bushwalks. This could include (but is not limited to) updated signage on the approaches to the bridge, outlining the key stories, themes and cultural significance of Galston Timber Bridge
- The SHI database entries for the Galston Timber Bridge should be updated to record the latest repair works.

9.4 Heritage approval

9.4.1 Section 60

A Section 60 application is required for this project, and specifically for the Stage 2-4 works that are highlighted in bold text in the proposal description in Section 6.2.

The Section 60 application does not include those Stage 1 and Stage 2 works (including routine cleaning and maintenance activities) which would be subject to Standard Exemptions from Heritage NSW approval.

ConnectSydney on behalf of TfNSW would be required to seek Land Owner's Consent and lodge a Section 60 application for Heritage NSW review. Approval of the Section 60 application must be received prior to commencement of construction.

10.0 REFERENCES

Galston Timber Truss Bridge Load Rating Report. (Aurecon for ConnectSydney, May 2022).

NSW Timber Truss Road Bridges Overarching Conservation Management Plan. (RMS, 2018).

Pearces Creek Bridge, Galston Gorge – Draft Conservation Management Plan (GHD and Austral Archaeology, 2002).

State Heritage Inventory. 'Bridge over Tunks (Pearces) Creek'. Retrieved from: https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5051382

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Timber Truss Bridge Conservation Strategy – Submissions Report and Revised Conservation Strategy (Futurepast Heritage Consulting and RMS, 2012).

The Timber Truss Bridge Book (TfNSW, 2021). Retrieved from: https://roadswaterways.transport.nsw.gov.au/about/environment/protecting-heritage/timber-trussbridge/index.html

Australia ICOMOS, 2013. *Burra Charter*, Australia ICOMOS.

Heritage Council of NSW, 2020. *Standard Exemptions*, gazetted 19 November 2020.

Heritage NSW, 2023A*. 'Assessing Heritage Significance, Guidelines for assessing places and objects against the Heritage Council of NSW criteria',* Heritage NSW.

Heritage NSW, 2023B. *'Guidelines for preparing a statement of heritage impact',* Heritage NSW.

11.0 APPENDIX A

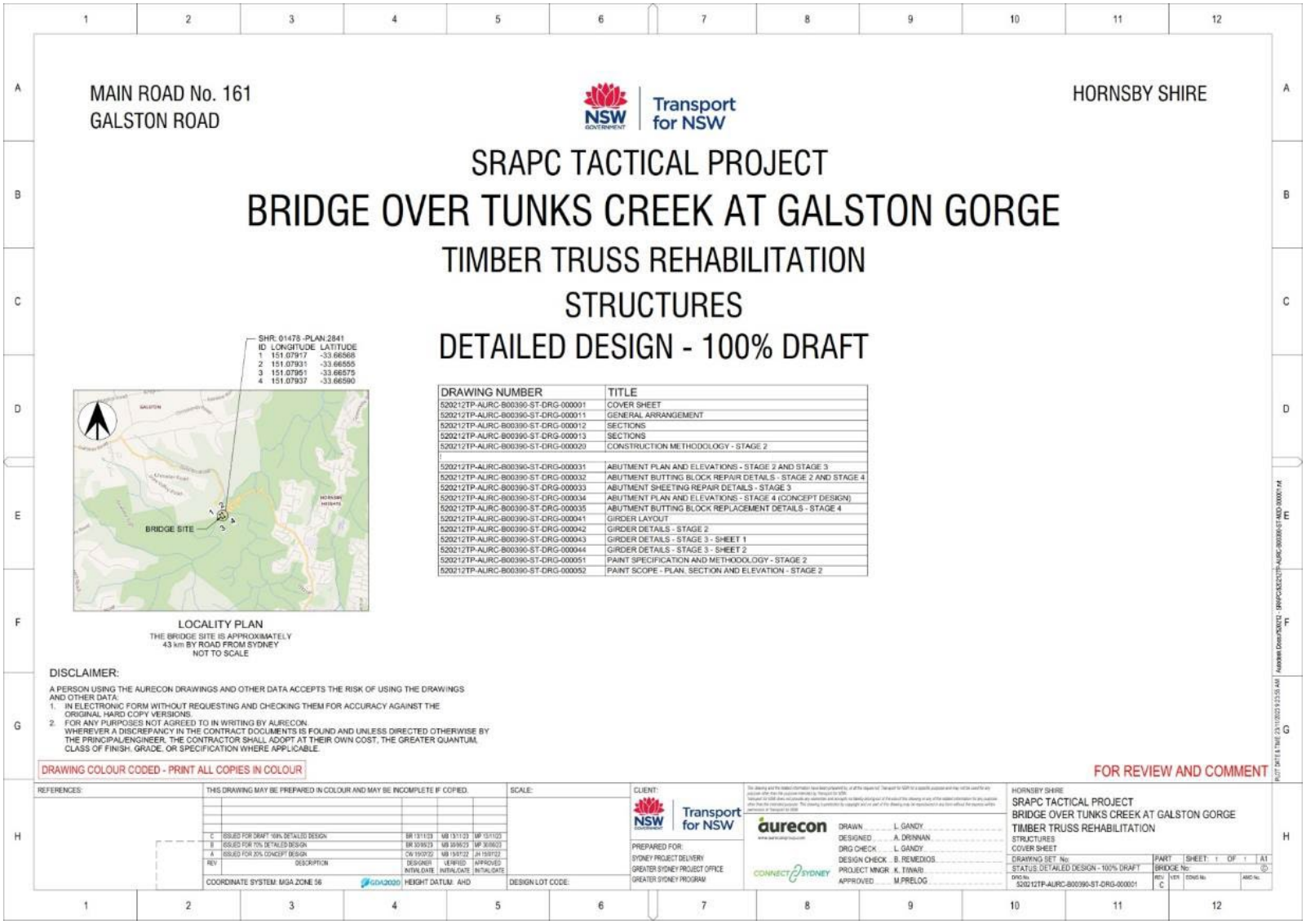


Figure 11-1: Drawing set cover sheet: 520212TP-AURC-B00390-ST-DRG-000001 (Source: Aurecon)

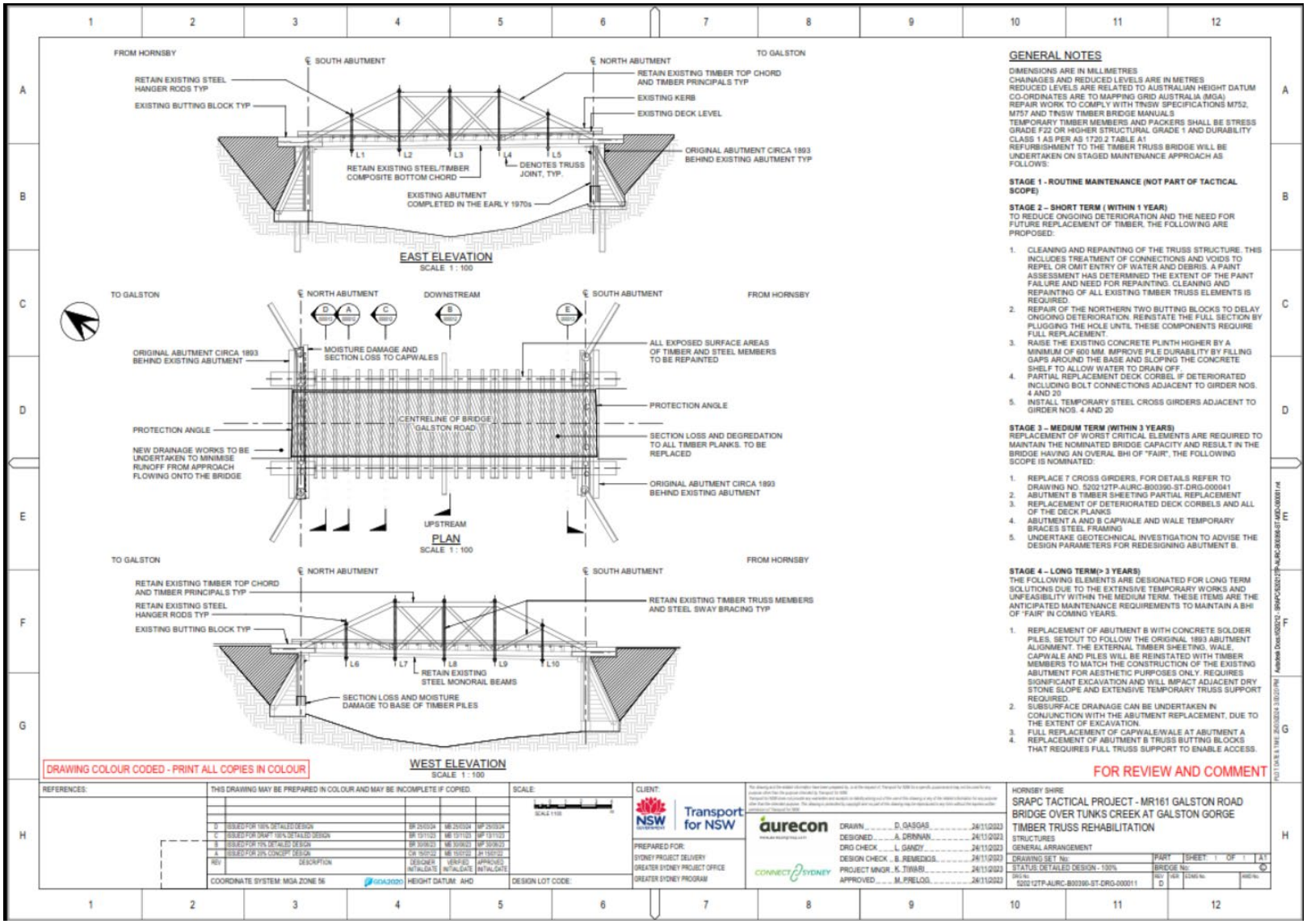


Figure 11-2: Structures general arrangement: 520212TP-AURC-B00390-ST-DRG-000011 (Source: Aurecon)

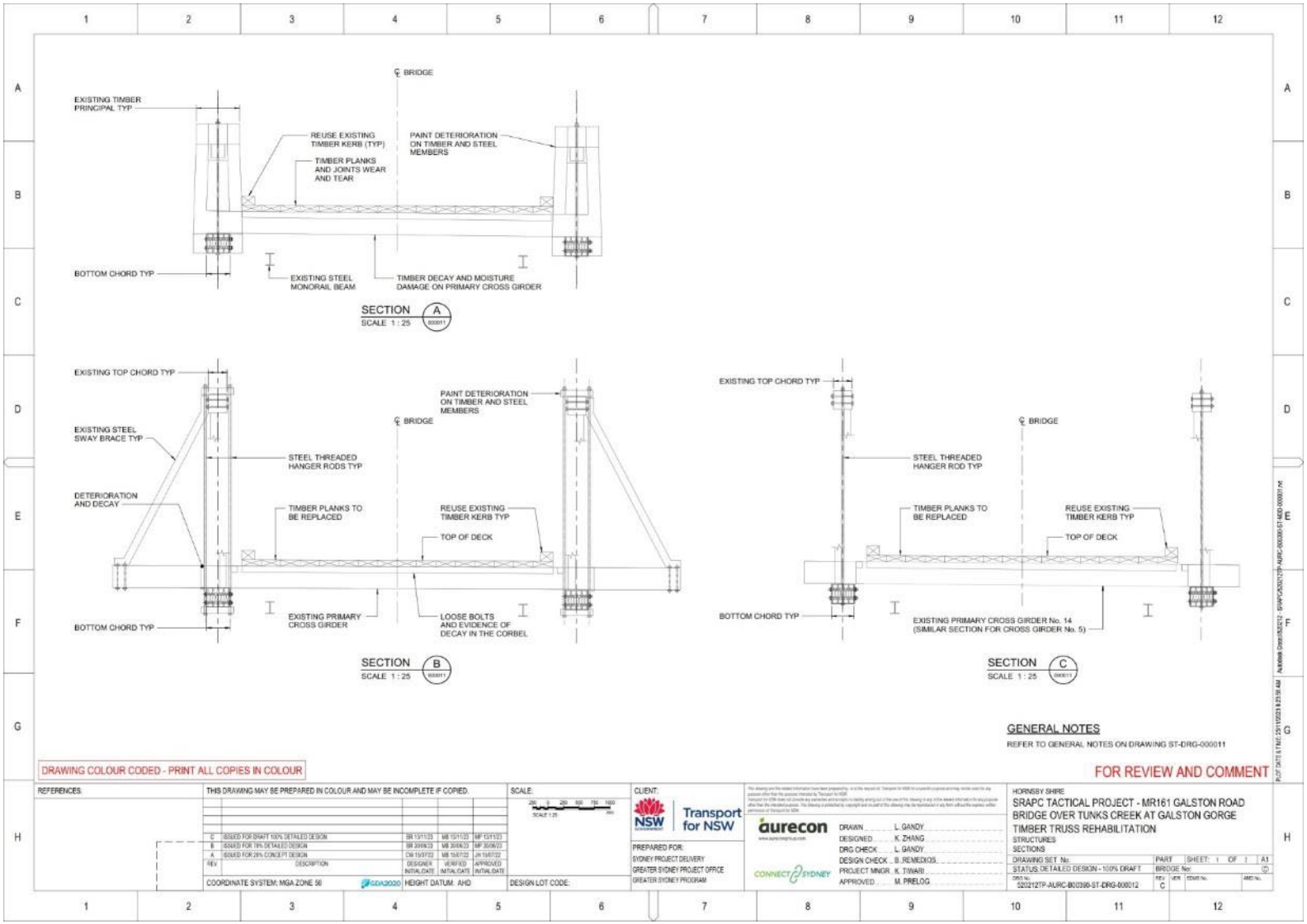


Figure 11-3: Structures – sections: 520212TP-AURC-B00390-ST-DRG-000012 (Source: Aurecon)

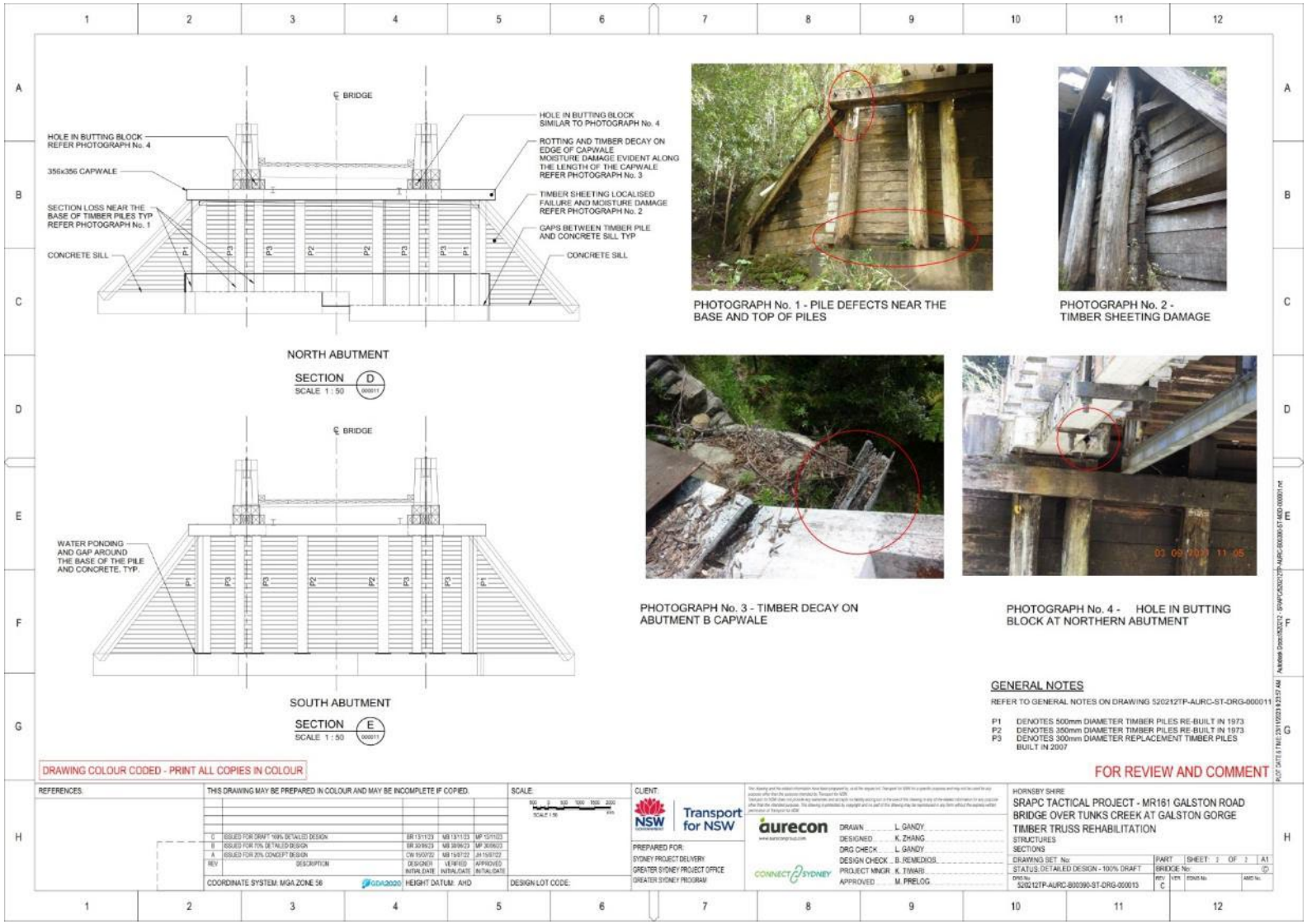


Figure 11-4: Structures - sections: 520212TP-AURC-B00390-ST-DRG-000013 (Source: Aurecon)

