Transport for NSW

New England Highway bypass of Singleton

Addendum review of environmental factors

August 2024

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which we work and live.

We pay our respects to 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.

Prepared by Aurecon on behalf of ACCIONA and Transport for NSW.

Executive summary

The proposed modification

Transport for NSW (Transport) proposes to modify the New England Highway bypass of Singleton project (the Project) by reconfiguring road alignments, retaining maintenance access tracks, revising bridge arrangements and carrying out associated construction activities including:

- reconfiguring the southern connection interchange arrangement and realigning the northbound exit ramp
- revising the location of the Putty Road roundabout and northbound entry and exit ramps
- realigning the northbound exit ramp and roundabout, and constructing a large detention basin at the Gowrie Gates connection
- reducing the size of the southbound entry and exit loop ramp at the northern connection
- revising bridge arrangements
- revising property access alignments (subject to ongoing design development and consultation and agreement with relevant property owners)
- retaining maintenance access tracks, about 10 meters wide, for the viaduct at the southern end of the bypass connection with New England Highway
- providing associated road furniture, drainage and earthworks, and landscaping.

Background

The New England Highway is a major freight and commuter route, passing through Singleton and forms the main road access through the town. The route allows for the transport of goods to domestic and international markets via Newcastle and Sydney. Due to mining activities in the region, the route also accommodates the transport of mining equipment and vehicles, which are often oversize and/or over-mass vehicles.

The project REF was placed on public display between 16 December 2019 and 1 March 2020 for community and stakeholder feedback. A submissions report, dated 7 August 2020, was prepared to respond to issues raised. The project design has since been further refined in response to issues raised or identified.

In addition, two addendum REFs for the Project were prepared to aid general constructability and in response to the submissions report, and were determined in May 2023 and October 2023.

This addendum REF provides a detailed description of the potential environmental impacts associated with the proposed modification for the Project.

Need for the proposed modification

The proposed modification is consistent with the strategic needs discussed in Chapter 2 of the addendum REF (October 2023). The proposed modification continues to provide better access to Singleton town centre, through improved flood immunity of the Putty Road connection and associated ramps.

Proposal objectives

Section 2.3 of the addendum REF (October 2023) identifies the project objectives that are applicable to the proposed modification. Additionally, the objectives of the proposed modification include:

- Minimising the impact of flooding and improving surface water flow in the vicinity of the Putty Road connection
- Realigning property accesses (subject to ongoing design development and consultation and agreement with relevant property owners) to improve access, functionality and constructability
- Improving maintenance access for the Project and service authorities by providing permanent maintenance tracks and extra maintenance entries
- Improving road safety
- Reducing construction time by revising bridge arrangements and bridge pier design

- Provision of borrow sites to source the required fill material during construction that would later be repurposed as grassed swales for improved stormwater management during operation.

Options considered

The following options were considered for this addendum REF:

- Option 1 – Do nothing
- Option 2 – Construct the proposed modification.

Statutory and planning framework

Section 2.109 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (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.

The proposed modification is for the purpose of a road and is to be carried out by Transport. Therefore, development consent from Singleton Council is not required. As a public authority, Transport has a duty to consider the potential environmental impacts of the development in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This addendum REF has been prepared to consider the environmental impacts of the proposed modification.

Community and stakeholder consultation

Transport has continued to consult with the community and relevant stakeholders throughout the development of the Project. Ongoing consultation will continue with those directly affected by the Project and proposed modification as the Project develops.

Singleton Council and NSW State Emergency Services have been consulted about the proposed modification as per the requirements of SEPP (Transport and Infrastructure). Landowners who would have changes to their acquisition and access arrangements will continue to be consulted during the development of the Project design.

Feedback from consultation has been incorporated into the proposed modification. Community and stakeholder consultation will continue throughout the construction of the Project, including matters relevant to the proposed modification. Information about the Project and the proposed modification is also available on the Transport website.

Environmental impacts

The main environmental impacts for the proposed modification are:

Surface water, hydrology and flooding

Construction of the proposed modification is not expected to alter the potential impacts to surface water quality identified in Section 6.2 of the addendum REF (October 2023). With respect to surface water quality, the proposed modification is consistent with the addendum REF (October 2023).

Changes to the southern connection and Putty Road connection would alter the flood behaviour across the Hunter River and Doughboy Hollow floodplains. The overall flood impacts are generally minor relative to the existing flood conditions at these rural properties, with both increases and decreases in peak flood level and velocity most apparent in the immediate vicinity of the Project. All areas subject to increases in flood level are limited to primary production zoned land. There are also decreases in peak flood level across a significant extent of urban areas within the town of Singleton, most notably in the one per cent annual exceedance probability (AEP) event, as the bypass directs water away from the town of Singleton. Whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration on inundation. The design has aimed to minimise these impacts to flood behaviour as far as possible while meeting other key project objectives such as road flood immunity, road safety, and accessibility to Singleton during and after flood events.

Traffic

An assessment of the modification to the Putty Road connection was carried out to determine potential traffic impacts. The traffic modelling results demonstrate that the proposed modification of the Putty Road connection would have minimal impacts on the overall network performance, intersection performance and travel time results. The proposed modification to the interchange layout results in a slight reduction in traffic flows along the Singleton bypass and through the Putty Road interchange. There would be a minor increase in vehicle delay during both peak periods when going through the Putty Road interchange, and slight increases and decreases in travel times in comparison to the addendum REF (October 2023).