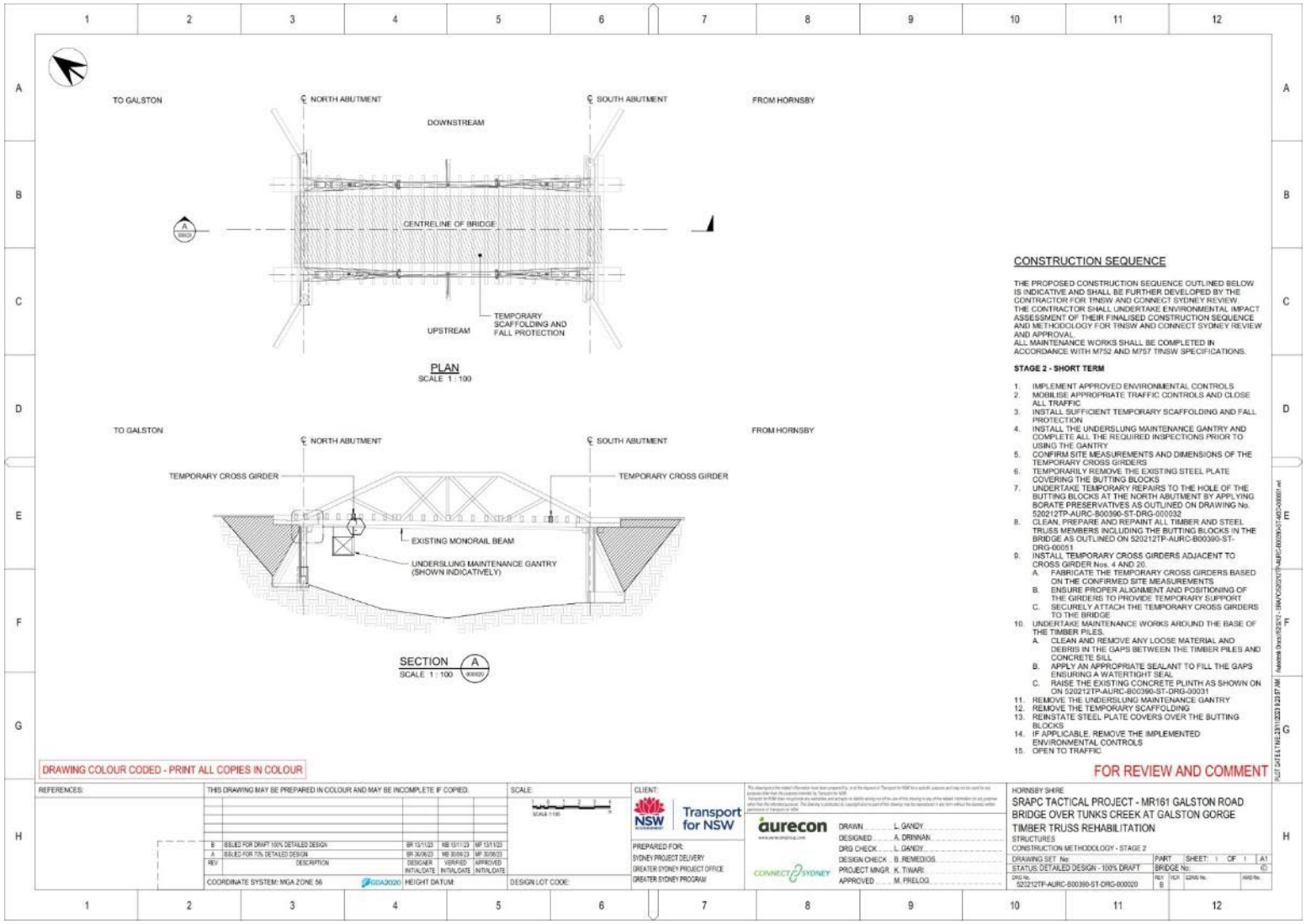


Figure 11-5: Structures construction methodology – Stage 2: 520212TP-AURC-B00390-ST-DRG-000020 (Source: Aurecon)

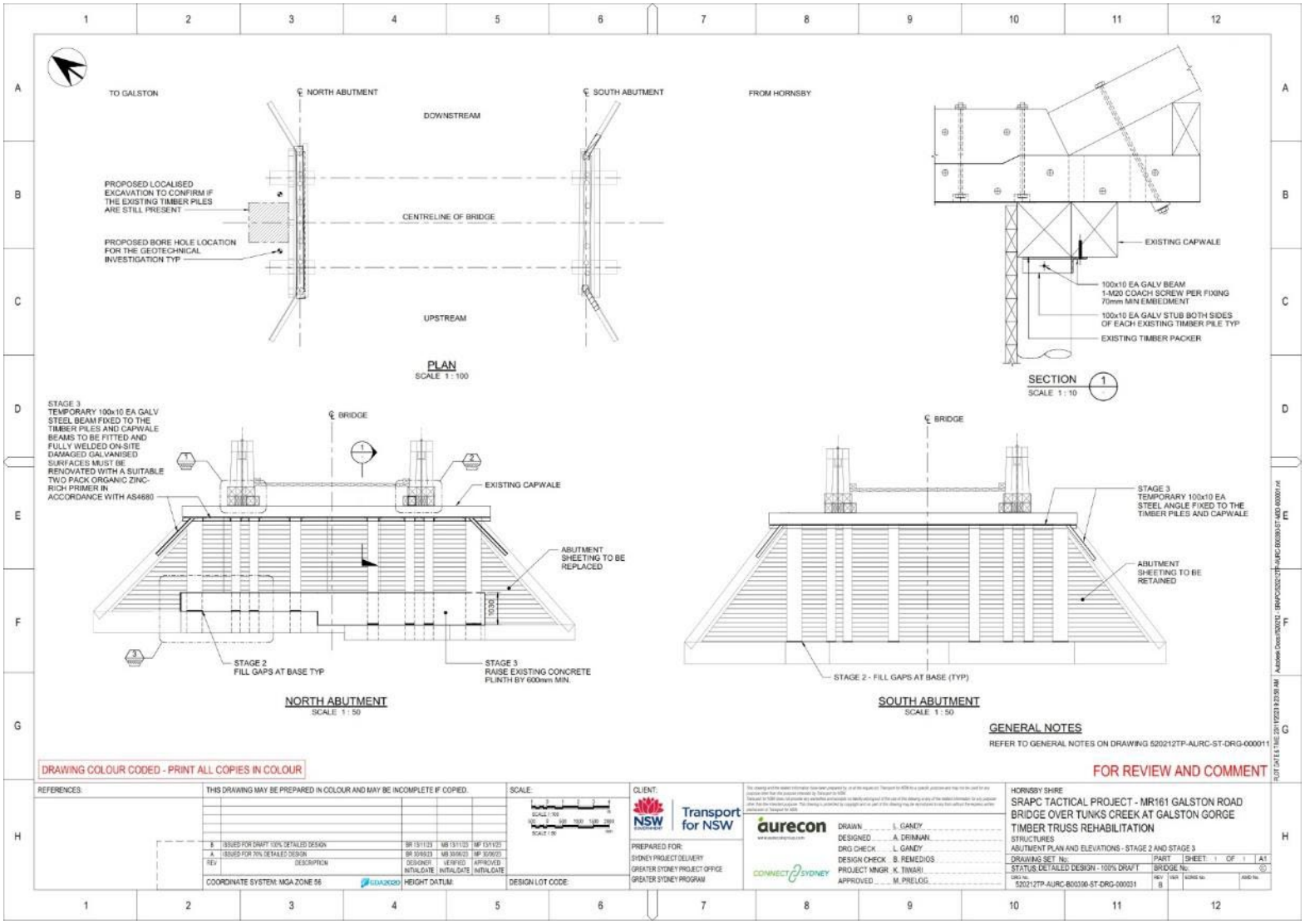


Figure 11-6: Structures abutment plan and elevations - Stage 2 and Stage 3: 520212TP-AURC-B00390-ST-DRG-000031 (Source: Aurecon)

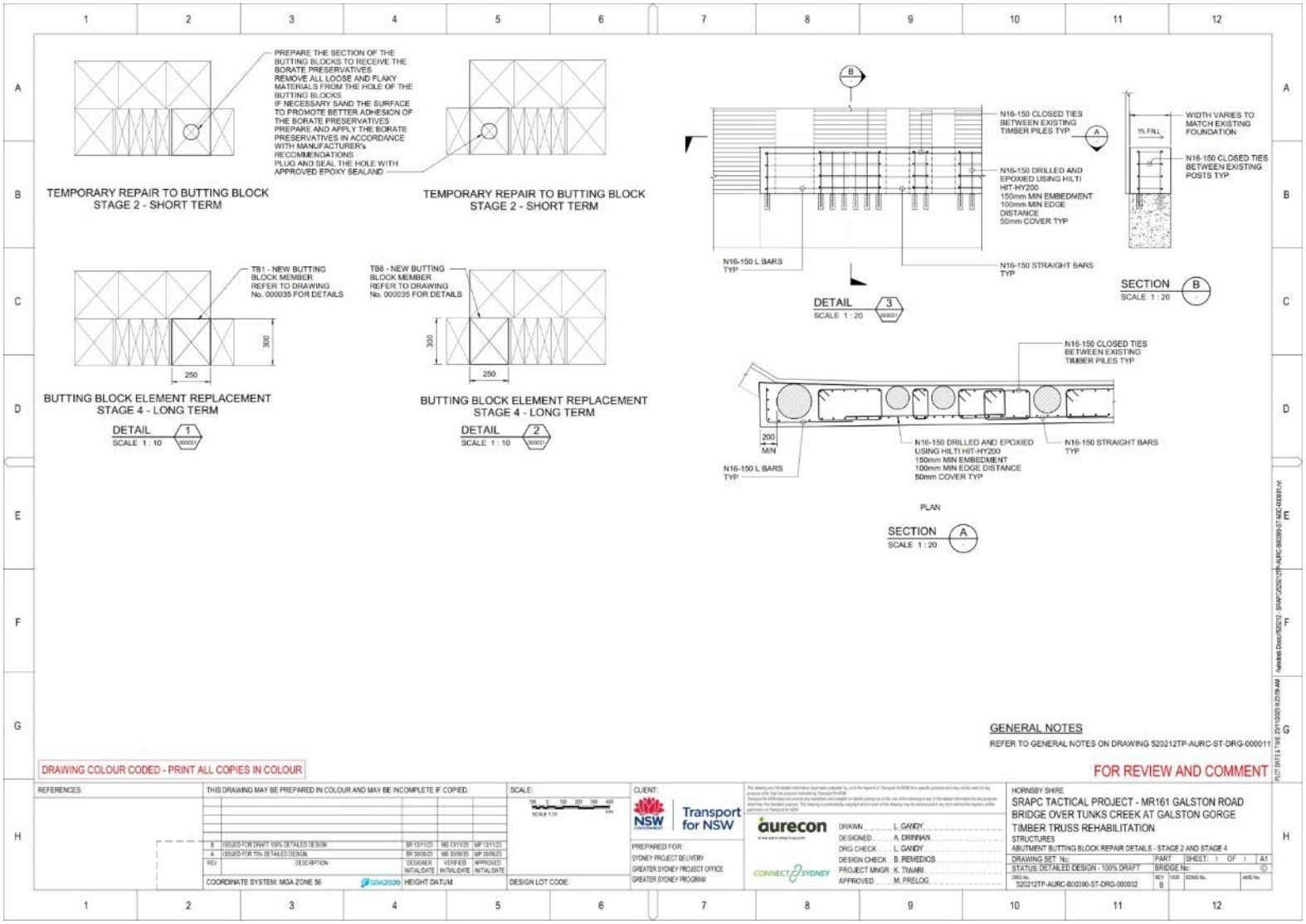


Figure 11-7: Structures abutment butting block repair details – Stage 2 and Stage 4: 520212TP-AURC-B00390-ST-DRG-000032 (Source: Aurecon)

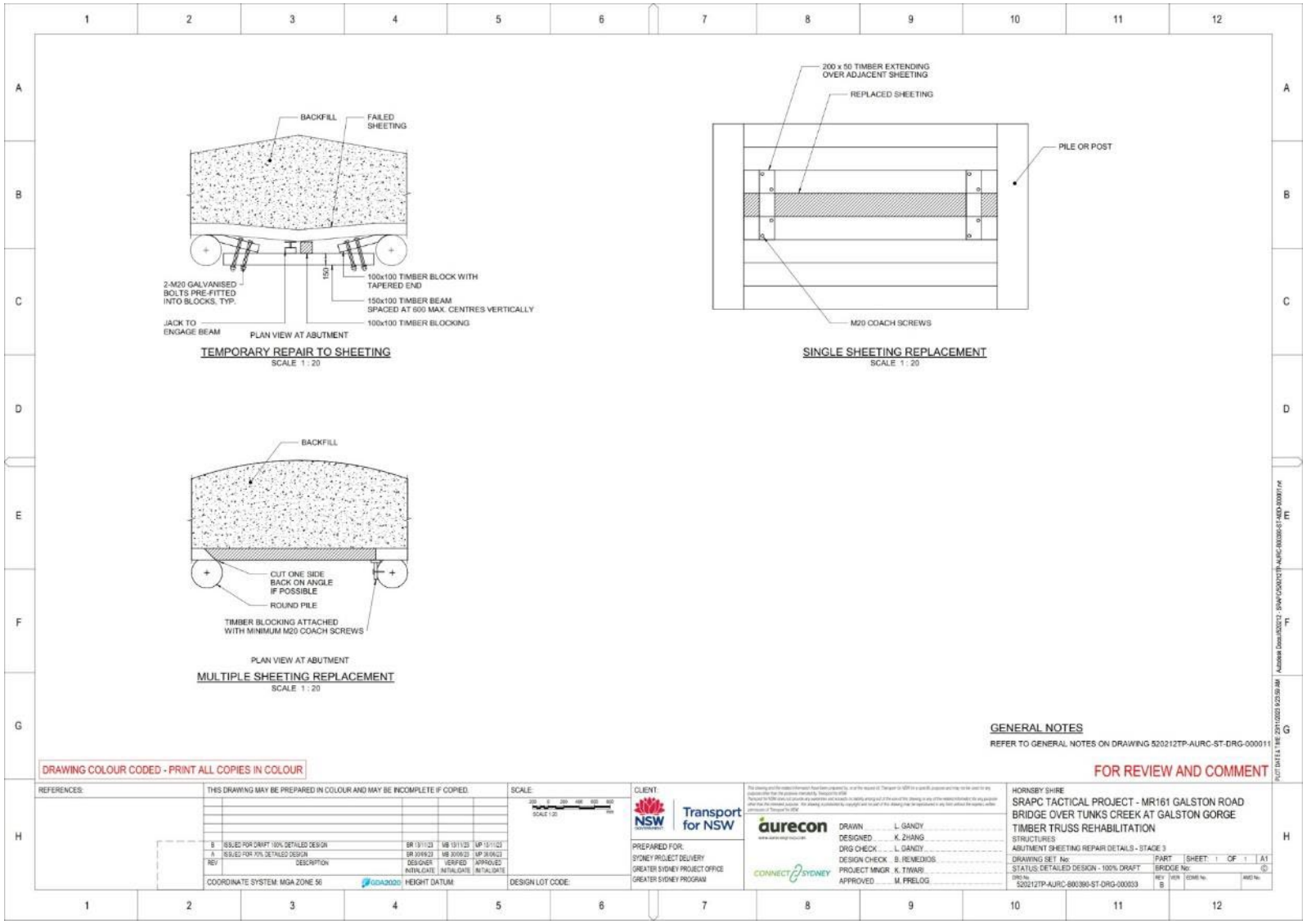


Figure 11-8: Structures abutment sheeting repair details – Stage 3: 520212TP-AURC-B00390-ST-DRG-000033 (Source: Aurecon)

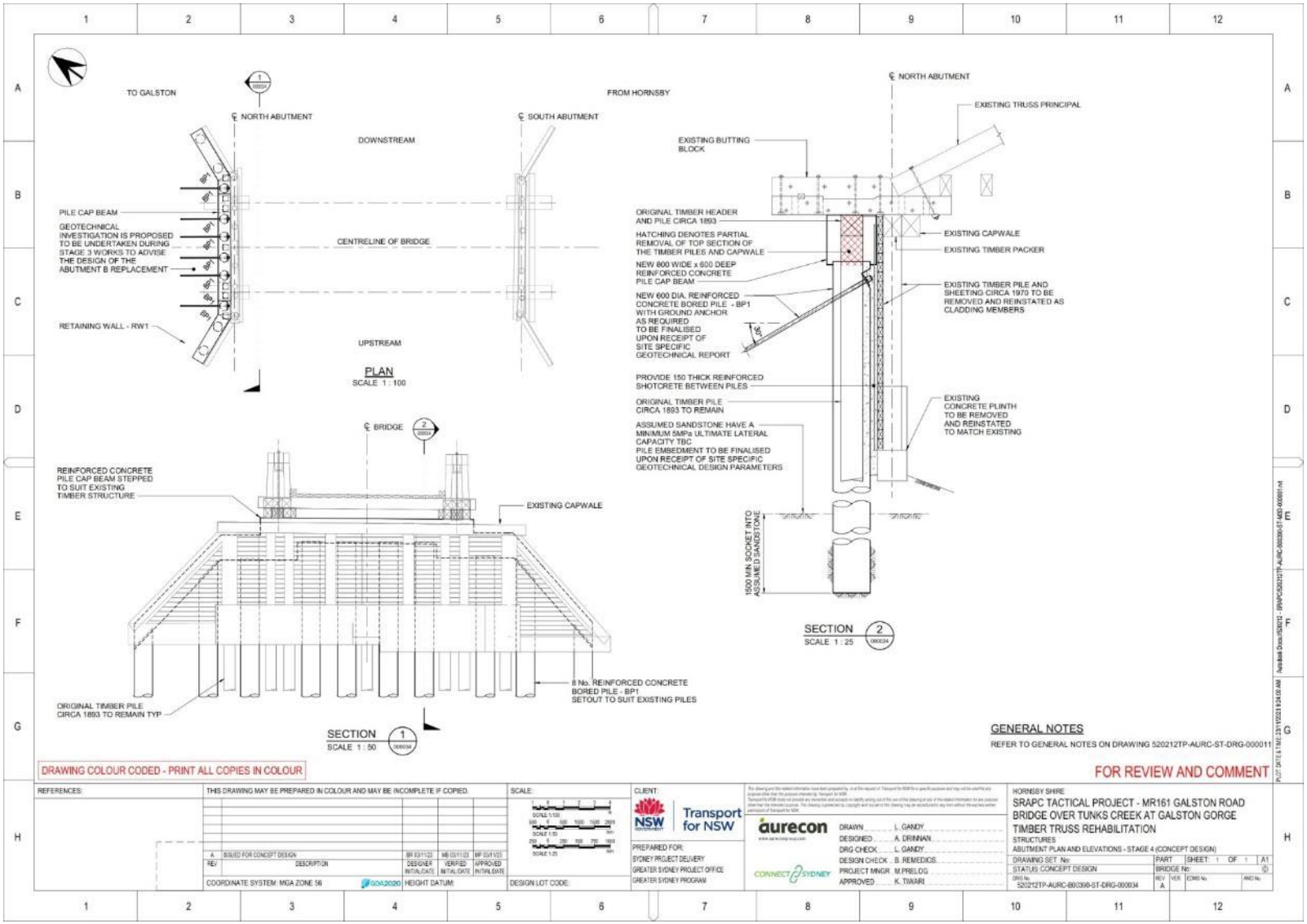


Figure 11-9: Structures abutment plan and elevations – Stage 4 (Concept Design): 520212TP-AURC-B00390-ST-DRG-000034 (Source: Aurecon)

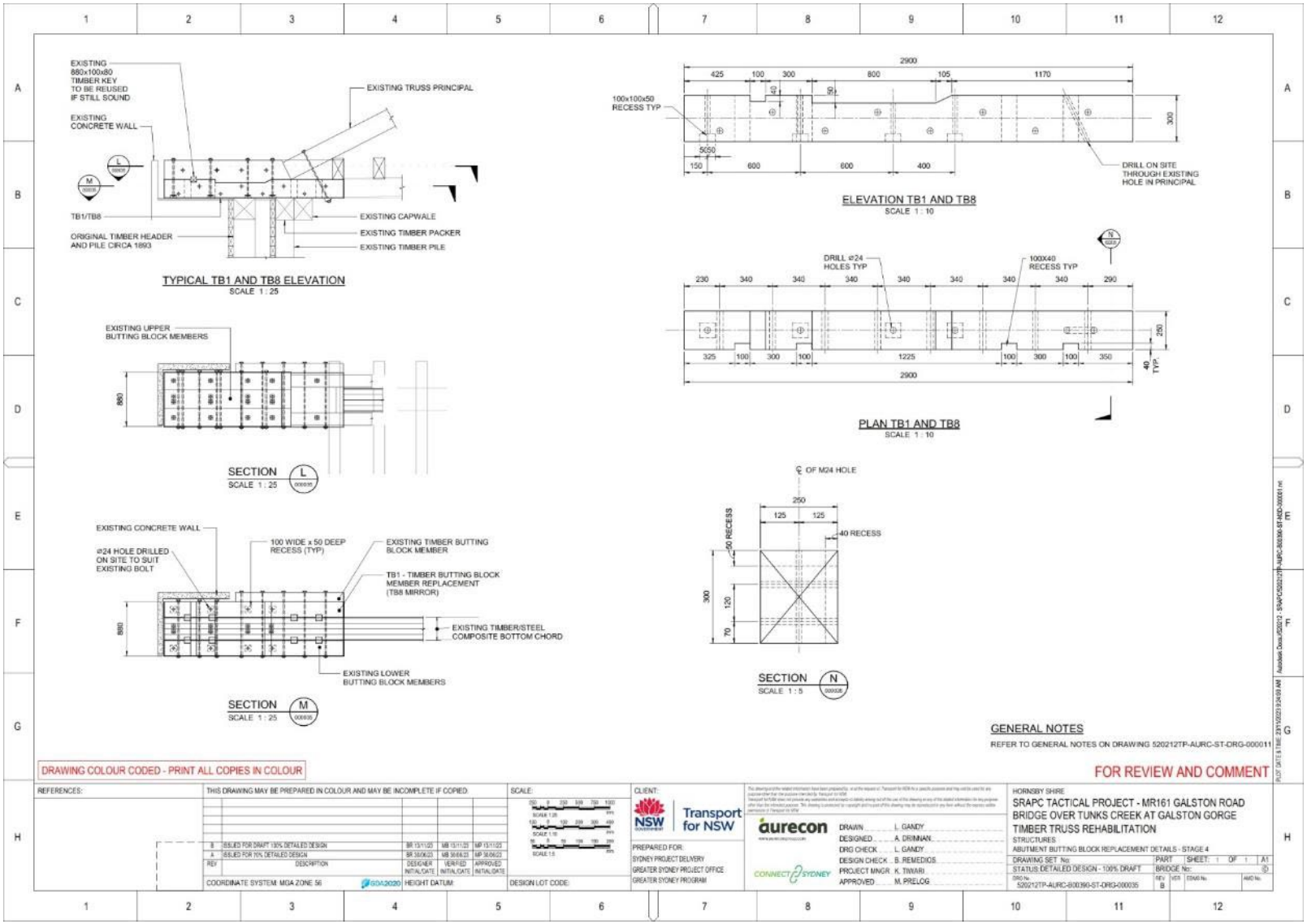


Figure 11-10: Structures abutment butting block replacement details – Stage 4: 520212TP-AURC-B00390-ST-DRG-000035 (Source: Aurecon)

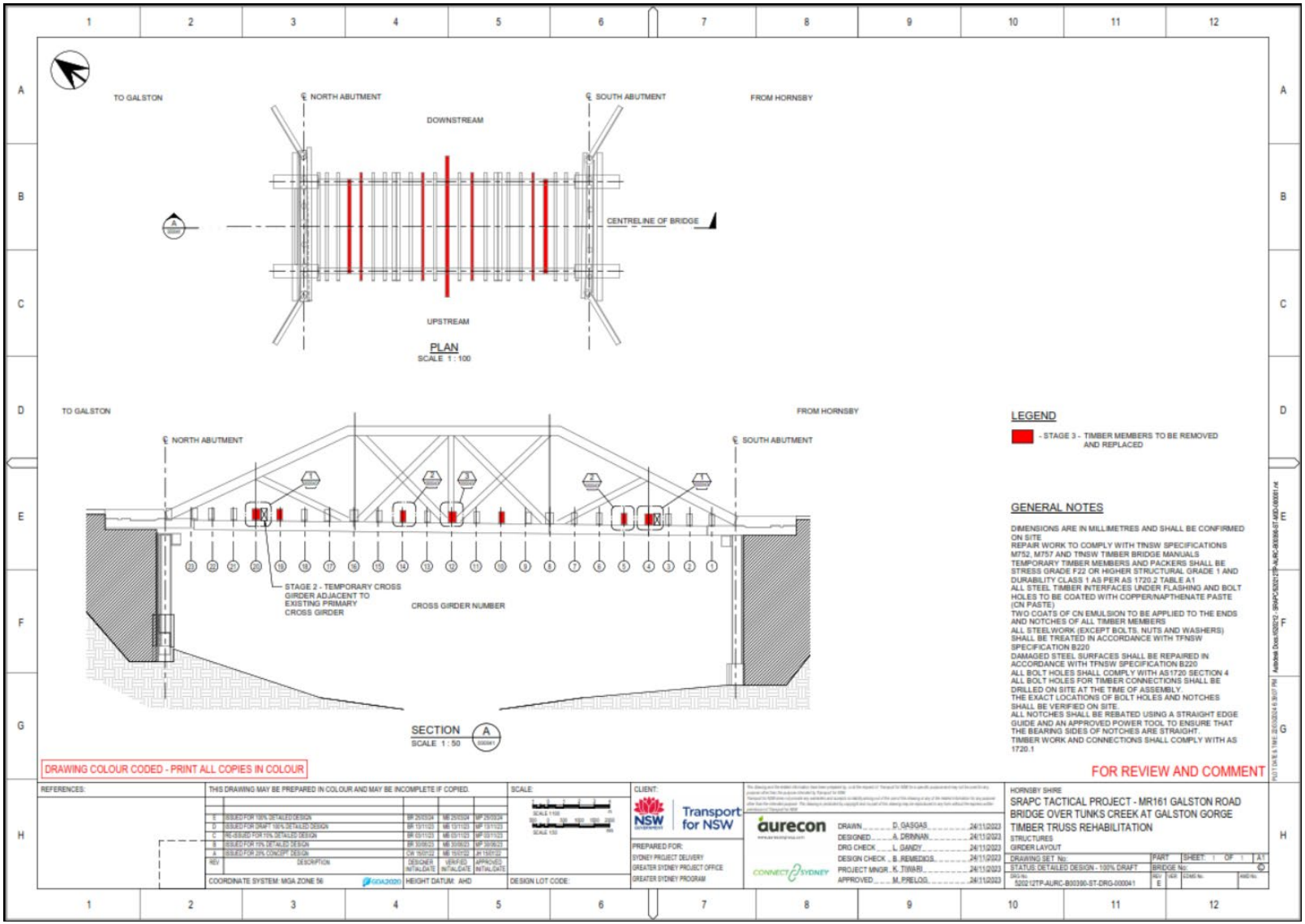


Figure 11-11: Structures girder layout: 520212TP-AURC-B00390-ST-DRG-000041 (Source: Aurecon)

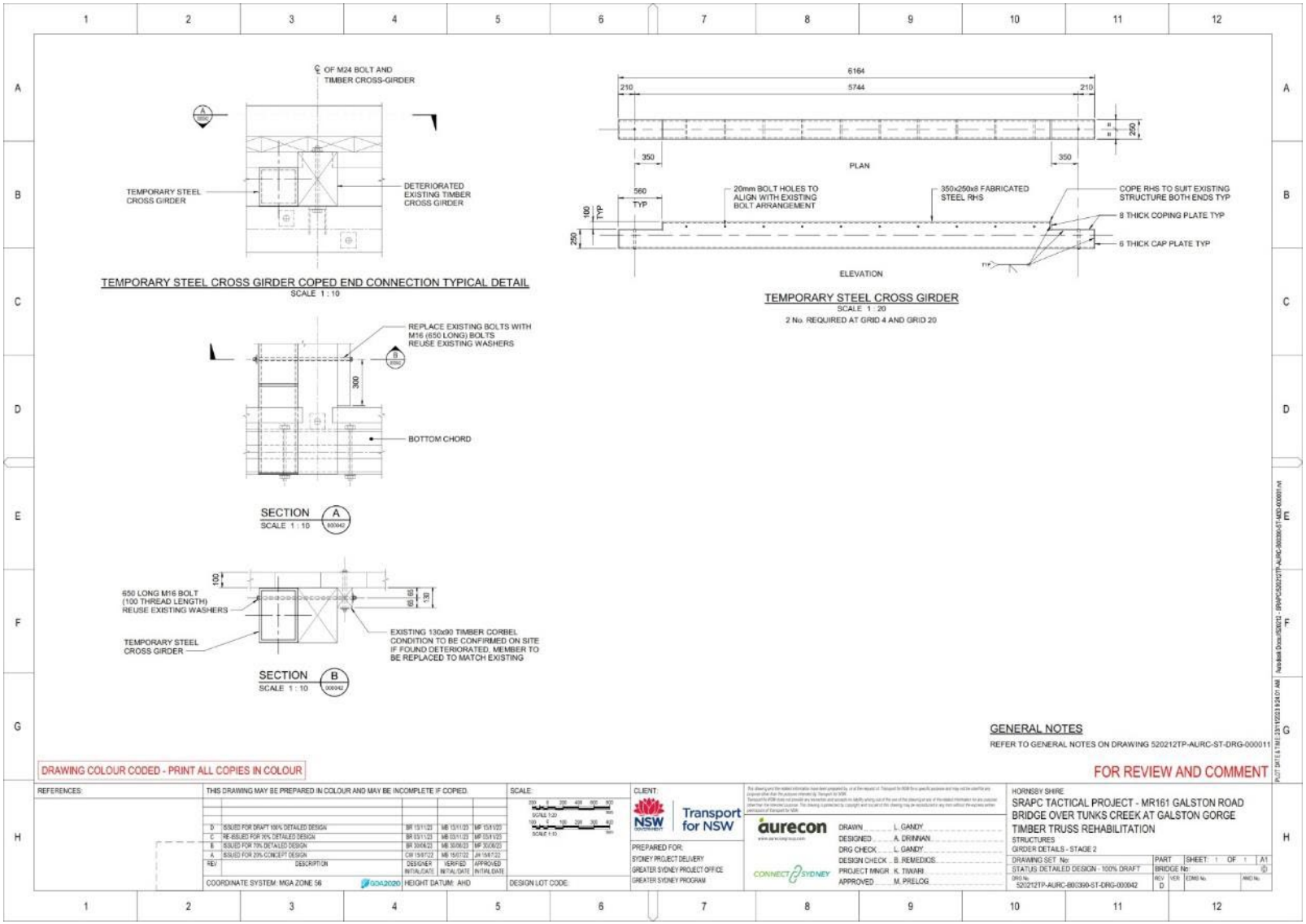


Figure 11-12: Structures girder details – Stage 2: 520212TP-AURC-B00390-ST-DRG-000042 (Source: Aurecon)

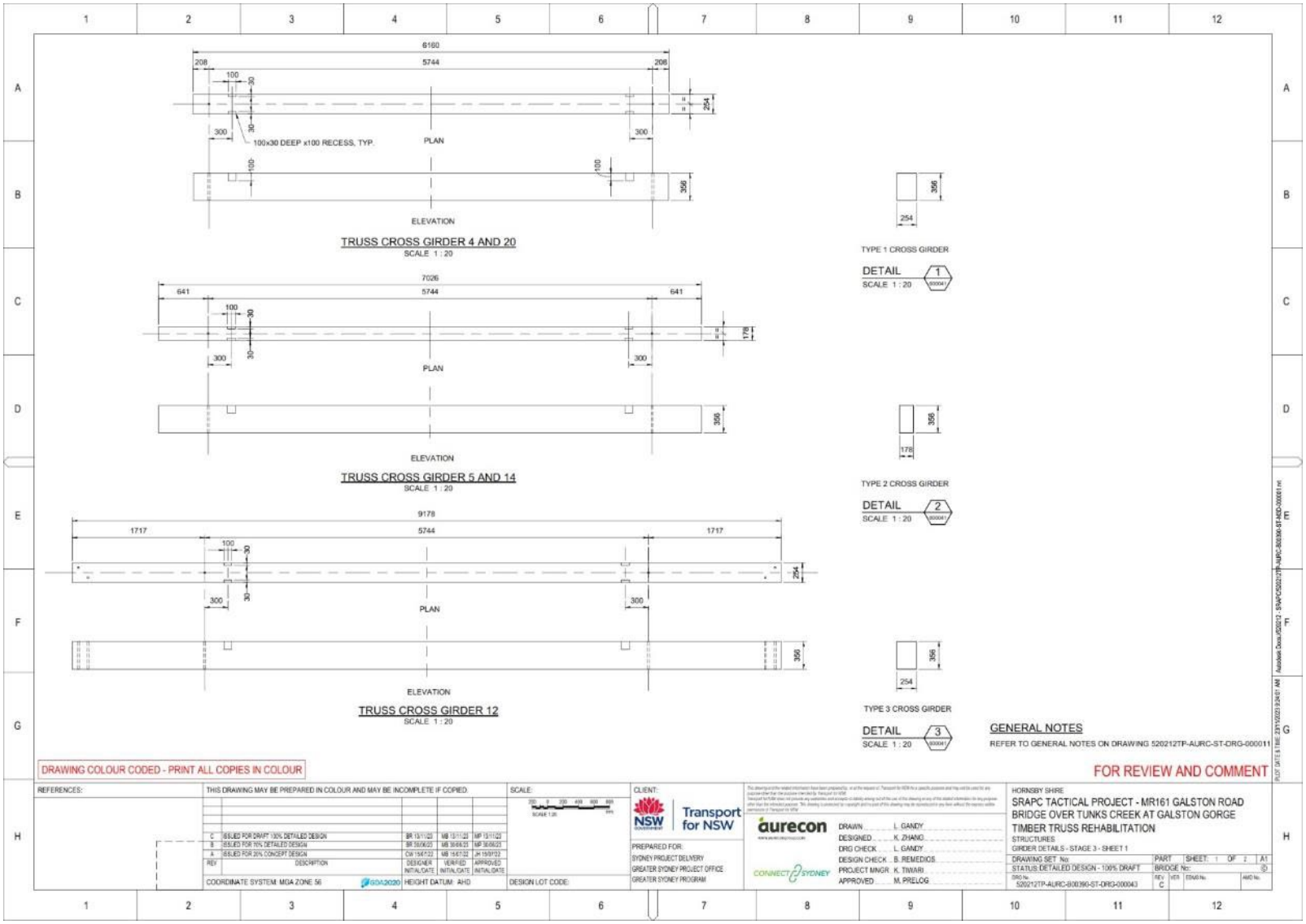


Figure 11-13: Structures girder details – Stage 3, sheet 1: 520212TP-AURC-B00390-ST-DRG-000043 (Source: Aurecon)