The roundabout at the Putty Road connection is shown to perform at LoS A during all peak traffic periods. The modelling results indicate that the roundabout would have capacity to carry the expected traffic volumes from the bypass, on and off ramps, and along Putty Road.

Noise and vibration

A qualitative assessment of the potential noise and vibration impacts was carried out for the proposed modification. In general, the proposed modification would have a negligible increase in impacts experienced by the community during construction, whether for works during or outside standard construction hours. Similarly, the proposed modification is not anticipated to result in more intensive vibratory equipment operating closer to sensitive receivers than previously considered, and therefore no increase in affected receivers is expected. These impacts would be managed through the implementation of mitigation measures including consultation with the affected community where required.

The proposed modification does not significantly alter road geometry or operation. The anticipated noise impacts considering predicted noise levels in both Year 2026 and Year 2036 during the daytime and night-time periods with the noise barriers as detailed in the addendum REF (October 2023) are not anticipated to significantly change as a result of the proposed modification.

An operational noise report will be prepared as part of the detail design process. The report will be in accordance with the Road Noise Policy providing an updated assessment of road traffic noise at the year of opening (2026 indicative) and at the design year (2036 indicative) for daytime and night-time periods. To confirm that the noise level targets are achieved, a post-construction noise monitoring program would be carried out in accordance with the Road Noise Mitigation Guideline (TfNSW 2024). The program will provide further validation of the design noise levels based on actual traffic during operation to determine the final number and location of properties which are eligible for consideration of at property noise treatments.

Landscape and visual

An assessment of the potential landscape and visual impacts was carried out for the proposed modification. Overall, the Project is consistent with the addendum REF (October 2023) in terms of scale and form and is considered to fulfil the vision, objectives and design principles developed through the approved project. As such, the proposed modification does not significantly impact the magnitude ratings for the landscape character or visual impact assessment.

During construction, the proposed modification would have visual impacts to a variety of receptors. These include road users, residents and businesses. Visual amenity may be affected by removal of vegetation, establishment of construction ancillary facilities, installation of construction hoardings and the visual appearance of construction sites, equipment, materials and site sheds.

The proposed modification would result in changes to the built form of the Project, including bridge structures, permanent maintenance access tracks and the reconfiguration of the Putty Road connection. However, the proposed modification does not significantly impact the magnitude ratings for the landscape character or visual impact assessment. Overall, the proposed modification is consistent with the LCVIA (October 2022) undertaken to inform the addendum REF (October 2023) in terms of scale and form and is considered to fulfil the vision, objectives and design principles developed through the approved project.

Justification and conclusion

The proposed modification is consistent with the project objectives as stated in section 2.2 of the addendum REF (October 2023) and section 2.2 of this addendum REF. The proposed modification would provide better access to Singleton town centre through improved flood immunity of the Putty Road connection and associated ramps.

This addendum REF has examined and considered to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposed activity. The potential environmental impacts of the proposed modification are not

likely to be significant and therefore an environmental impact statement and approval from the Minister for Planning under Division 5.2 of the EP&A Act are not required. The potential environmental impacts are considered to be manageable with the effective implementation of the measures detailed in the project REF (December 2019), submissions report, previous addendum REFs (May and October 2023) and this addendum REF.

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1. Introduction

1.1 Proposed modification overview

Transport for NSW (Transport) proposes to modify the New England Highway bypass of Singleton project (the Project) by reconfiguring road alignments, retaining maintenance access tracks, revising bridge arrangements and carrying out associated construction activities including:

- reconfiguring the southern connection interchange arrangement and realigning the northbound exit ramp
- revising the location of the Putty Road roundabout and northbound entry and exit ramps
- realigning the northbound exit ramp and roundabout, and constructing a large detention basin at the Gowrie Gates connection
- reducing the size of the southbound entry and exit loop ramp at the northern connection
- revising bridge arrangements
- revising property access alignments (subject to ongoing design development and consultation and agreement with relevant property owners)
- retaining maintenance access tracks, about 10 metres wide, for the viaduct at the southern end of the bypass connection with New England Highway
- providing associated road furniture, drainage and earthworks, and landscaping.

The Project location is shown in Figure 1-1. The proposed modification is shown in Figure 1-2 - Figure 1-7. Section 3 describes the key features of the proposed modification in greater detail.

A review of environmental factors (REF) was prepared for the Project in December 2019 (hereafter referred to as the project REF (December 2019)). The project REF (December 2019) was placed on public display between Monday 16 December 2019 and Sunday 1 March 2020 for community and stakeholder comment. A submissions report dated 7 August 2020 was prepared to respond to issues raised.

In addition, the following addendum REFs for the Project have been prepared and approved:

- An addendum REF, determined in May 2023, was prepared to adjust the proposal area after consultation and to help general constructability, hereafter referred to as the addendum REF (May 2023).
- An addendum REF, determined in October 2023, was prepared to provide a full interchange at Putty Road for ease of access to Singleton's town centre from the bypass, extending the bridge over the floodplain and reconfiguring the design at the southern connection, hereafter referred to as the addendum REF (October 2023). The design presented in the addendum REF (October 2023) is hereafter referred to as the approved project.

Transport awarded a design and construction contract to ACCIONA Construction Australia Pty Ltd to deliver the Singleton Bypass. As a result of design development, modifications to the approved project were required to further improve road safety and constructability and has resulted in revised interchange arrangements and proposed realigned property accesses. This addendum REF captures these design changes, hereafter known as the proposed modification. The project approval boundary shown in Figure 1-1 is the same as the proposal area identified within the addendum REF (October 2023).