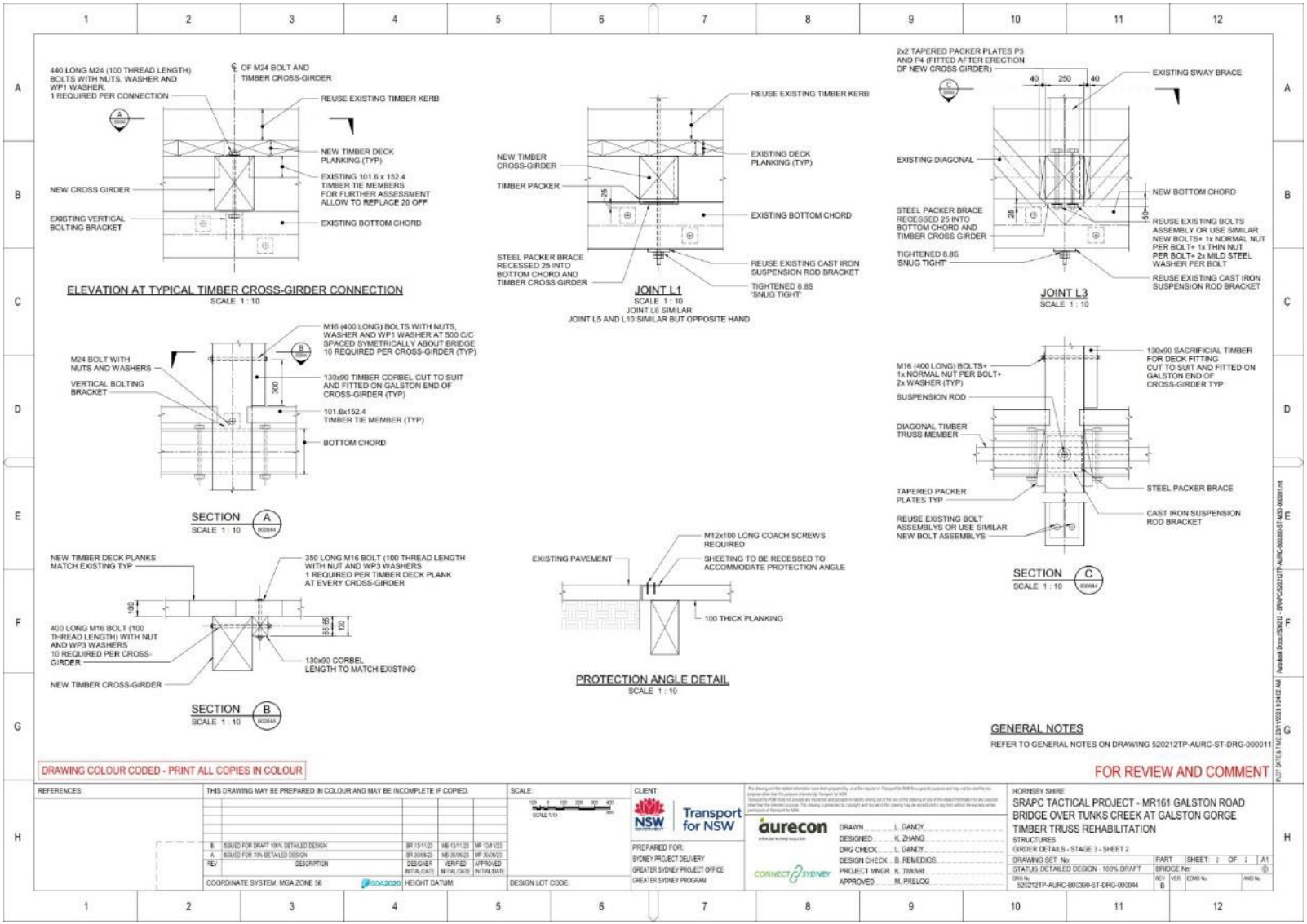
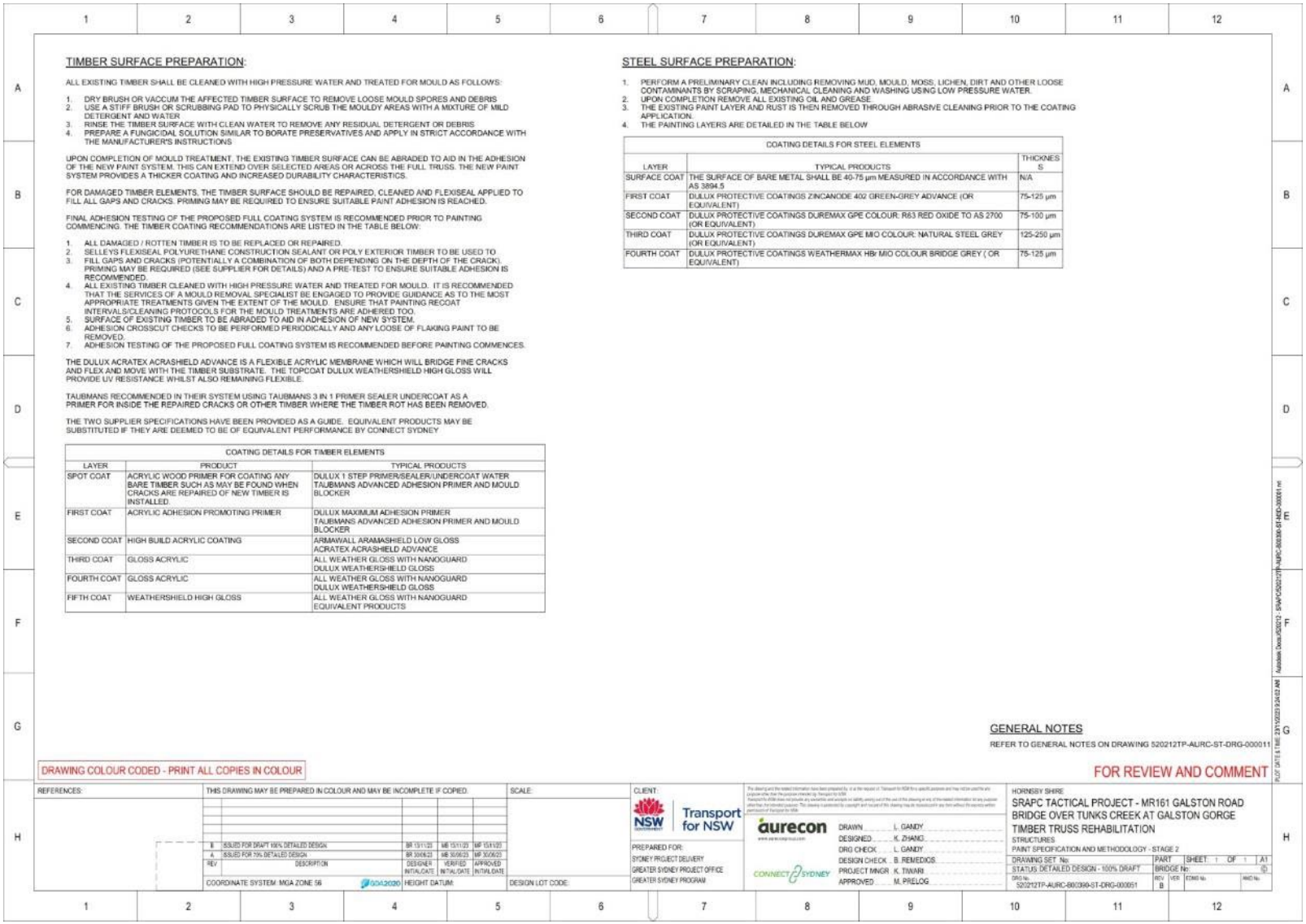


Figure 11-14: Structures girder details – Stage 3, sheet 2: 520212TP-AURC-B00390-ST-DRG-000044 (Source: Aurecon)



TIMBER SURFACE PREPARATION:

ALL EXISTING TIMBER SHALL BE CLEANED WITH HIGH PRESSURE WATER AND TREATED FOR MOULD AS FOLLOWS:

1. DRY BRUSH OR VACCUM THE AFFECTED TIMBER SURFACE TO REMOVE LOOSE MOULD SPORES AND DEBRIS
2. USE A STIFF BRUSH OR SCRUBBING PAD TO PHYSICALLY SCRUB THE MOULDY AREAS WITH A MIXTURE OF MILD DETERGENT AND WATER
3. RINSE THE TIMBER SURFACE WITH CLEAN WATER TO REMOVE ANY RESIDUAL DETERGENT OR DEBRIS
4. PREPARE A FUNGICIDAL SOLUTION SIMILAR TO BORATE PRESERVATIVES AND APPLY IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS

UPON COMPLETION OF MOULD TREATMENT, THE EXISTING TIMBER SURFACE CAN BE ABRADED TO AID IN THE ADHESION OF THE NEW PAINT SYSTEM. THIS CAN EXTEND OVER SELECTED AREAS OR ACROSS THE FULL TRUSS. THE NEW PAINT SYSTEM PROVIDES A THICKER COATING AND INCREASED DURABILITY CHARACTERISTICS.

FOR DAMAGED TIMBER ELEMENTS, THE TIMBER SURFACE SHOULD BE REPAIRED, CLEANED AND FLEXISEAL APPLIED TO FILL ALL GAPS AND CRACKS. PRIMING MAY BE REQUIRED TO ENSURE SUITABLE PAINT ADHESION IS REACHED.

FINAL ADHESION TESTING OF THE PROPOSED FULL COATING SYSTEM IS RECOMMENDED PRIOR TO PAINTING COMMENCING. THE TIMBER COATING RECOMMENDATIONS ARE LISTED IN THE TABLE BELOW:

1. ALL DAMAGED / ROTTEN TIMBER IS TO BE REPLACED OR REPAIRED.
2. SELLEYS FLEXISEAL POLYURETHANE CONSTRUCTION SEALANT OR POLY EXTERIOR TIMBER TO BE USED TO
3. FILL GAPS AND CRACKS (POTENTIALLY A COMBINATION OF BOTH DEPENDING ON THE DEPTH OF THE CRACK). PRIMING MAY BE REQUIRED (SEE SUPPLIER FOR DETAILS) AND A PRE-TEST TO ENSURE SUITABLE ADHESION IS RECOMMENDED.
4. ALL EXISTING TIMBER CLEANED WITH HIGH PRESSURE WATER AND TREATED FOR MOULD. IT IS RECOMMENDED THAT THE SERVICES OF A MOULD REMOVAL SPECIALIST BE ENGAGED TO PROVIDE GUIDANCE AS TO THE MOST APPROPRIATE TREATMENTS GIVEN THE EXTENT OF THE MOULD. ENSURE THAT PAINTING RECOAT INTERVALS/CLEANING PROTOCOLS FOR THE MOULD TREATMENTS ARE ADHERED TOO.
5. SURFACE OF EXISTING TIMBER TO BE ABRADED TO AID IN ADHESION OF NEW SYSTEM.
6. ADHESION CROSSCUT CHECKS TO BE PERFORMED PERIODICALLY AND ANY LOOSE OF FLAKING PAINT TO BE REMOVED.
7. ADHESION TESTING OF THE PROPOSED FULL COATING SYSTEM IS RECOMMENDED BEFORE PAINTING COMMENCES.

THE DULUX ACRATEX ACRASHIELD ADVANCE IS A FLEXIBLE ACRYLIC MEMBRANE WHICH WILL BRIDGE FINE CRACKS AND FLEX AND MOVE WITH THE TIMBER SUBSTRATE. THE TOPCOAT DULUX WEATHERSHIELD HIGH GLOSS WILL PROVIDE UV RESISTANCE WHILST ALSO REMAINING FLEXIBLE.

TAUBMANS RECOMMENDED IN THEIR SYSTEM USING TAUBMANS 3 IN 1 PRIMER SEALER UNDERCOAT AS A PRIMER FOR INSIDE THE REPAIRED CRACKS OR OTHER TIMBER WHERE THE TIMBER ROT HAS BEEN REMOVED.

THE TWO SUPPLIER SPECIFICATIONS HAVE BEEN PROVIDED AS A GUIDE. EQUIVALENT PRODUCTS MAY BE SUBSTITUTED IF THEY ARE DEEMED TO BE OF EQUIVALENT PERFORMANCE BY CONNECT SYDNEY

COATING DETAILS FOR TIMBER ELEMENTS

LAYER	PRODUCT	TYPICAL PRODUCTS
SPOT COAT	ACRYLIC WOOD PRIMER FOR COATING ANY BARE TIMBER SUCH AS MAY BE FOUND WHEN CRACKS ARE REPAIRED OF NEW TIMBER IS INSTALLED.	DULUX 1 STEP PRIMER/SEALER/UNDERCOAT WATER TAUBMANS ADVANCED ADHESION PRIMER AND MOULD BLOCKER
FIRST COAT	ACRYLIC ADHESION PROMOTING PRIMER	DULUX MAXIMUM ADHESION PRIMER TAUBMANS ADVANCED ADHESION PRIMER AND MOULD BLOCKER
SECOND COAT	HIGH BUILD ACRYLIC COATING	ARMAWALL ARAMASHIELD LOW GLOSS ACRATEX ACRASHIELD ADVANCE
THIRD COAT	GLOSS ACRYLIC	ALL WEATHER GLOSS WITH NANOGUARD DULUX WEATHERSHIELD GLOSS
FOURTH COAT	GLOSS ACRYLIC	ALL WEATHER GLOSS WITH NANOGUARD DULUX WEATHERSHIELD GLOSS
FIFTH COAT	WEATHERSHIELD HIGH GLOSS	ALL WEATHER GLOSS WITH NANOGUARD EQUIVALENT PRODUCTS

STEEL SURFACE PREPARATION:

1. PERFORM A PRELIMINARY CLEAN INCLUDING REMOVING MUD, MOULD, MOSS, LICHEN, DIRT AND OTHER LOOSE CONTAMINANTS BY SCRAPING, MECHANICAL CLEANING AND WASHING USING LOW PRESSURE WATER.
2. UPON COMPLETION REMOVE ALL EXISTING OIL AND GREASE.
3. THE EXISTING PAINT LAYER AND RUST IS THEN REMOVED THROUGH ABRASIVE CLEANING PRIOR TO THE COATING APPLICATION.
4. THE PAINTING LAYERS ARE DETAILED IN THE TABLE BELOW

COATING DETAILS FOR STEEL ELEMENTS

LAYER	TYPICAL PRODUCTS	THICKNESS
SURFACE COAT	THE SURFACE OF BARE METAL SHALL BE 40-75 µm MEASURED IN ACCORDANCE WITH AS 3894.5	N/A
FIRST COAT	DULUX PROTECTIVE COATINGS ZINCANODE 402 GREEN-GREY ADVANCE (OR EQUIVALENT)	75-125 µm
SECOND COAT	DULUX PROTECTIVE COATINGS DUREMAX GPE COLOUR: R63 RED OXIDE TO AS 2700 (OR EQUIVALENT)	75-100 µm
THIRD COAT	DULUX PROTECTIVE COATINGS DUREMAX GPE MIO COLOUR: NATURAL STEEL GREY (OR EQUIVALENT)	125-250 µm
FOURTH COAT	DULUX PROTECTIVE COATINGS WEATHERMAX HBr MIO COLOUR BRIDGE GREY (OR EQUIVALENT)	75-125 µm

GENERAL NOTES

REFER TO GENERAL NOTES ON DRAWING 520212TP-AURC-ST-DRG-000011

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR REVIEW AND COMMENT

REFERENCES:

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED.

REV	DESCRIPTION	DESIGNER INITIALS/DATE	VERIFIED INITIALS/DATE	APPROVED INITIALS/DATE
B	ISSUED FOR DRAFT 100% DETAILED DESIGN	BR 13/11/23	MB 15/11/23	MF 15/11/23
A	ISSUED FOR 70% DETAILED DESIGN	BR 30/06/23	MB 30/06/23	MF 30/06/23

COORDINATE SYSTEM: MGA ZONE 56 GDA2020 HEIGHT DATUM:

SCALE:

DESIGN LOT CODE:

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: SYDNEY PROJECT DELIVERY GREATER SYDNEY PROJECT OFFICE GREATER SYDNEY PROGRAM

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DRAWN L. GANDY
DESIGNED K. ZHANG
DRG CHECK L. GANDY
DESIGN CHECK B. REMEDIOS
PROJECT MNGR K. TIWARI
APPROVED M. PRELOG

HORNSBY SHIRE

SRAPC TACTICAL PROJECT - MR161 GALSTON ROAD BRIDGE OVER TUNKS CREEK AT GALSTON GORGE
TIMBER TRUSS REHABILITATION
STRUCTURES
PAINT SPECIFICATION AND METHODOLOGY - STAGE 2

DRAWING SET No: PART SHEET 1 OF 1 A1
STATUS DETAILED DESIGN - 100% DRAFT BRIDGE No:
DRG No. 520212TP-AURC-B00390-ST-DRG-000051 REV B VER EDMS No. AMG No.

Figure 11-15: Structures paint specification and methodology – Stage 2: 520212TP-AURC-B00390-ST-DRG-000051 (Source: Aurecon)

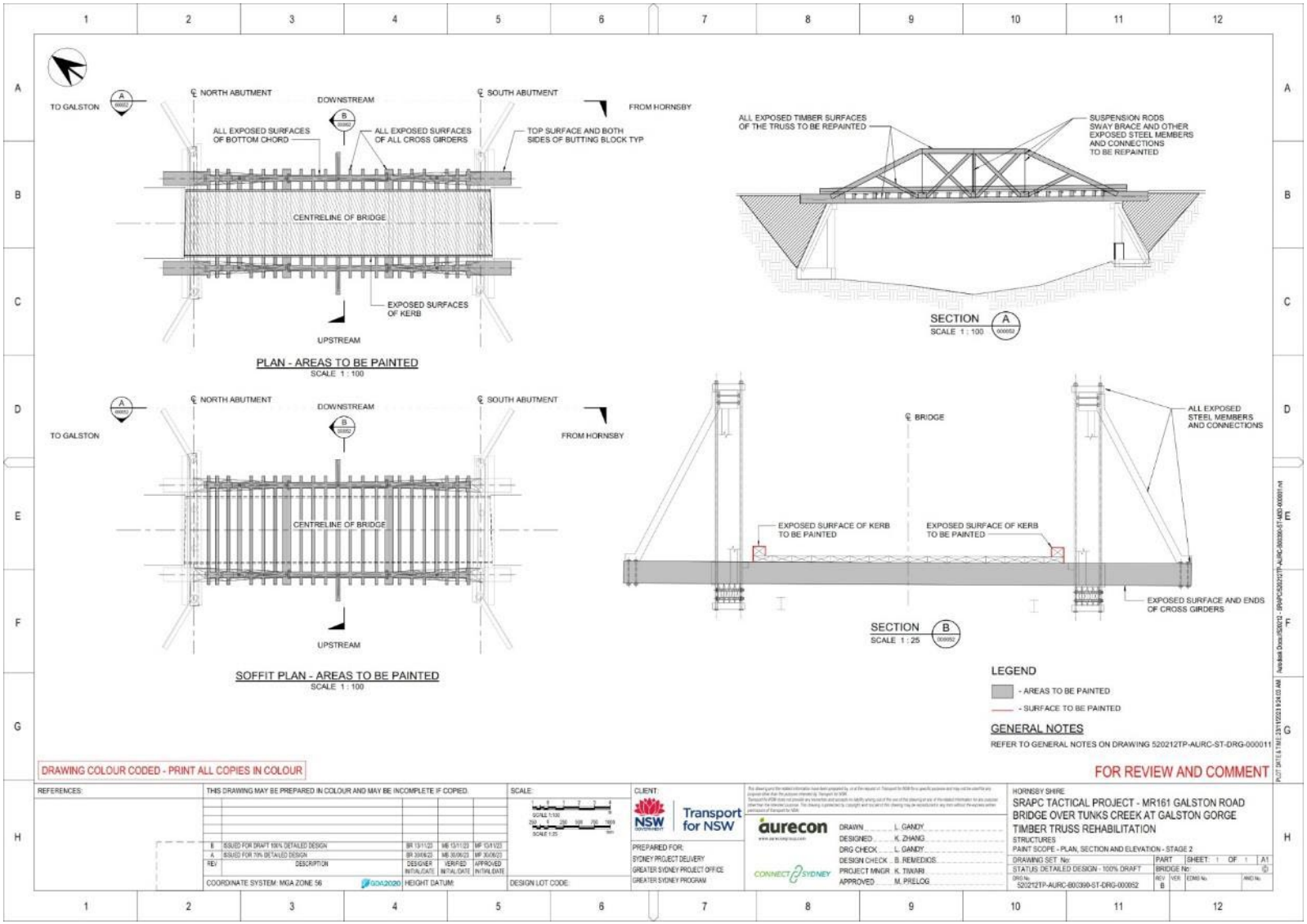

Figure 11-16: Structures paint scope – plan, section and elevation – Stage 2: 520212TP-AURC-B00390-ST-DRG-000052 (Source: Aurecon)

artefact

Artefact Heritage

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Suite 56, Jones Bay Wharf
26-32 Pirrama Road
Pyrmont NSW 2009 Australia

+61 2 9518 8411
office@artefact.net.au
www.artefact.net.au

HMS Application ID: 6118

Mr Ian Berger
Transport for NSW
8 Lewis Street
CARDIFF SOUTH NSW 2285

By email: [redacted]

Dear Mr Berger

APPLICATION UNDER SECTION 60 OF THE *HERITAGE ACT 1977*

Bridge over Tunks (Pearces) Creek
State Heritage Register No. 01478

Address:	Main Road 161, GALSTON NSW 2159
Proposal:	Repaint the truss, install temporary steel supports to facilitate replacement of 7 timber cross girders with new cross girders. Replacement of Northern Abutment (abutment B) with concrete soldier piles and reinstate timber sheeting to match existing.
Section 60 application no:	HMS ID 6118, received 28/03/2024

As delegate of the Heritage Council of NSW (the Heritage Council), I have considered the above Section 60 application. Pursuant to section 63 of the *Heritage Act 1977*, approval is granted subject to the following conditions:

APPROVED DEVELOPMENT

1. All work shall comply with the information contained within:

   a) Engineering drawings, prepared by Aurecon as listed below:

Dwg No	Dwg Title	Date	Rev
Project Name: MR 161 Galston Road Bridge over Tunks Creek at Galston Gorge Timber Truss Rehabilitation			
520212TP-AURC-B00390-ST-DRG-000001	Cover Sheet	13/11/23	C
520212TP-AURC-B00390-ST-DRG-000011	General Arrangement	25/03/23	D

520212TP-AURC-B00390-ST-DRG-000012	Sections	13/11/23	C
520212TP-AURC-B00390-ST-DRG-000013	Sections	13/11/23	C
520212TP-AURC-B00390-ST-DRG-000020	Construction Methodology Stage 2	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000031	Abutment Plan and Elevations – Stage 2 and Stage 3	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000032	Abutment Butting Block Repair Details – Stage 2 and Stage 4	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000033	Abutment Sheeting Repair Details – Stage 3	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000034	Abutment Plan and Elevations – Stage 4 (Concept Design)	03/11/23	A
520212TP-AURC-B00390-ST-DRG-000035	Abutment Butting Block Replacement Details – Stage 4	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000041	Girder Layout	25/03/24	E
520212TP-AURC-B00390-ST-DRG-000042	Girder Details – Stage 2	13/11/23	D
520212TP-AURC-B00390-ST-DRG-000043	Girder Details – Stage 3 – Sheet 1	13/11/23	C
520212TP-AURC-B00390-ST-DRG-000044	Girder Details – Stage 3 – Sheet 2	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000051	Paint Specification and Methodology – Stage 2	13/11/23	B
520212TP-AURC-B00390-ST-DRG-000052	Paint Scope – Plan, Section and Elevation – Stage 2	13/11/23	B

b) *Galston Timber Bridge Refurbishment Statement of Heritage Impact*, prepared by Artefact Heritage & Environment, March 2024.