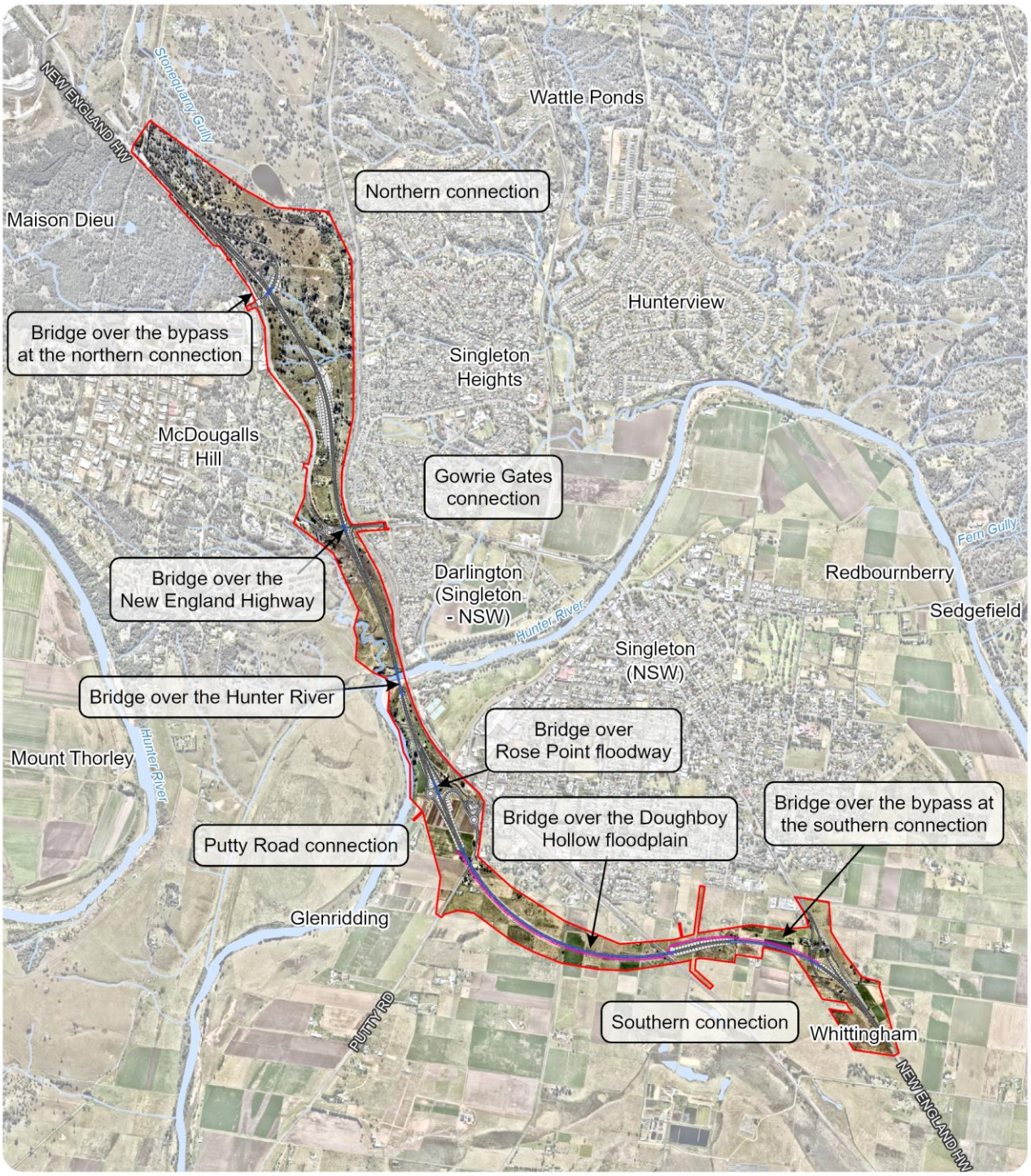
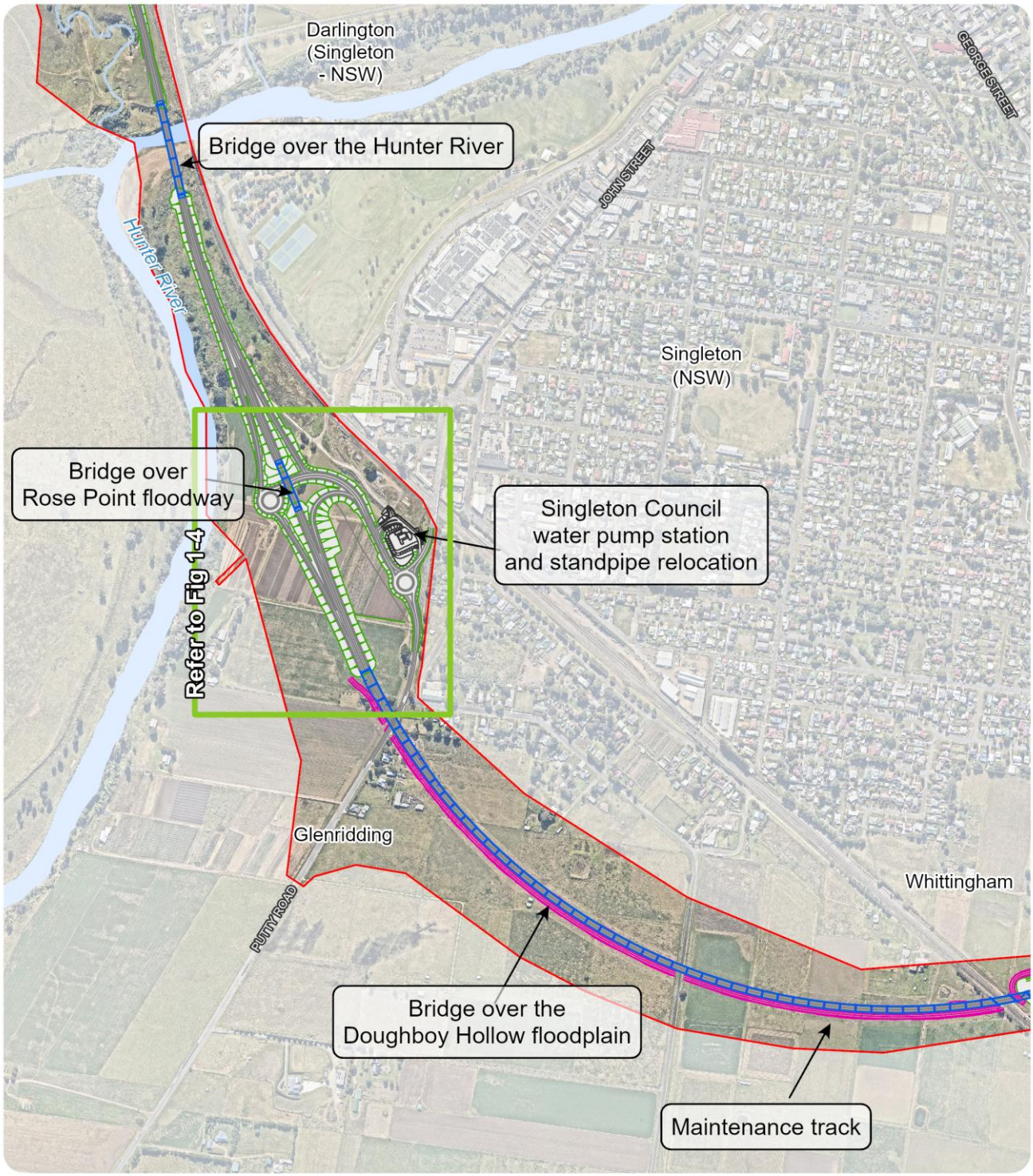