EXCEPT AS AMENDED by the conditions of this approval:

HERITAGE CONSULTANT

2. A suitably qualified and experienced heritage consultant must be nominated for this project. The nominated heritage consultant must provide input into the detailed design, provide heritage information to be imparted to all tradespeople during site inductions, and oversee the works to minimise impacts to heritage values. The nominated heritage consultant must be involved in the selection of appropriate tradespersons and must be satisfied that all work has been carried out in accordance with the conditions of this consent.

   Reason: So that appropriate heritage advice is provided to support best practice conservation and ensure works are undertaken in accordance with this approval.

SPECIALIST TRADESPERSONS

3. All work to, or affecting, significant fabric shall be carried out by suitably qualified tradespersons with practical experience in conservation and restoration of similar heritage structures, materials and construction methods.

   Reason: So that the construction, conservation and repair of significant fabric follows best heritage practice.

SITE PROTECTION

4. Significant built and landscape elements including the original north and south bridge abutments are to be protected during site preparation and the works from potential damage. Protection systems must ensure significant fabric, including landscape elements, is not damaged or removed.

   Reason: To ensure significant fabric including vegetation is protected during construction.

PHOTOGRAPHIC ARCHIVAL RECORDING

5. A photographic archival recording must be prepared prior to the commencement of works and at the completion of works. This recording must be in accordance with the Heritage NSW publication '*Photographic Recording of Heritage Items using Film or Digital Capture'* (2006). The digital copy of the archival record must be provided to Heritage NSW.

   Reason: To capture the condition and appearance of the place prior to, and during, modification of the site which impacts significant fabric.

UNEXPECTED FINDS

6. The Applicant must ensure that if substantial intact archaeological deposits and/or State significant relics or any other buried fabric such as works not identified in Statement of Heritage Impact by Artefact Heritage dated March 2024, are discovered, work must cease in the affected area(s) and the Heritage Council of NSW must be notified. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.

   Reason: All significant fabric within a State Heritage Register curtilage should be managed according to its significance. This is a standard condition to identify to the applicant how to proceed if historical archaeological relics, or other unexpected, buried discoveries such as works are identified during the approved project.

ABORIGINAL OBJECTS

7. Should any Aboriginal objects be uncovered by the work which is not covered by a valid Aboriginal Heritage Impact Permit, excavation or disturbance of the area is to stop immediately and Heritage NSW is to be informed in accordance with the *National Parks and Wildlife Act 1974*. Works affecting Aboriginal objects on the site must not continue until Heritage NSW has been informed and the appropriate approvals are in place. Aboriginal objects must be managed in accordance with the *National Parks and Wildlife Act 1974*.

   Reason: This is a standard condition to identify to the applicant how to proceed if Aboriginal objects are unexpectedly identified during works.

COMPLIANCE

8. If requested, the applicant and any nominated heritage consultant may be required to participate in audits of Heritage Council of NSW approvals to confirm compliance with conditions of consent.

   Reason: To ensure that the proposed works are completed as approved.

DURATION OF APPROVAL

9. This approval will lapse five years from the date of the consent unless the building works associated with the approval have physically commenced.

   Reason: To ensure the timely completion of works

Advice

Section 148 of the *Heritage Act 1977* (the Act), allows people authorised by the Minister to enter and inspect, for the purposes of the Act, with respect to buildings, works, relics, moveable objects, places or items that is or contains an item of environmental heritage. Reasonable notice must be given for the inspection.

Right of appeal

If you are dissatisfied with this determination appeal may be made to the Minister under section 70 of the Act.

It should be noted that an approval under the Act is additional to that which may be required from other Local Government and State Government Authorities in order to undertake works.

Stamped documents

Any stamped documents (e.g., approved plans) for this application are available for the Applicant to download from the Heritage Management System at https://hms.heritage.nsw.gov.au under 'My Completed Applications.'

If you have any questions about this correspondence, please contact Katrina Stankowski, Manager at Heritage NSW on (02) 9873 8500 or heritagemailbox@environment.nsw.gov.au

Yours sincerely

[redacted]

Rochelle Johnston
Senior Manager, Major Projects
Heritage NSW
Department of Climate Change, Energy, the Environment and Water
As Delegate of the Heritage Council of NSW
6 May 2024

cc: Hornsby Council: hsc@hornsby.nsw.gov.au

Appendix E Contaminated Land & lead paint testing results

Search results

Your search for: Suburb: GALSTON

Search Again | Refine Search

did not find any records in our database.

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... more search tips

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the planning process.

More information about particular sites may be available from:

- The POEO public register
- The appropriate planning authority: for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act.

See What's in the record and What's not in the record.

If you want to know whether a specific site has been the subject of notices issued by the EPA under the CLM Act, we suggest that you search by Local Government Area only and carefully review the sites that are listed.
This public record provides information about sites regulated by the EPA under the Contaminated Land Management Act 1997, including sites currently and previously regulated under the Environmentally Hazardous Chemicals Act 1985. Your inquiry using the above search criteria has not matched any record of current or former regulation. You should consider searching again using different criteria. The fact that a site does not appear on the record does not necessarily mean that it is not affected by contamination. The site may have been notified to the EPA but not yet assessed, or contamination may be present but the site is not yet being regulated by the EPA. Further information about particular sites may be available from the appropriate planning authority, for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act. In addition the EPA may be regulating contamination at the site through a licence under the Protection of the Environment Operations Act 1997. You may wish to search the POEO public register.POEO public register

25 September 2024

Search results

Your search for: Suburb: HORNSBY HEIGHTS

Search Again Refine Search

did not find any records in our database.

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... more search tips

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
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25 September 2024

TUNKS CREEK BRIDGE GALSTON

Site Inspection and report

ABSTRACT
Report of site inspection carried out Marcia Prelog Aurecon

Conducted by:
Ian Clark

Project Location: Galston NSW
Address: Tunks Creek Bridge, Galston, NSW
Project: Tunks Creek Bridge, Galston, NSW
Client: Marica Prelog, Aurecon
Paintspection Consultant: Ian Clark

BACKGROUND

Aurecon have engaged the services of Paintspection in NSW to report on the paint condition of the Tunks Creek Bridge in Galston. It has been requested that the coating be inspected for Adhesion, Lead and Chromate (hazardous materials) in paint, determination of existing coating type and to provide a rectification specification in line with Transport for NSW QA Specification B220 where appropriate.

SITE VISIT...

A site visit was conducted by Ian Clark on 16/02/2022.

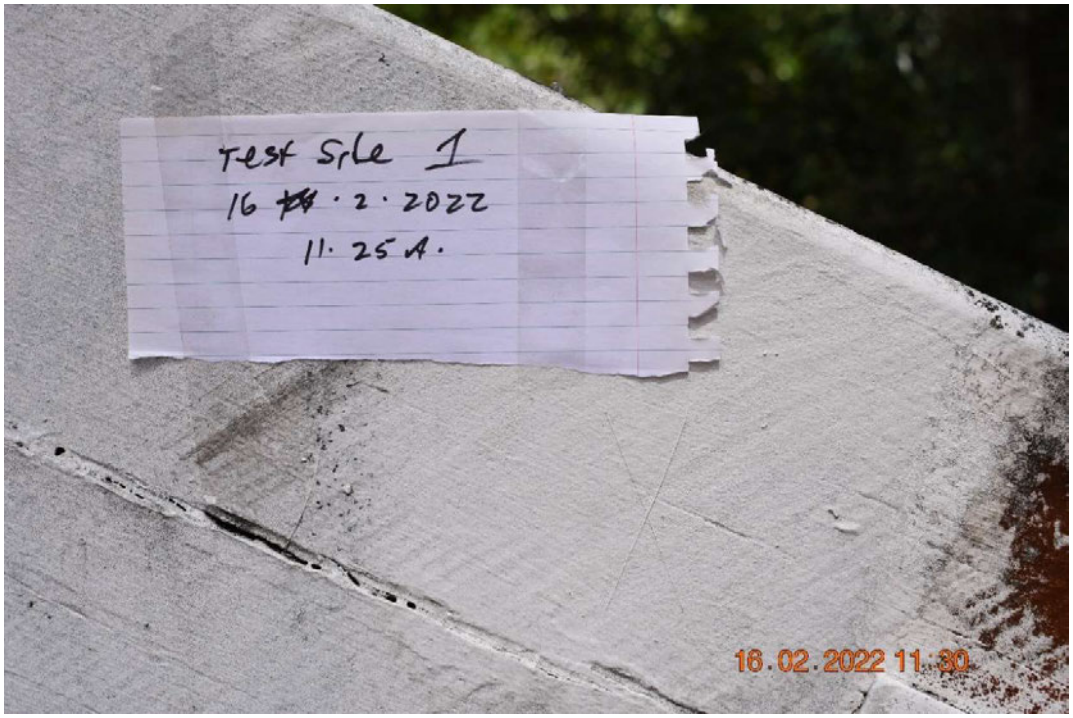
OBSERVATIONS...

As per the client requests adhesion was inspected at several test sites on the bridge. Dry Film Build measurements (DFT) were taken insitu on painted steelwork and timber film builds will be determined from samples taken from 3 test sites using photo microscopy. 3M Lead Tests Kits and 3M Chromate Test Kits were conducted on 4 areas as well as samples collected for full analytical lead and chromate analysis.

Prior to testing the areas were cleaned using Ajax Spray and Wipe to remove any dirt, mould or mildew.

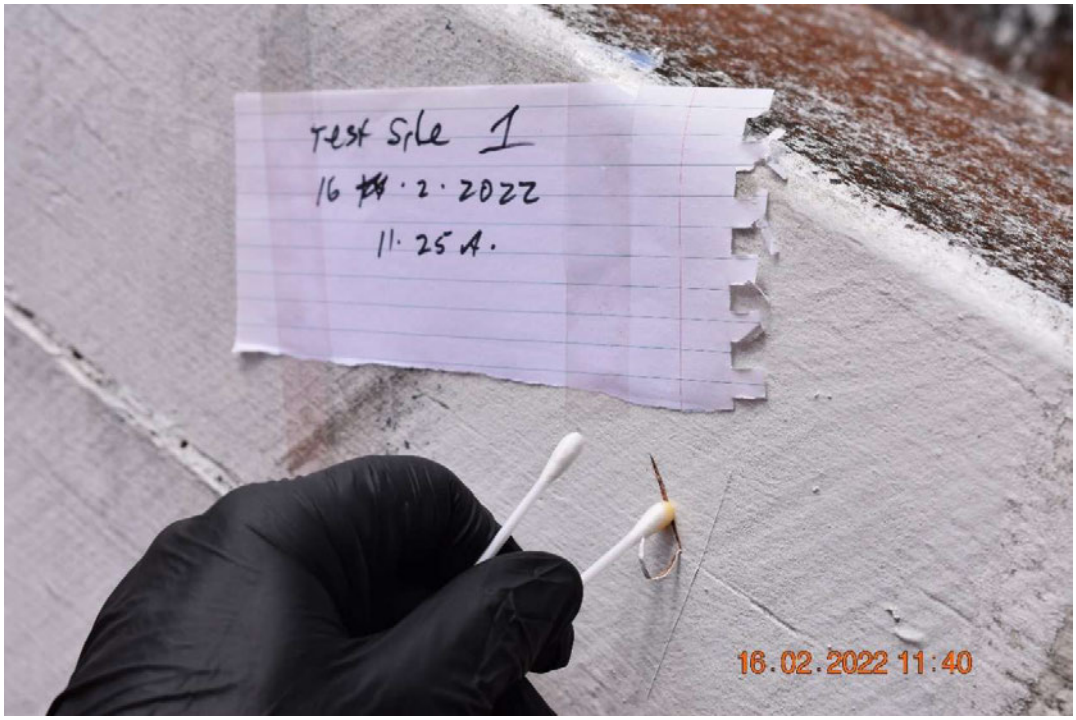
Picture 1 Cleaning of the painted surface prior to coating tests.

Test Site 1 Adhesion
Timber
Girder
West



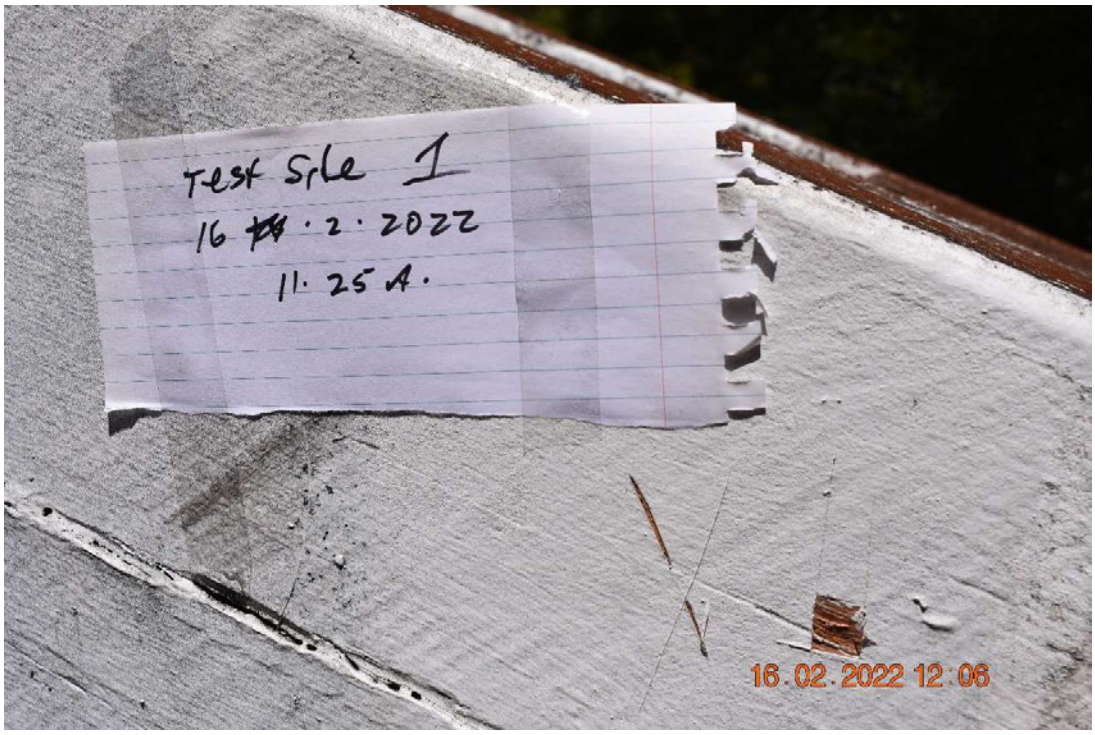
Picture 2 Adhesion tests

Lead Test



Picture 3 Lead / Chromate Test

Samples



Picture 4 Sample taken for analysis

Comments Adhesion – Good adhesion to substrate
Lead Spot Test – No evidence of Lead or Chromate
Sample taken for DFT, Lead and Chromate laboratory analysis.

Test Site 2
Tie-down
South Side

Adhesion

Picture 5 Adhesion Test

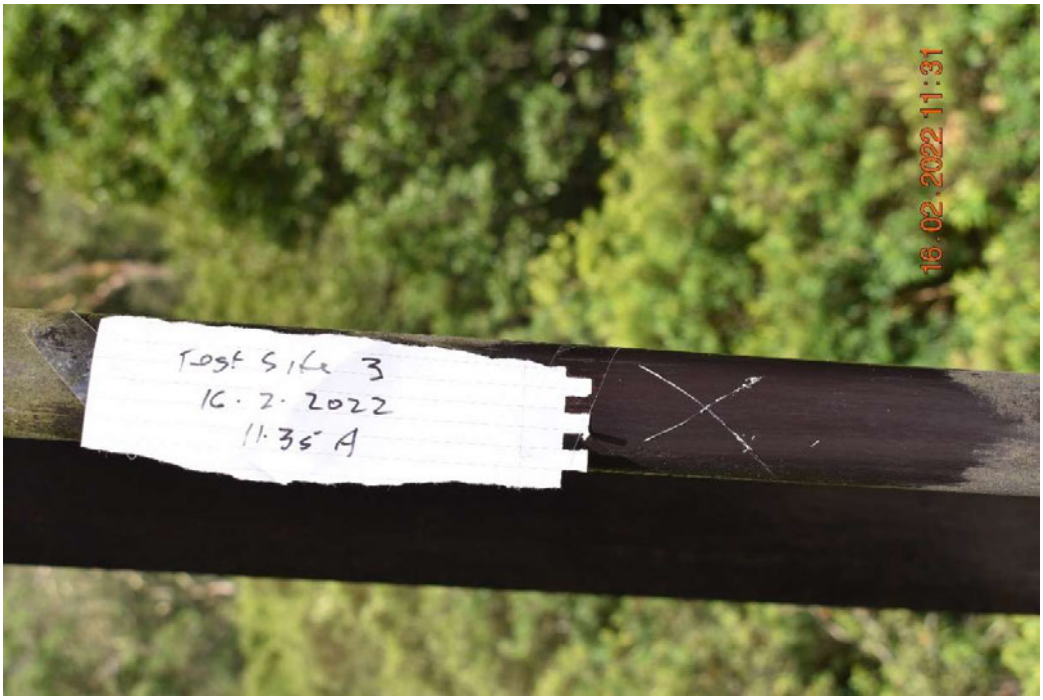
Lead Test

Picture 6 *Lead / Chromate Test*

Samples

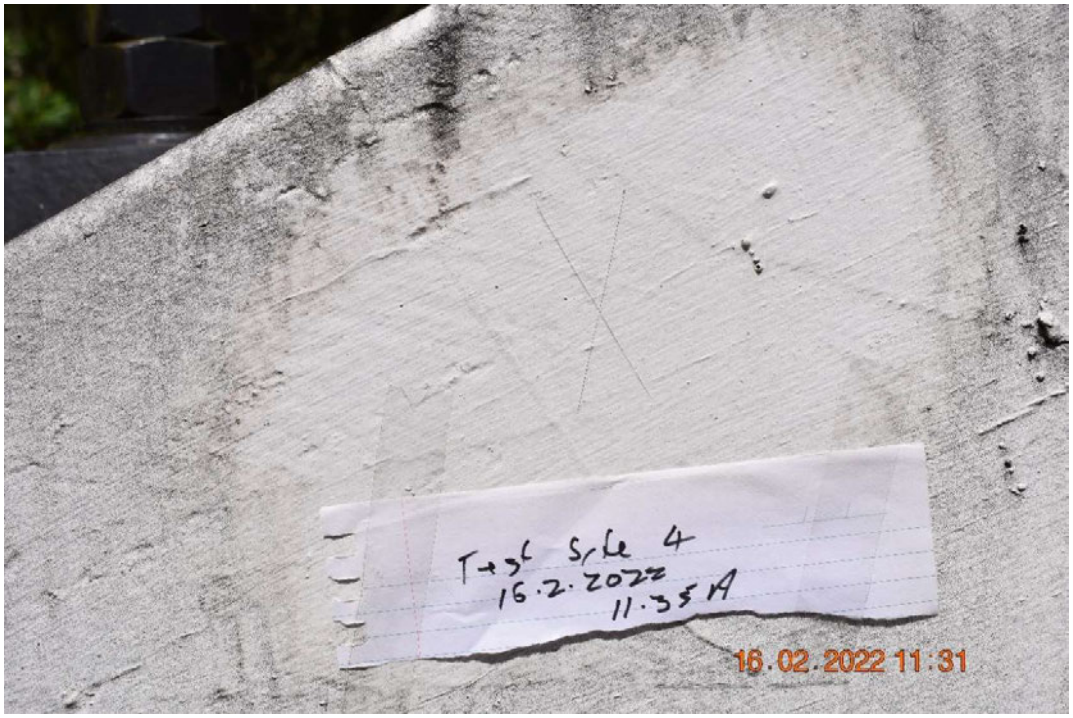
Picture 7 Sample taken for analysis

Comments Adhesion – Loss of adhesion between black and grey layer of paint
Hazardous material in paint spot tests for lead and chromate – No evidence of Lead or chromate. Sample taken for laboratory analysis.

Test Site 3 Tie Rod Middle	Adhesion	 *Picture 8 Adhesion Test*
	Comments	Adhesion – Good adhesion to substrate

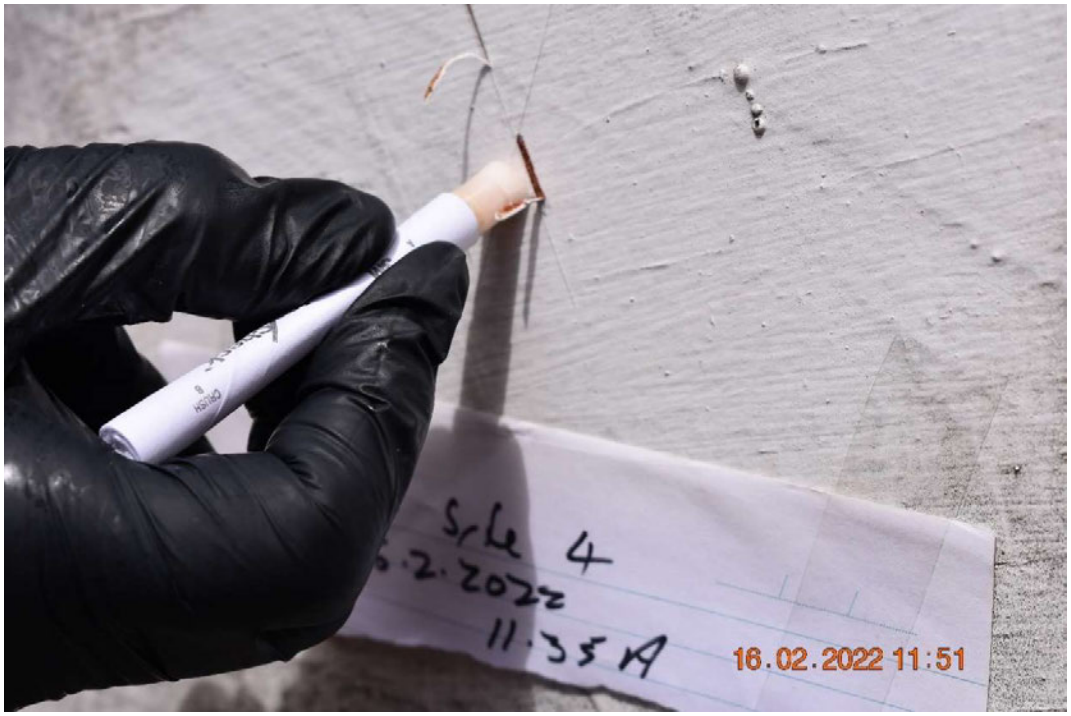
Test Site 4
Girder East

Adhesion



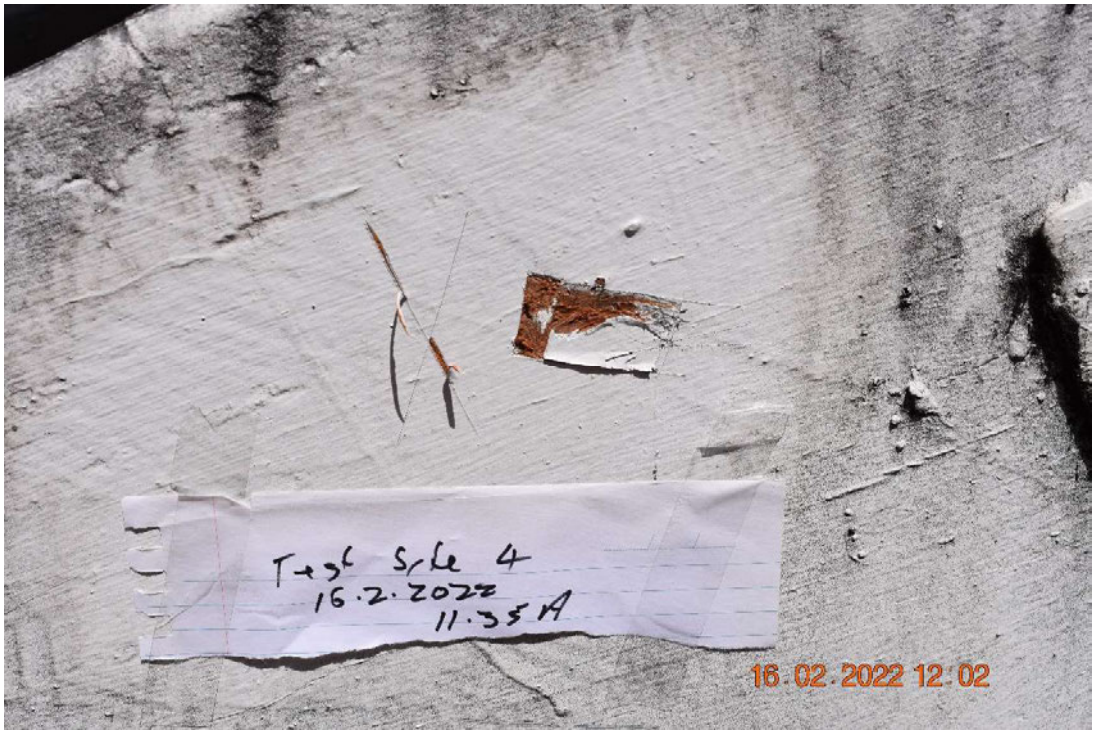
Picture 9 Adhesion Test

Lead Test



Picture 10 Lead / Chromate Test

Samples



Picture 11 Sample taken for analysis

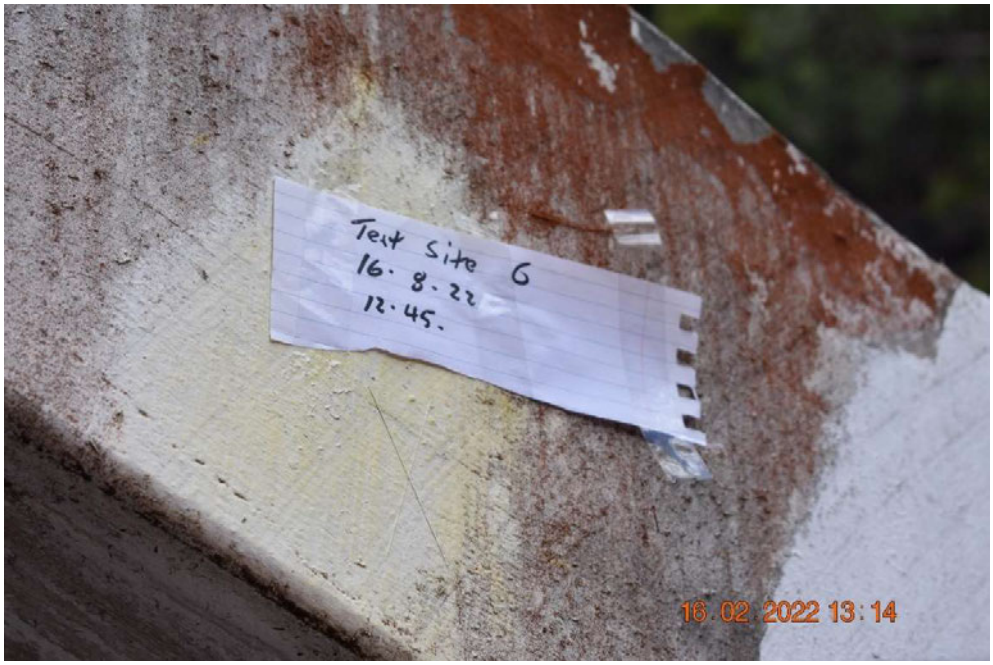
Comments Adhesion – Good adhesion to substrate
Hazardous material in paint spot test – No evidence of Lead or chromate
Sample taken for DFT, Lead and Chromate laboratory analysis

Test Site 5 Sample

Picture 12 Adhesion Test

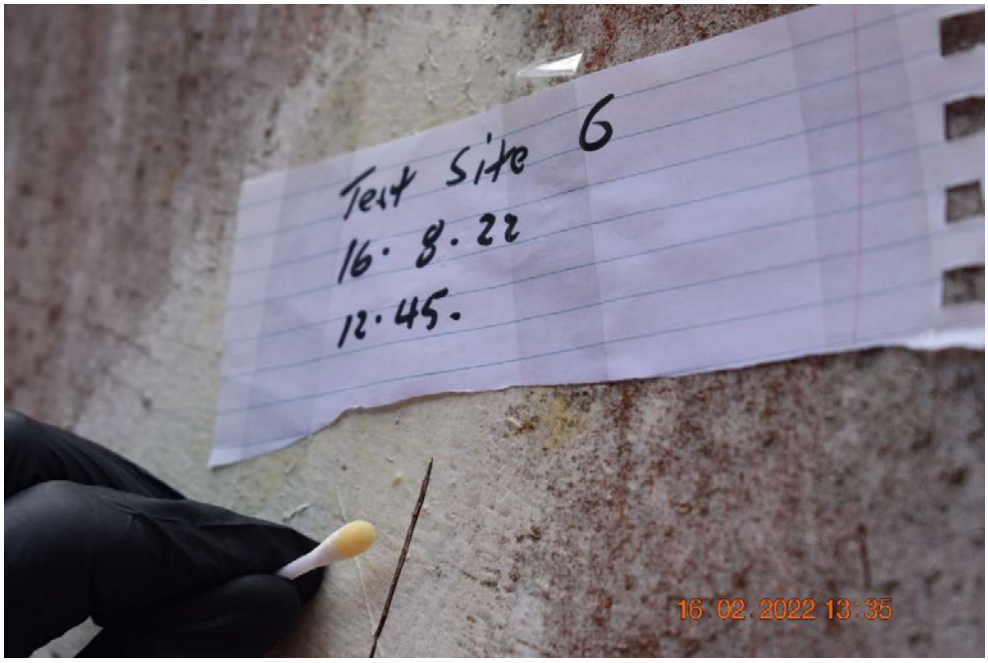
Comments Due to location of the sample site, it was not physically possible to clean and carry out adhesion checks. This spot was only sampled.

Test Site 6 Adhesion



Picture 13 Adhesion Test

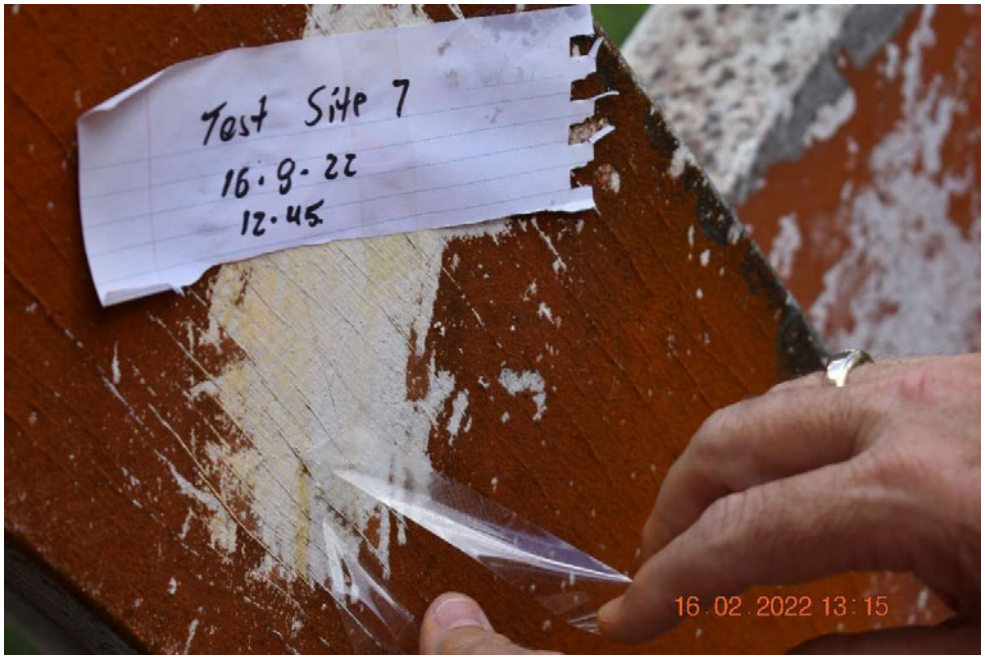
Lead Test



Picture 14 Lead / Chromate Test

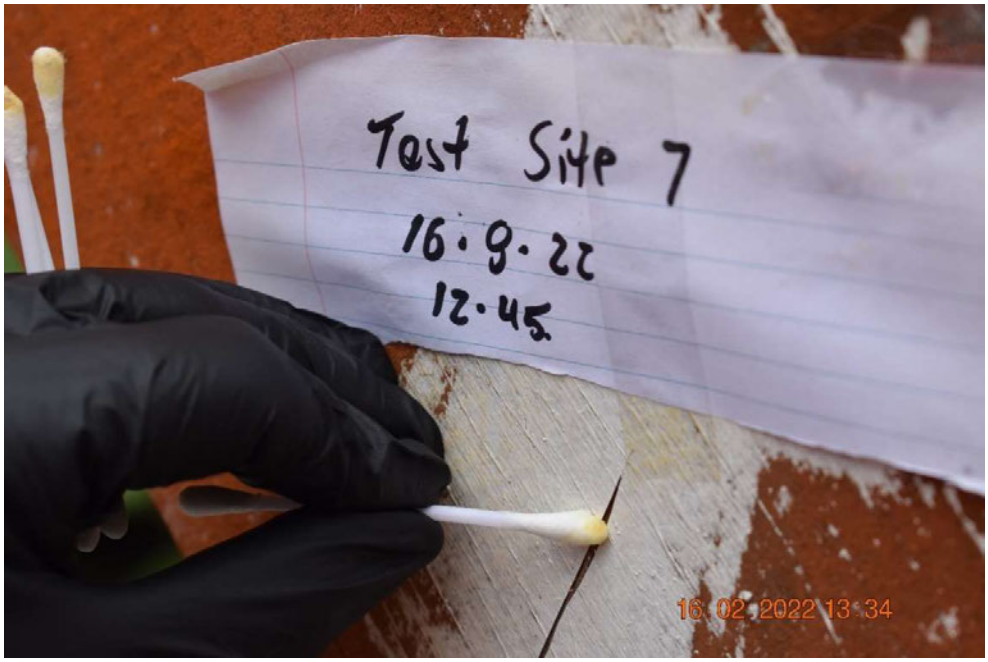
Comments Adhesion – Good adhesion to substrate
Lead Spot Test – No evidence of Lead

Test Site 7 Adhesion



Picture 15

Lead Test



Picture 16 Lead / Chromate Test

Comments Adhesion – Good adhesion to substrate
Lead Spot Test – No evidence of Lead