Figure 1-1: Location of the proposed modification

Figure 1-2: Southern connection



Bridge design
Maintenance track
Embankments
Road design
Project approval boundary

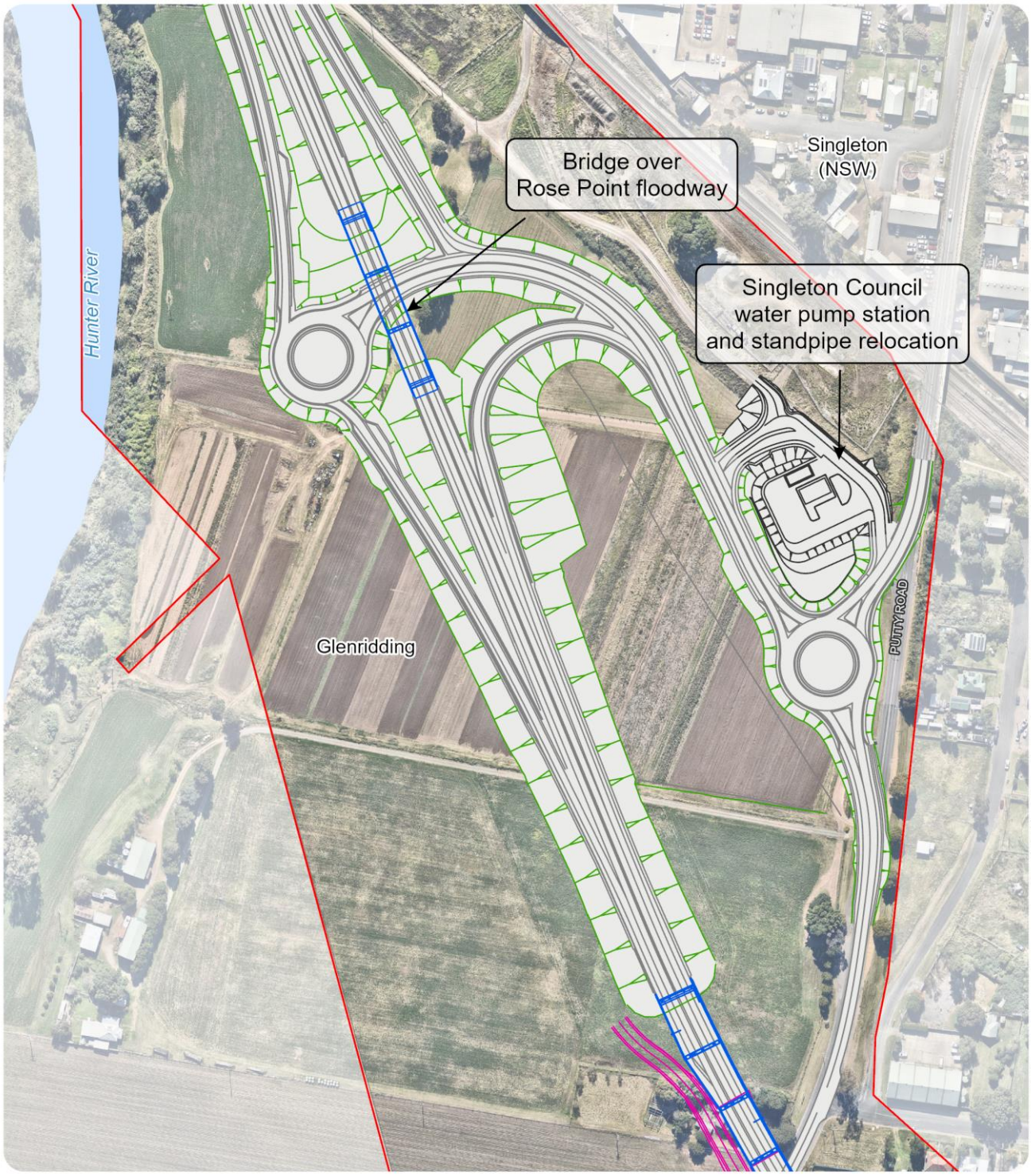
Sources: Aurecon, Spatial Services (DCS), Esri Basemap, Nearmap

1:11,250
0 190 380 m

Projection: GDA 1994 MGA Zone 56

Singleton Bypass Addendum REF

Figure 1-3: Putty Road connection



Bridge design
Maintenance track
Embankments
Road design
Project approval boundary

Sources: Aurecon, Spatial Services (DCS), Esri Basemap, Nearmap

1:3,000
0 50 100 m

Projection: GDA 1994 MGA Zone 56

Singleton Bypass Addendum REF

Figure 1-4: Putty Road connection

Singleton Bypass Addendum REF

Figure 1-5: Gowrie Gates connection


Singleton
Heights
MAISONDIEU ROAD
NEW ENGLAND HIGHWAY
Bridge over the
New England Highway
Darlington
(Singleton
- NSW)
McDougalls
Hill
Bridge design
Maintenance track
Embankments
Road design
Project approval boundary
Sources: Aurecon, Spatial Services (DCS), Esri Basemap, Nearmap
1:2,750
0
40
80 m
Projection: GDA 1994 MGA Zone 56
Singleton Bypass Addendum REF
Figure 1-6: Gowrie Gates connection

Figure 1-7: Northern connection

1.2 Purpose of the report

This addendum REF has been prepared by Aurecon Group Pty Ltd on behalf of ACCIONA and Transport. For the purposes of these works, Transport is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This addendum REF is to be read in conjunction with the project REF (December 2019), submissions report and previous addendum REFs (May 2023 and October 2023) for the Project. The purpose of this addendum REF is to describe the proposed modification, to document and assess the likely impacts of the proposed modification 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 context of section 171 of the Environmental Planning and Assessment Regulation 2021, *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS Required? guidelines) (DUAP, 1995/1996), *Roads and Road 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* (EPBC Act).

In doing so, this addendum 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 strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport's road activities on nationally listed threatened species, ecological communities and migratory species.

The findings of this addendum REF would be considered when assessing:

- Whether the proposed modification is likely to result in a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces 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 EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured.
- The potential for the proposed modification to significantly impact any other matters of national environmental significance or Commonwealth land and therefore the need to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Australian Government Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

2.1 Strategic need for the proposed modification

Section 2 of the project REF (December 2019) addresses the strategic need for the Project, the project objectives and the options that were considered. The proposed modifications described and assessed in this addendum REF are consistent with the strategic need for the Project.

The proposed modification in this addendum REF must accommodate several design changes after determination of the addendum REF (October 2023) that would further improve road safety, constructability and has resulted in revised interchange arrangements and proposed realigned property accesses.

Transport is committed to delivering a solution for both motorists and the Singleton community. By modifying the Project, the bypass would operate more efficiently for passing traffic and those entering and leaving the town.

2.2 Proposal objectives and development criteria

Section 2.3 of the project REF (December 2019) identifies the overarching project objectives and development criteria that also apply to the proposed modification. Extra objectives relevant to the proposed modification include:

- Minimising the impact of flooding and improving surface water flow and flood immunity in the vicinity of the Putty Road connection
- Realigning property accesses (subject to ongoing design development and consultation and agreement with relevant property owners) to improve access, functionality and constructability
- Improving maintenance access for the Project and service authorities by providing permanent maintenance tracks and extra maintenance entries
- Improving road safety
- Reducing construction time by revising bridge arrangements and bridge pier design
- Provision of borrow sites to source the required fill material during construction that would later be repurposed as grassed swales for improved stormwater management during operation.

2.3 Alternatives and options considered

The following sections describe the options that have been considered and assessed during the development of the proposed modification.

2.3.1 Methodology for selection of preferred option

As a result of design progression and modifications which were required to further improve road safety and constructability, ACCIONA considered the feasibility of modifying the proposal as presented in the addendum REF (October 2023). Two options have been considered for the proposed modification and are discussed in the following sections.

2.3.2 Identified options

The following options have been considered in the preparation of this addendum REF:

- Option 1 – Do nothing (maintain design as per the addendum REF (October 2023))
- Option 2 – Modify the design.

2.3.3 Analysis of options

Option 1 – Do nothing

This option would involve the construction of the Singleton bypass as per the approved project. Although this would provide a bypass of Singleton, it would not provide an opportunity to improve flooding outcomes, road safety and constructability.

Southern connection

A revised interchange arrangement and northbound exit ramp and southbound entry ramp alignment has been proposed to improve road geometry and road safety and reduce the footprint of the interchange. Additionally, access to properties on Newington Lane has been simplified. The do nothing option would not allow for these improvements to be adopted.