Test Site 8 Adhesion

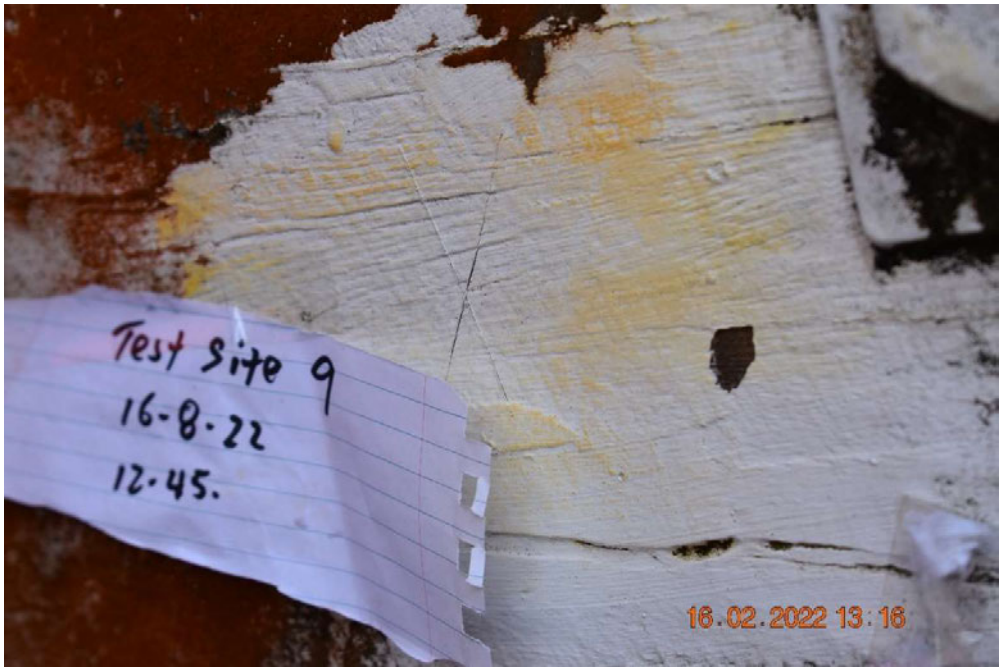
Picture 17 Adhesion Test

Lead Test

Picture 18 Lead/ Chromate Test

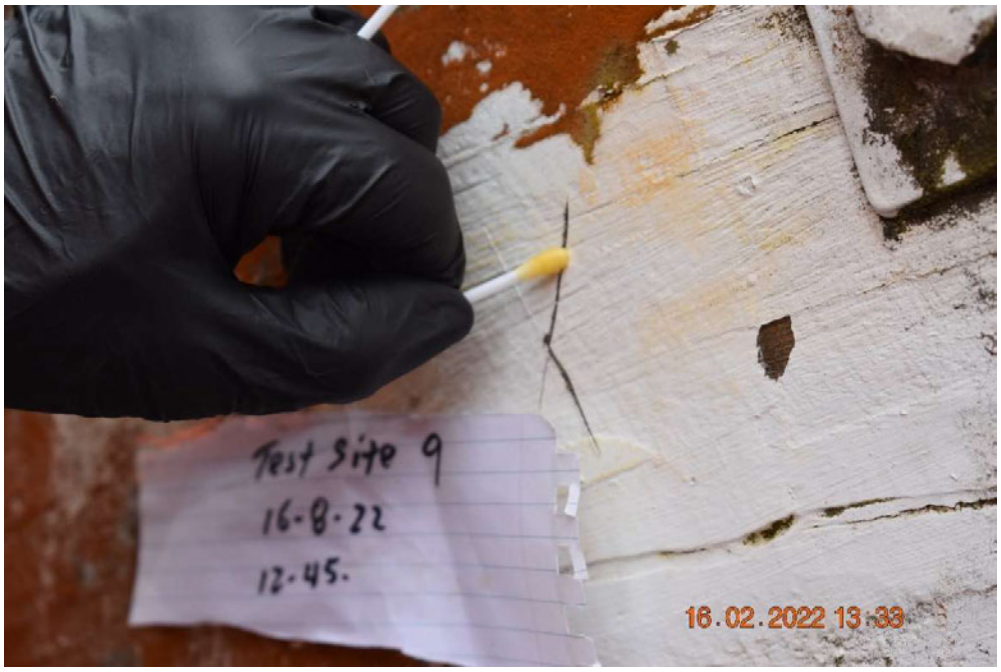
Comments Adhesion – Good adhesion to substrate
Lead Spot Test – No evidence of Lead

Test Site 9 Adhesion



Picture 19 Adhesion Test

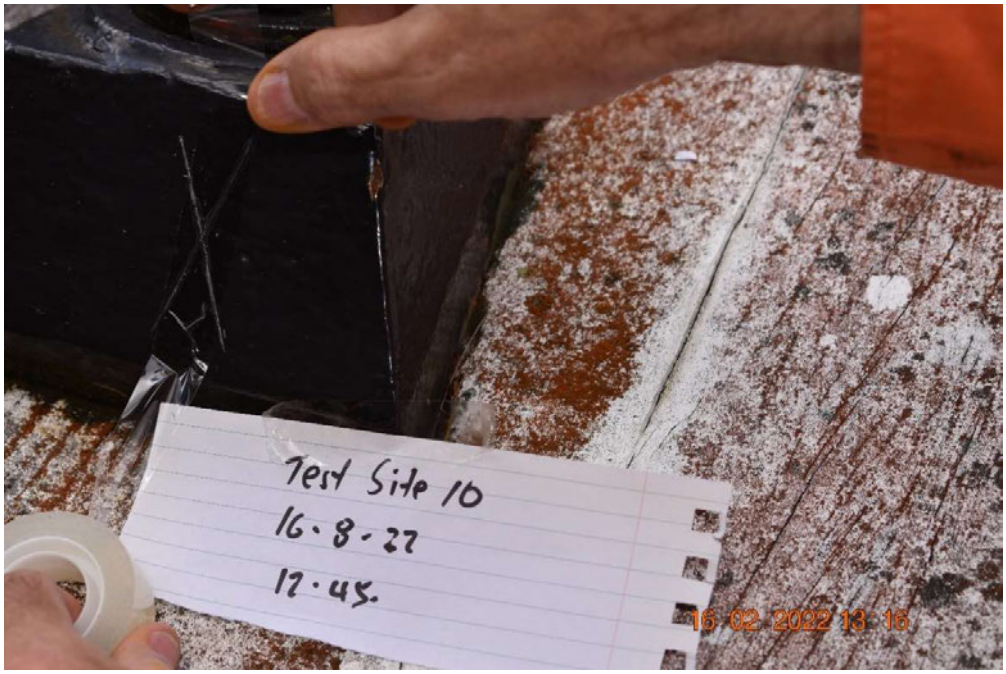
Lead Test



Picture 20 Lead / Chromate Test

Comments Adhesion – Good adhesion to substrate
Lead Spot Test – No evidence of Lead

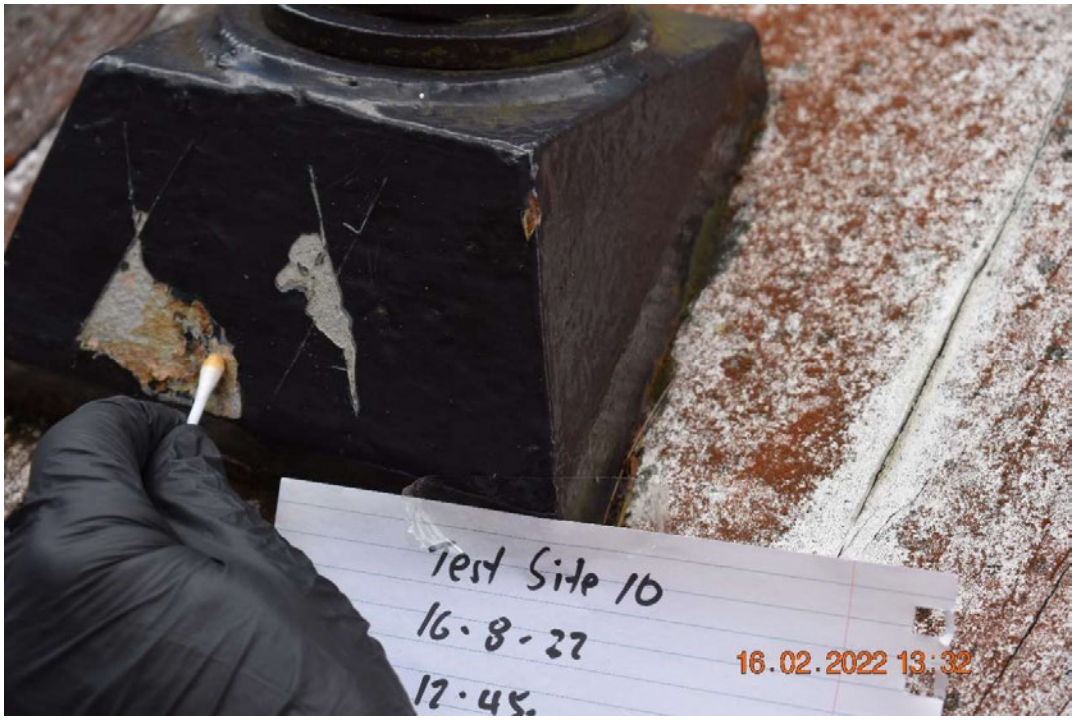
Test Site 10 Adhesion



Picture 21 Adhesion Test

Picture 22 Adhesion Test

Lead Test



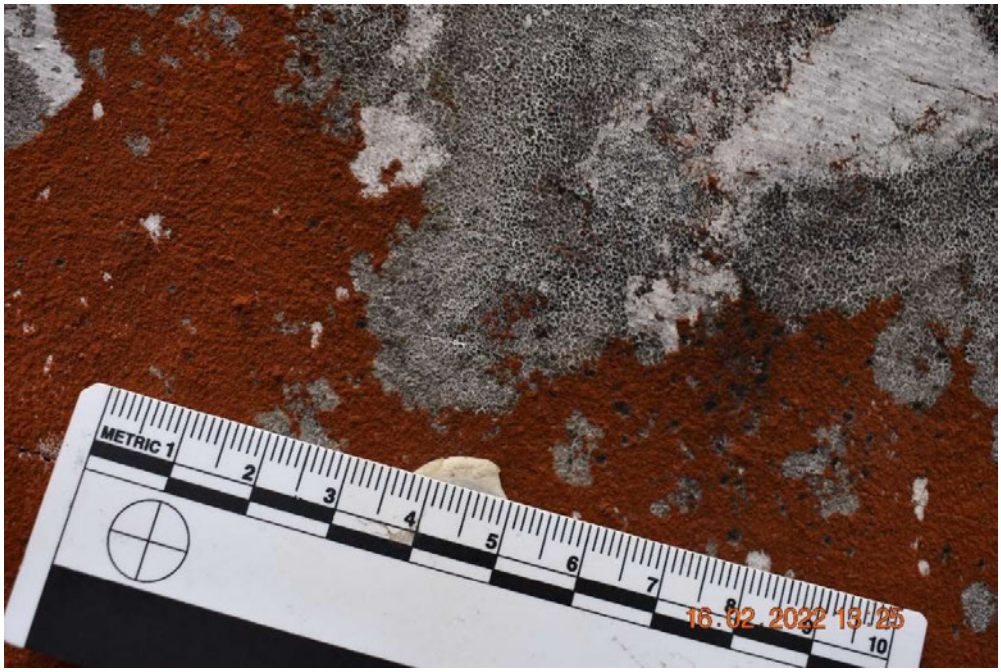
Picture 23 Lead / Chromate Test

Comments Adhesion – Loss of adhesion between black and grey layer of paint
Lead Spot Test – No evidence of Lead

Defects

Mould, Mildew & Lichen

Picture 24 Mould, Lichen & Mildew



Picture 25 Mould, Lichen & Mildew

Picture 26 Mould on white painted timbers

Rust on Bolts

Picture 27 General corrosion on bolt

Picture 28 General corrosion on bolt

Picture 29 General corrosion on I beams and bolts

Timber Rot

Picture 30 – Timber Rot and Paint delamination

Picture 31 Timber Rot

Picture 32 Timber Rot

Picture 33 Timber Rot

ADDITIONAL SITE PHOTOGRAPHS

Picture 34 – Timber Beam

Picture 35 Corrosion on black metal poles

Picture 36 Corrosion on black metal pole

Picture 37 Paint Delamination

Picture 38 Bridge

TESTING CONDUCTED

Site Conditions

Air Temperature – 24.5C

Surface Temperature – 31.2C

Dew Point – 18.6˚C

Surface differential – 13.6 ˚C

The test equipment used was a Protimeter Hygromaster 2. This equipment holds current certification and is not due to be recertified until December 2022

Adhesion (Cross Cut)

This test is based on AS/NZ 1580.408.4 Method of Test Adhesion Cross-cut. It requires a large X to be cut into the coating. At the point of intersection, the coating is picked with the blade of a knife to determine if the coating can be easily picked off. This result of this test is subjective, but it is commonly used as a guide to determine adhesion.

Dry Film Thickness Determination (DFT)

The test equipment used was an Elcometer 456 F/N. This gauge holds current certification and is not due to be recertified until December 2022. It was zeroed and calibrated prior to use.

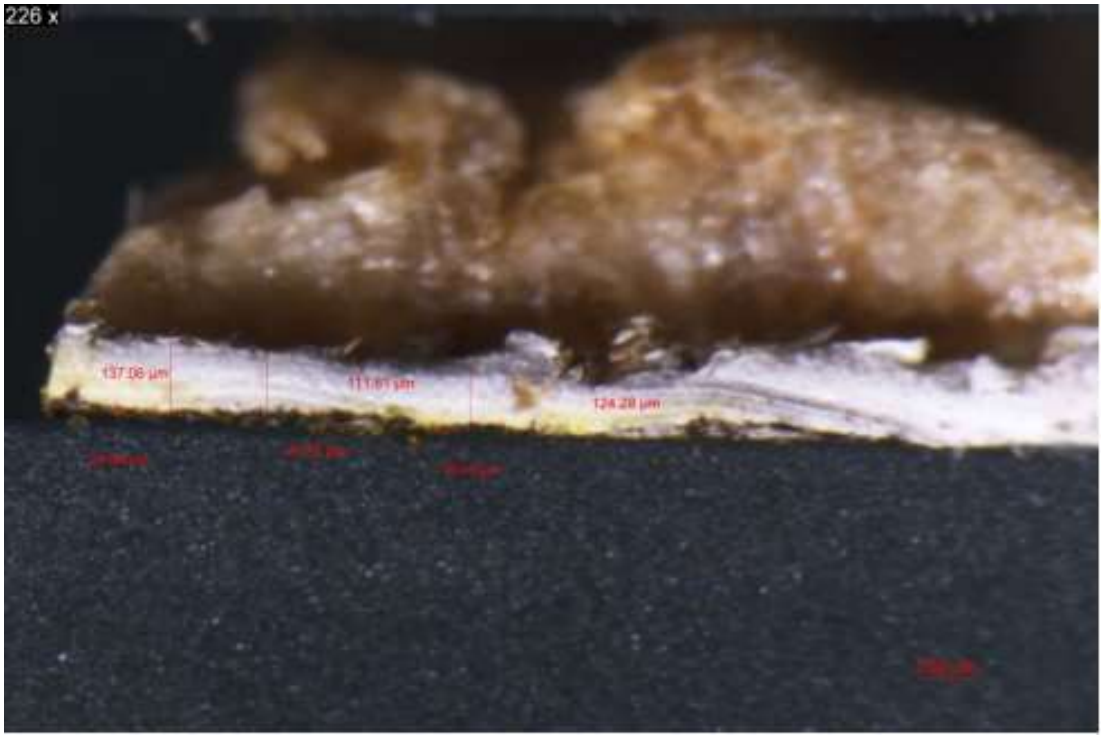
The dry film build thickness of the coating system was determined.

Number of Readings	24
Average Reading	272.5
Lowest Reading	83.1
Highest Reading	596.0

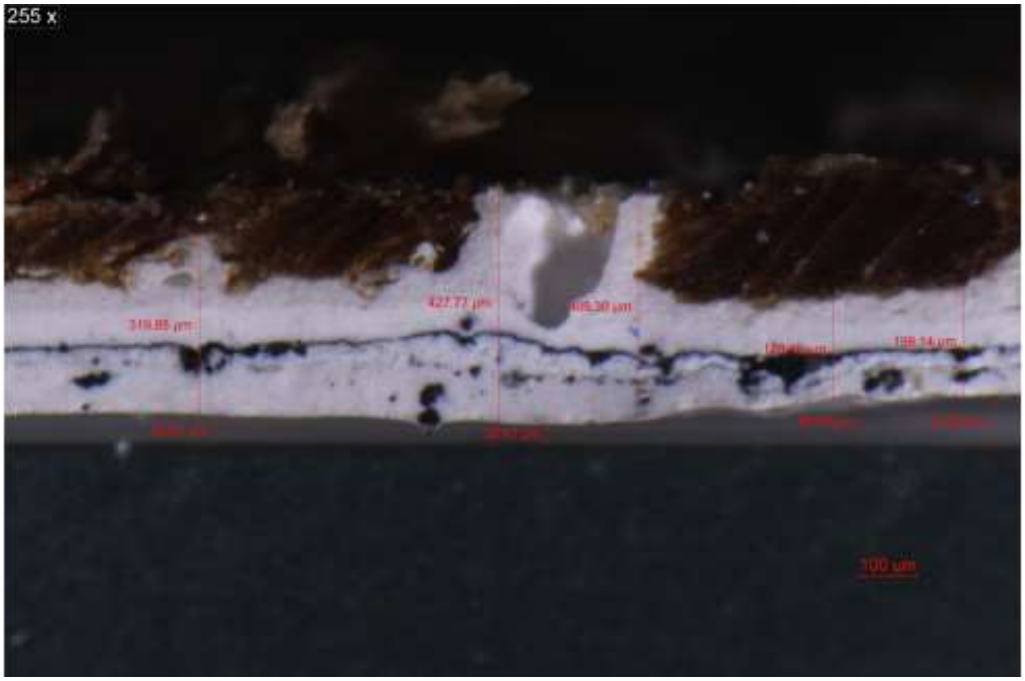
Comments – There was very little steel on site so these readings were taken on a combination of structures including the tie rods and nuts.

Optical Microscopy Film Build Determination

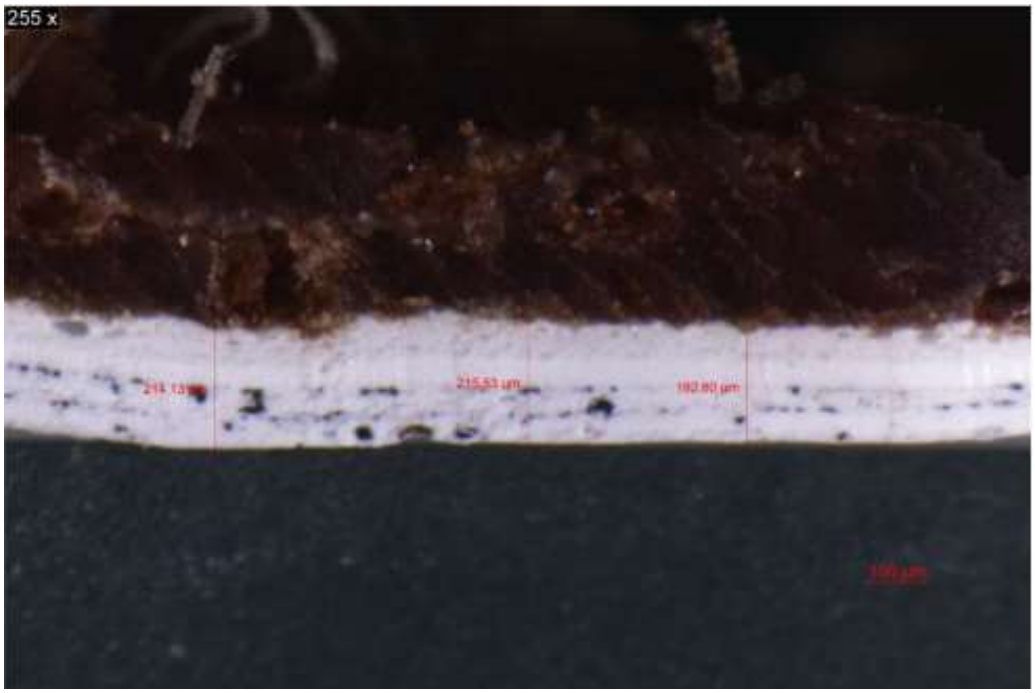
The Dry Film Build of 3 sample flakes was determined using Optical Microscopy.