Putty Road connection

The realignment of the Putty Road interchange and changes to the entry and exit ramp arrangements to improve road safety, flood immunity and maintenance are proposed. Additionally, the relocation of the roundabout further away from properties is required to address community concerns about light spill. The do nothing option would not allow for these improvements to be adopted or provide an opportunity to address community concerns about light spill.

Gowrie Gates connection

The relocation of the roundabout and revision of the northbound exit ramp are proposed to improve constructability. In addition, the incorporation of a detention basin between the roundabout connecting to Maison Dieu Road and the main carriageway is proposed to improve stormwater management. The do nothing option would not allow for these improvements to be adopted or for surface water outcomes to be improved.

Northern connection

The southbound entry and exit loop ramps have been reduced in size to reduce impacts of vegetation clearing on endangered ecological communities, and a new wet basin is proposed to be located within this loop ramp to locally manage drainage. The distance between Rixs Creek Lane and the southbound exit ramp has been increased to improve road safety for motorists navigating these movements. The do nothing option would have the potential for greater environmental impact on endangered ecological communities and would not result in improved road safety.

Revised bridge arrangements

Revisions to bridge arrangements are proposed to allow for reduced construction time and make improvements to road safety, flood performance and maintenance. The do nothing option would not allow for these improvements to be adopted.

Realignment of property accesses

As a result of design progression, five property access roads are proposed to be adjusted and/ or consolidated subject to ongoing design development and consultation and agreement with relevant property owners to improve access, functionality and constructability. While the “Do Nothing” option would still provide property accesses for residents as part of the approved project, the ‘Do nothing’ option would not allow for these property access improvements based on the proposed modification.

Conclusion

The ‘Do nothing’ option is not considered further as it would not meet the objectives identified in Section 2.2. Further, design changes which result in improvements in road safety and constructability support the proposed modification to the Project.

Option 2 – Modify the design

This option consists of modifying the design at key locations to allow for improvements to the approved project after the determination of the addendum AREF (October 2023). These locations and the proposed modification are discussed below.

Southern connection

The revised interchange arrangement and northbound exit ramp and southbound entry ramp alignment would improve road geometry and road safety and reduce the footprint of the interchange. Furthermore, access to properties on Newington Lane has been simplified.

Putty Road connection

The realignment of the Putty Road interchange and changes to the entry and exit ramp arrangements would improve road safety and maintenance, minimise the impact of flooding and improve surface water flow in the vicinity of the Putty Road connection. The northbound entry and southbound exit ramp flood immunity has been increased from 5 years to 10 years. Furthermore, the relocation of the roundabout further from properties would reduce light spill on nearby residential properties. Extra material excavated in this area to improve drainage would also improve cut to fill haulage operations during construction of the Project to minimise impact on the road network and improve environmental sustainability outcomes by using less fuel.

Gowrie Gates connection

The relocation of the roundabout and revision of the northbound exit ramp are proposed to be modified to improve constructability. In addition, the incorporation of a detention basin between the roundabout connecting to Maison Dieu Road and the main carriageway would improve stormwater management. New borrow sites to be established between the bridge over the Hunter River and the bridge over the New England Highway would also improve cut to fill haulage operations during construction of the Project to minimise impact on the road network and improve environmental sustainability outcomes by using less fuel.

Northern connection

The reduction in the size of the southbound entry and exit loop ramps would reduce impacts on endangered ecological communities, by reducing the area of clearing and require less material to build the ramp. The distance between Rixs Creek Lane and the southbound exit ramp has been increased to improve road safety for motorists navigating these movements.

Revised bridge arrangements

Revisions to bridge arrangements would result in reduced construction time and improvements in road safety, flood performance and maintenance.

Maintenance access tracks, about 10 metres wide, on the northern side of the bridge over the bypass at the southern connection and the southern side of the bridge over the Doughboy Hollow floodplain would also be retained for maintenance access for the Project, including the piling pad and crane pad at every second span.

Realignment of property accesses

As a result of design progression, five property accesses are proposed to be relocated and/or consolidated to improve access, functionality and constructability, subject to ongoing design development and consultation and agreement with relevant property owners. The realignment of these property accesses is required to facilitate the design changes associated with the proposed modification.

Conclusion

This option would meet the objectives of the project REF (December 2019) as well as the extra objectives provided in Section 2.2 and is therefore considered the preferred option.

2.4 Preferred option

The preferred option is Option 2, to modify the approved project as described in Section 2.3, as this would allow for the benefits of the modified design to be delivered. This option would also allow project objectives to be achieved through improvements in flooding, surface water flow and stormwater management, improved private property access and maintenance accesses for the Project and utility authorities, improved road safety, reduced construction time and reduced environmental impacts.

3. Description of the proposed modification

3.1 The proposed modification

Transport proposes to modify the Project by reconfiguring road alignments, retaining maintenance access tracks, revising bridge arrangements and carrying out associated construction activities including:

- reconfiguring the southern connection interchange arrangement and realigning the northbound exit ramp
- revising the location of the Putty Road roundabout and northbound entry and exit ramps
- realigning the northbound exit ramp and roundabout, and constructing a large detention basin at the Gowrie Gates connection
- reducing the size of the southbound entry and exit loop ramp at the northern connection
- revising bridge arrangements
- revising property access alignments (subject to ongoing design development and consultation and agreement with relevant property owners)
- retaining maintenance access tracks, about 10 metres wide, for the viaduct at the southern end of the bypass connection with New England Highway
- providing associated road furniture, drainage and earthworks, and landscaping.

The proposed modification is shown in Figure 1-2 – Figure 1-7. The proposed modification has not required an update to the Project approval boundary presented in the addendum REF (October 2023).

Key features of the proposed modification are summarised in Table 3-1.

Table 3-1: Key features of the proposed modification

Key feature	Description
Southern connection	• Reconfiguration of the interchange arrangement at the southern end of the bypass connection with New England Highway and the realignment of the northbound exit ramp • Associated road furniture, drainage and earthworks, including landscaping.
Putty Road connection	• Reconfiguration of the interchange including revised location of the Putty Road roundabout and the northbound entry and exit ramps at the Putty Road connection that has shifted further north off Putty Road • Associated road furniture, drainage and earthworks, including landscaping.
Gowrie Gates connection	• Realignment of the New England Highway northbound exit ramp and roundabout which has been shifted off New England Highway • Inclusion of a large detention basin • Associated road furniture, drainage and earthworks, including landscaping.
Northern connection	• Reduced size of the southbound entry and exit loop ramp and new wet basin to be located within this loop ramp.
Revised bridge arrangements	• The bridge over the bypass at the southern connection, the bridge over the Doughboy Hollow floodplain and the bridge over the Rose Point Floodway have been reconfigured from single column with cantilever headstock to portal frame (double columns) • Reducing the total length of bridge over the Doughboy Hollow floodplain and increasing embankment abutments either side • Reconfiguration of the span alignment of the bridge over the Hunter River and the bridge over the bypass at the northern connection • Retaining maintenance access tracks, about 10 metres wide, over the Doughboy Hollow floodplain for permanent maintenance access, including piling pads/ crane pads.
Realigned property accesses	• As a result of design progression, five property accesses are proposed to be relocated and/or consolidated to improve access, functionality and constructability, subject to ongoing design development and consultation and agreement with relevant property owners.

3.2 Design

The design criteria and engineering constraints outlined in Section 3.2 of the project REF (December 2019) remain consistent with the approach that would be undertaken for the proposed modification.

3.2.1 Main features of the modification

Southern connection

The southern connection with the New England Highway at Whittingham as presented in the addendum REF (October 2023) has been reconfigured. The interchange arrangement has been revised to accommodate improved road geometry on the main alignment of the Project. The northbound exit ramp and southbound entry ramp have been lengthened to match a larger mainline curve, improving road safety. The access to properties on Newington Lane has been simplified with a single crossing between the entry and exit ramps replacing a turnaround bay and extra intersection on White Falls Lane.

Associated road furniture, drainage and earthworks, including landscaping would be completed. Extra material would be excavated from adjacent borrow sites to improve drainage and cut to fill haulage operations during construction of the Project. Locally excavating material from borrow sites would minimise impacts on the road network and improve environmental sustainability outcomes by using less fuel. The reconfiguration of the southern connection is shown on Figure 1-2.

Putty Road connection

The design of the Putty Road connection as presented in the addendum REF (October 2023) is proposed to be modified. The Putty Road interchange has been realigned to improve safety, flood performance and maintenance. The northbound exit ramp arrangement is reconfigured to a conventional interchange arrangement for improved road safety, and the northbound entry and southbound exit flood immunity has been increased from 5 years to 10 years. The Putty Road roundabout has been shifted from Putty Road further north away from properties. The Putty Road Lane and shoulder arrangements have also been formalized with edge line marking for road safety and to define the shoulder in the road corridor.

Associated road furniture, drainage and earthworks, including landscaping have been adjusted to accommodate the above changes. Extra material would be excavated from adjacent borrow sites to improve drainage and cut to fill haulage operations during construction of the Project. Locally excavating material would reduce haulage from the north of the Project minimising impacts to the road network and improving environmental sustainability outcomes by using less fuel. The reconfiguration of the Putty Road connection is shown on Figure 1-3 and Figure 1-4. The Singleton Council water pump station and standpipe relocation is consistent with the addendum REF (October 2023).

Gowrie Gates connection

For improved constructability, the Gowrie Gates connection to the New England Highway northbound exit ramp and roundabout has been shifted west from the New England Highway to better tie into Maison Dieu Road.

Associated infrastructure in the vicinity of the Gowrie Gates connection includes:

- A large permanent detention basin between the roundabout connecting to Maison Dieu Road and the main carriageway has been incorporated to improve stormwater management.
- Borrow sites would be established between the bridge over the Hunter River and the bridge over the New England Highway to improve cut to fill haulage operations during construction of the Project to minimise the impact on the road network and improve environmental sustainability outcomes by using less fuel.
- Adjusted road furniture, drainage and earthworks, including landscaping.

The reconfiguration of the Gowrie Gates connection is shown on Figure 1-5 and Figure 1-6.

Northern connection

The southbound entry and exit loop ramps connecting New England Highway with the bypass have been reduced in size to reduce clearing impacts on endangered ecological communities. A new wet basin would be located within this loop ramp, resulting in better project outcomes for drainage.

Associated infrastructure in the vicinity of the northern connection includes:

- Local clearing in the road reserve including the addition of a steel wire rope barrier and table drain connections
- Wider benches for the safe constructability of earthworks
- Adjusted road furniture, drainage and earthworks, including landscaping.

The reconfiguration of the northern connection is shown on Figure 1-7.

Bridge arrangements

The following bridges formed part of the addendum REF (October 2023) design, namely:

- Bridge over the bypass at the southern connection
- Bridge over the Doughboy Hollow floodplain
- Bridge over the Rose Point floodway
- Bridge over the Hunter River
- Bridge over the New England Highway at Gowrie Gates
- Bridge over the bypass at the northern connection

The bridge over the Putty Road northbound entry ramp was removed due to the bridge over the Doughboy Hollow floodplain being extended to the Putty Road connection.