Picture 39



Picture 40



Picture 41

Lead Spot Test

As per earlier photos from the test sites indicated the presence of lead was not detected on site using 3M Lead Check test sticks Batch (LOT AARBB61) in accordance with manufacturer's instructions. Chromate testing was also carried out using 3M Chromate Check test sticks Batch (LOT CA6DA50). Two samples have been submitted for analytical analysis of chromates from Test sites 1 & 4.

	Pb (mg/Kg)	Cr (mg/Kg)
Sample A	<10	<10
Sample B	50	90

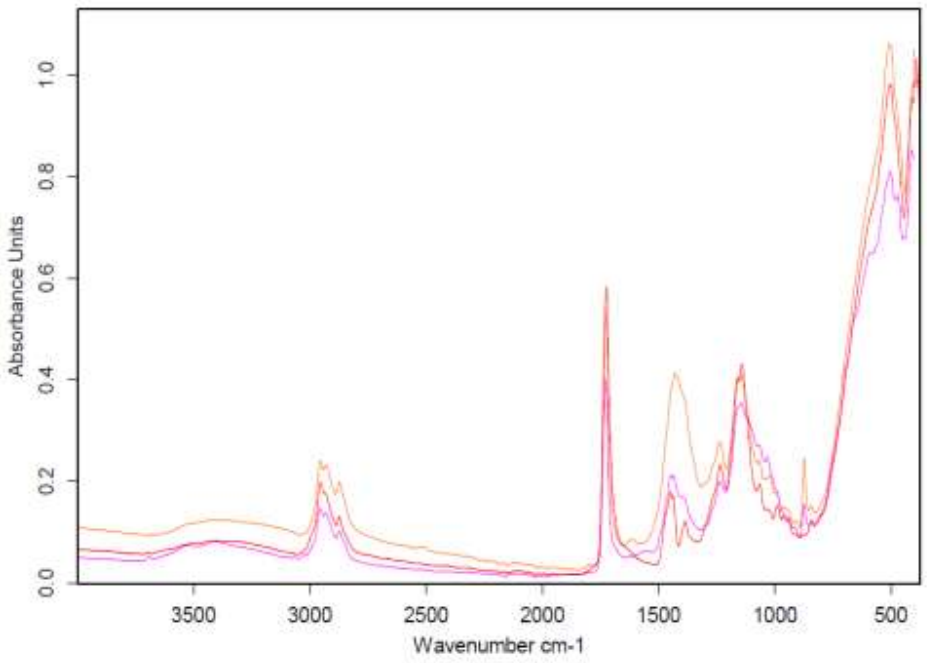
The levels found in the samples are minimal and well below the threshold concentration criteria as specified in AS/NZS 4361.1:2017 Guide to Hazardous Paint.

Analytical Analysis of Paint Flakes

Paint flakes were taken from the white timber beams and submitted for generic coating analysis.

The generic coating types were identified using FTIR (Fourier Transfer Infra-Red Spectroscopy) and were found to be as follows:

Based off the spectra all of three paint sample taken from the bridge are an acrylic based coating.



CONCLUSION

This conclusion relates to the site inspection of Tunks Creek Bridge in Galston by Ian Clark and the subsequent analytical analysis.

Paintspection's assessment of the coatings are as follows:

Aged Metal coating – Showing signs of general corrosion and poorly adhering black topcoat and underlying coats. The coatings on the metal will need to be removed and the substrates prepared before application of a coating system in line with Transport for NSW QA Specification B220/E.2. The black coating was tested for lead and chromate and was found to contain neither. Film builds of the black coating were determined onsite with a DFT Gauge, given the likely system as specified by Transport for NSW QA Specification B220/E.2, these builds were not deemed excessive.

Aged White Coating was analytically determined to be an acrylic coating. Most of this coating was well adhered to the substrate but has eroded and is exhibiting large amounts of fungal and mould growth. There are some areas where the coating is delaminating, and timber has rotted and will need replacing. The white coating was tested for lead and chromate and was found to contain neither. Film builds of the white coating were determined using optical microscopy and the coating film build was not deemed excessive.

Kim Baker

Coating Consultant

Paintspection.

Appendix F AHIMS Basic Search Results

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Galston

Client Service ID : 862788

Aidann Stathis

13/357 Military Road
Mosman New South Wales 2088

Attention: Aidann Stathis

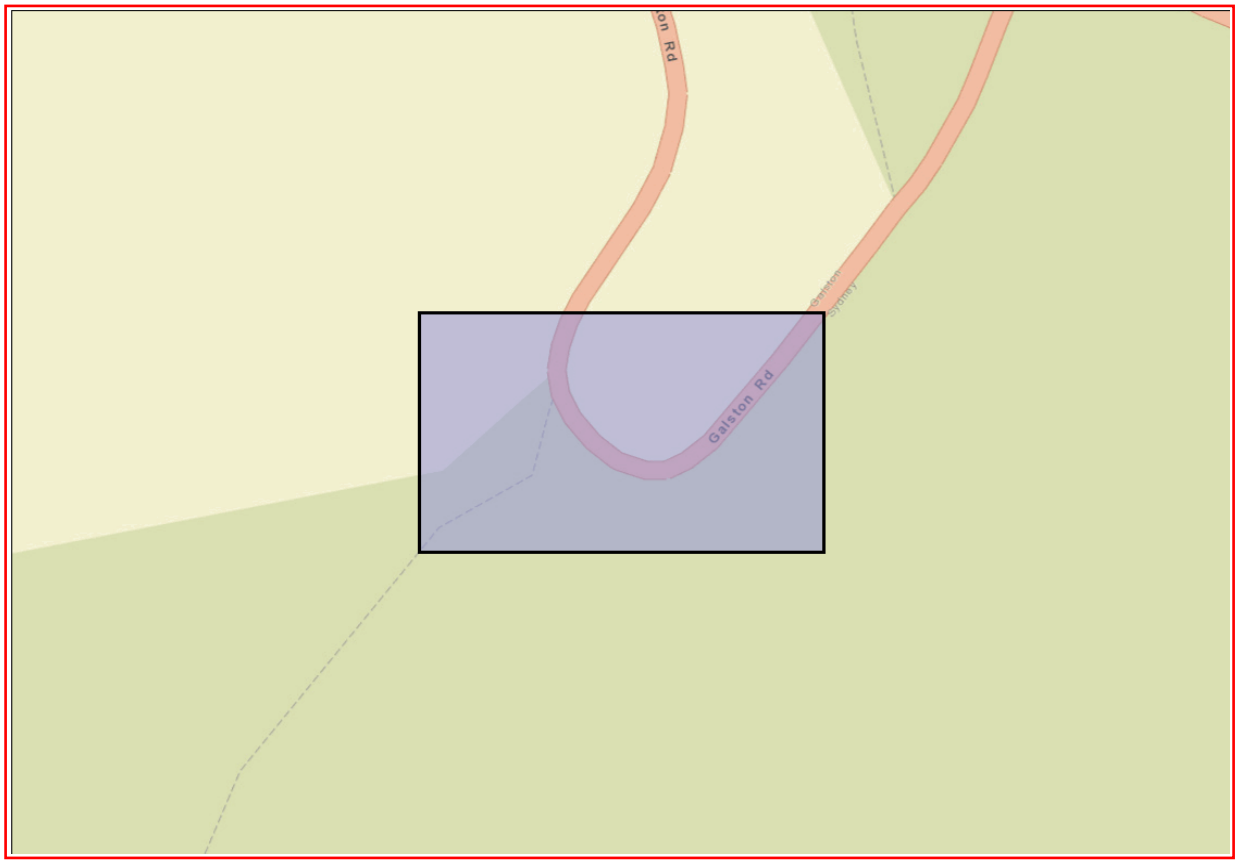
Email: [redacted]

Date: 09 February 2024

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.666, 151.0789 - Lat, Long To : -33.6655, 151.0799, conducted by Aidann Stathis on 09 February 2024.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Tunks 2

Client Service ID : 896907

Aidann Stathis

13/357 Military Road
Mosman New South Wales 2088

Attention: Aidann Stathis

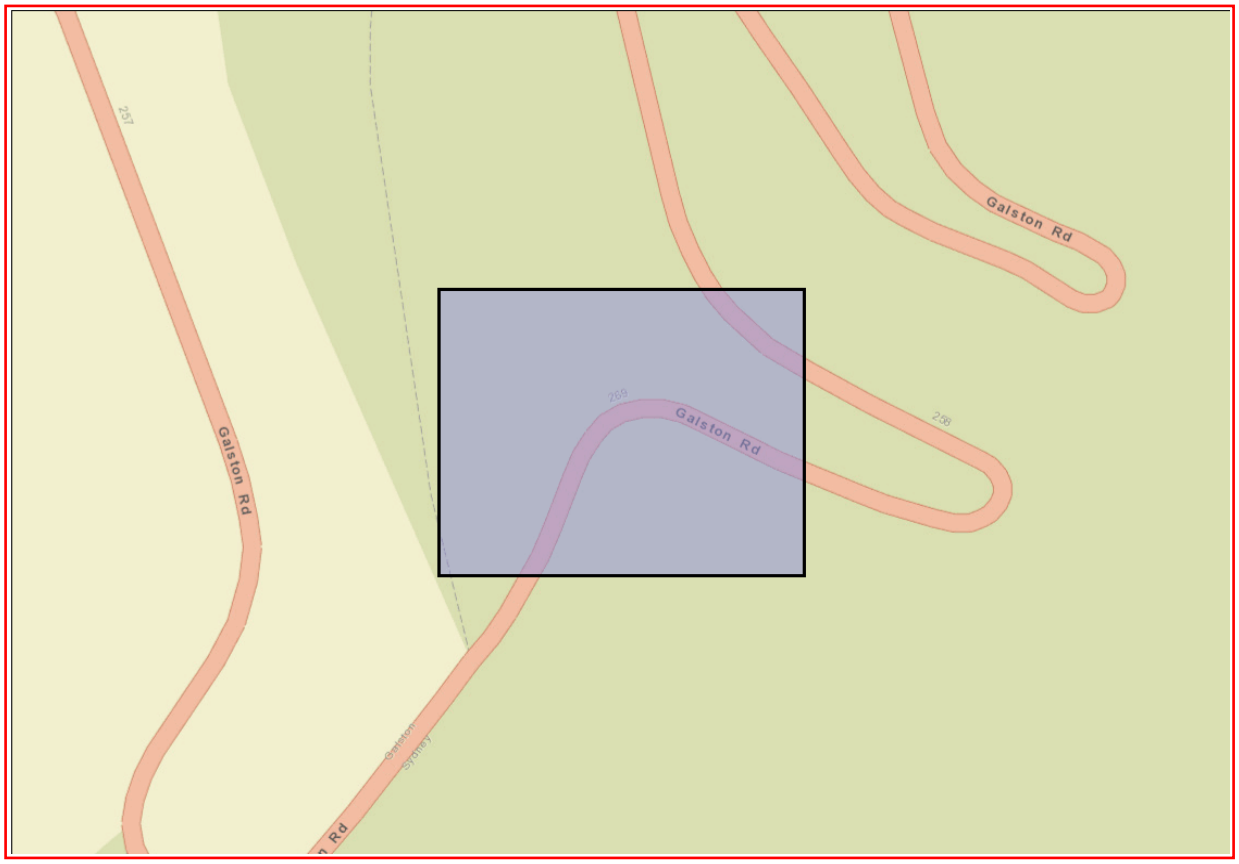
Email: [redacted]

Date: 30 May 2024

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.6651, 151.08 - Lat, Long To : -33.6645, 151.0809, conducted by Aidann Stathis on 30 May 2024.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



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0	Aboriginal sites are recorded in or near the above location.
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- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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Appendix G Noise Assessment Report

Construction noise impact assessment

Galston Road Bridge Rehabilitation- Stage 3

Proposed works	Worst Case Cleaning		
Proponent	Hutchison Weller		
Assessment Date	08/08/2024		
Prepared by	Aidann Stathis	**Assessment Id**	1

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Stage 3-

The proposed works would be undertaken in two phases. During phase 1 of the Project Galston road would be closed for 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require road closures for around 19 shifts from 8pm to 5am weather permitting, during quarter 3 of 2025.

Key features of the stage 3 include:

- Repacement of up to seven degraded timber cross girders.
- Cleaning and repainting of entire truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris.
- Repair of the Northern abutment butting block to delay the ongoing deterioration.
- Installation of steel framing and temporary bracing for the capwale/headstock on both Abutment A and B.
- Partial replacement of the timber sheeting at Abutment B timber.
- Replacement of deteriorated timber deck planks and deck corbel.
- Remove the temporary steel support girders once all timber elements have been completed.
- To facilitate construction road closures during the evening and night time periods will be required to ensure the ongoing safety of the public road users and workers.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML ($L_{Aeq,15min}$)
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:
PC = Phone calls
V = verification
IB = Individual briefings
N= Notification
AA = Alternative accommodation
SN = Specific notifications
RO = Respite offer
R1 = Respite period 1
R2 = Respite period 2
DR = Duration respite
Perception = relates to levels above RBL
NML = Noise management level
HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Rural / Suburban, characterised as:

Areas with negligible transportation or very limited local traffic, typically light vehicles only.

100m or more from the road.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	**Rural / Suburban**		Using custom background noise data?		**No**
Criterion	Day	Weekend Day	Evening	Night	Sleep
RBL	40	40	35	30	
NML	50	45	40	35	65

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of LAmax 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) P*ropagation of noise from petroleum and petrochemical complexes to neighboring communities.*

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 1000 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites

- United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted $L_{Aeq,\ 15\ minute}$ noise level	39 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	3
10 – 20 dB above NML	0
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	3
Clearly audible	5 – 15 dB above NML	0
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

Table 6 Safeguards and controls

Action	Description
Community consultation or notification	Notify the affected community. The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures site opening/closing times (including deliveries) environmental incident procedures
Behaviour	No swearing or unnecessary shouting or loud stereos/radios on site. Limit compression braking at night in residential areas. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.
Construction hours	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Respite for out-of-hours works	Respite would be scheduled as indicated in Appendix C and described in the CNVG.
Equipment selection	Use quieter construction methods where feasible and reasonable. Ensure plant including the silencer is well maintained. Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG
Use and siting of plant	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.

Action	Description
Plan worksites and activities to minimise noise and vibration.	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact

Appendix B Proposed activities and equipment

Worst Case Cleaning

Equipment	Quantity	Usage	Reduction	SWL
Daymakers / Lighting plant	2	100%	0	96
Generator (6 kVA)	1	100%	0	89
Support Vehicle	1	30%	0	95
High pressure washer[1]	1	80%	0	108
Water pump small	1	100%	0	80

Activity Sound Power Level: 109

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Worst Case Cleaning				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 1	1502444	8 PINE VALLEY ROAD GALSTON	RES	35	37.1	2.1	**Noticable**
NCA 1	1502446	8 CRUSADER ROAD GALSTON	RES	35	37.6	2.6	**Noticable**
NCA 1	1502454	11 PINE VALLEY ROAD GALSTON	RES	35	36.6	1.6	**Noticable**

Construction noise impact assessment

Galston Road Bridge Rehabilitation-Stage 3

Proposed works	Ancillary Site Assessment		
Proponent	Hutchison Weller		
Assessment Date	08/08/2024		
Prepared by	Aidann Stathis	**Assessment Id**	2

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Stage 3-

The proposed works would be undertaken in two phases. During phase 1 of the Project Galston road would be closed for 15 shifts from 8pm-5am weather permitting during quarter 4 of 2024. Phase 2 works would require road closures for around 19 shifts from 8pm to 5am weather permitting, during quarter 3 of 2025.

Key features of the stage 3 include:

• Repacement of up to seven degraded timber cross girders.

• Cleaning and repainting of entire truss structure. This includes treatment of connections and voids to repel or omit entry of water and debris.

• Repair of the Northern abutment butting block to delay the ongoing deterioration.

• Installation of steel framing and temporary bracing for the capwale/headstock on both Abutment A and B.

• Partial replacement of the timber sheeting at Abutment B timber.

• Replacement of deteriorated timber deck planks and deck corbel.

• Remove the temporary steel support girders once all timber elements have been completed.

• To facilitate construction road closures during the evening and night time periods will be required to ensure the ongoing safety of the public road users and workers.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

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Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML ($L_{Aeq,15min}$)
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
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OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
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Clearly audible	10 to 20	5 to 15	N, R1, DR
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OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
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Notes:
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NML = Noise management level
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Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Rural / Suburban, characterised as:

Areas with negligible transportation or very limited local traffic, typically light vehicles only.

100m or more from the road.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	**Rural / Suburban**		Using custom background noise data?		**No**
Criterion	Day	Weekend Day	Evening	Night	Sleep
RBL	40	40	35	30	
NML	50	45	40	35	65

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of LAmax 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) P*ropagation of noise from petroleum and petrochemical complexes to neighboring communities.*

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 1000 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites

- United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted $L_{Aeq,\ 15\ minute}$ noise level	31 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	0
10 – 20 dB above NML	0
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	0
Clearly audible	5 – 15 dB above NML	0
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

Table 6 Safeguards and controls

Action	Description
Community consultation or notification	Notify the affected community. The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures site opening/closing times (including deliveries) environmental incident procedures
Behaviour	No swearing or unnecessary shouting or loud stereos/radios on site. Limit compression braking at night in residential areas. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.
Construction hours	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.
Respite for out-of-hours works	Respite would be scheduled as indicated in Appendix C and described in the CNVG.
Equipment selection	Use quieter construction methods where feasible and reasonable. Ensure plant including the silencer is well maintained. Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG
Use and siting of plant	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.

Action	Description
Plan worksites and activities to minimise noise and vibration.	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact

Appendix B Proposed activities and equipment

Ancillary Facility Operation

Equipment	Quantity	Usage	Reduction	SWL
Compressor	1	50%	0	90
Daymakers / Lighting plant	1	100%	0	93
Generator (6 kVA)	1	100%	0	89

Activity Sound Power Level: 96

Ancillary Facility Establishment

Equipment	Quantity	Usage	Reduction	SWL
Franna Crane	1	40%	0	94
Hand Tools (electric)	1	20%	0	87
Light vehicle	1	40%	0	81
Truck (10-15 tonne)	1	30%	0	95

Activity Sound Power Level: 98

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Ancillary Site Assessment				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification

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