The following revisions to bridge arrangements are proposed as part of the proposed modification:

- The bridge over the bypass at the southern connection, the bridge over the Doughboy Hollow floodplain, and the bridge over the Rose Point floodway would be reconfigured from single column with cantilever headstock to double columns with portal frame
- The bridge over the Doughboy Hollow floodplain would be reduced in length by about 150 metres to improve safety and flood outcomes for Singleton
- The span of the bridge over the Hunter River would be shortened from a bridge with 6 spans, about 204 meters long, to a bridge with 5 spans, about 191 meters long
- The span of the bridge over the bypass at the northern connection would be reconfigured from a two-span bridge, about 58 metres long, to a one-span bridge, about 38 meters long.

Permanent maintenance access tracks (about 10 metres wide) on the northern side of the bridge over the bypass at the southern connection and the southern side of the bridge over the Doughboy Hollow floodplain would also be retained for maintenance access, including piling pads and crane pads located at every second span.

The revised bridge arrangements are shown on Figure 1-2, Figure 1-3 and Figure 1-7.

Property accesses

Property accesses will continue to be developed during the detailed design phase. Up to five property access roads are proposed to be relocated and/ or consolidated for improved access, functionality and constructability. Any proposed changes to property accesses are subject to ongoing design development and further consultation and agreement with relevant property owners.

3.3 Construction activities

3.3.1 Work methodology

The work methodology outlined in Section 3.3.1 of the project REF (December 2019) and addendum REF (October 2023) remains generally consistent with the approach that would be used for the proposed modification. Detailed work methodologies would be determined during construction planning. Indicative work methodologies for the proposed modification are described below.

Southern, Putty Road, Gowrie Gates, and northern connections

Construction of the connections would involve:

- Site establishment works including clearing, grubbing, demolition, establishment of ancillary facilities, fencing and signage
- Earthworks activities to establish the design levels of the connections
- Drainage works including the installation of new drainage lines, temporary sediment basins, sediment fences, earth bunds and protection of any existing stormwater pits
- Road base and pavement construction
- Installation of barriers, signage and line marking
- Landscaping and finishing work.

Bridges

The construction of the new bridge arrangements would be consistent with the methodology for construction of the bridges described in Section 3.3.1 of the project REF (December 2019) and addendum REF (October 2023). An indicative construction methodology is as follows:

- Construction of a temporary access tracks next to the bridge to provide access to the bridge piers and abutments
- Establishment of a crane pad near each pier location to construct pile foundations, piers, and lift and place pre-cast bridge structural components
- To minimise impact on the aquifer, the pile holes would be installed by advancing a temporary or permanent steel casing into the ground as they are drilled. The steel casing prevents the ground from collapsing into the excavation and protects the groundwater from potential contamination
- The steel casing would be advanced into bedrock through the zone of weathering and seal the layers above and below the aquifer
- The steel casing would be backfilled with reinforced concrete to form the bridge foundations and either left in situ permanently or removed
- Bridge piers would be constructed on the foundations by casting reinforced concrete into formwork supported by temporary scaffolding
- Bridge girders and barriers would be lifted into place using cranes.

Property accesses

Construction of the property accesses would involve:

- Site establishment works including clearing, grubbing, demolition, fencing and signage
- Earthworks activities
- Drainage works including the installation of new drainage lines, temporary sediment basins, sediment fences, earth bunds and protection of any existing stormwater pits
- Road base and pavement construction
- Landscaping and finishing work.

3.3.2 Construction hours and duration

Construction would largely be carried out during standard construction hours in accordance with the Interim Construction Noise Guideline (DECC, 2009):

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no work.

Any construction of the proposed modification that would involve impulsive or tonal noise emissions would be limited to the following hours in accordance with the Construction Noise and Vibration Guideline (TfNSW, 2023):

- Monday to Friday: 8am to 5pm
- Saturday: 9am to 1pm
- Sundays and public holidays: no work.

To minimise the disruption to existing traffic movements and disturbance to surrounding landowners and businesses, some construction activities associated with the proposed modification may require works outside of the hours presented above. The following activities are likely to take place outside standard construction working hours:

- Construction activities within the rail corridor, undertaken during rail possessions
- Delivery of construction materials and equipment, such as precast bridge structures
- Intersection and tie-in activities of the bypass to existing roads, such as Putty Road, the southern connection and northern connection
- Construction of the bridge over the New England Highway at Gowrie Gates
- Installation and adjustment of barriers and signage for construction zones during each construction stage
- Operation of construction compounds to support the above work.

Where required, out of hours work (OOHW) will be managed in accordance with the Environment Protection Licence (EPL) and the approved Construction Noise and Vibration Management Plan (CNVMP) prepared in line with the NSW Environment Protection Authority's (EPAs) Interim Construction Noise Guideline and Transport's Construction Noise and Vibration Guideline.

3.3.3 Plant and equipment

The range of plant and equipment used during construction is expected to be consistent with the indicative list presented in Section 3.3.3 of the addendum REF (October 2023). Plant and equipment required for construction would be determined by the construction contractor.

3.3.4 Earthworks

Earthworks activities for the proposed modification include excavation where the design of the Project is lower than the existing ground level, construction of fill embankments where the design of the Project is above the existing ground level (such as approaches for bridges) and potentially boring into the ground for bridge structural supports.

The estimated quantities of materials associated with earthworks are provided in Table 3-2. The difference between the approved project and proposed modification reflects the replacement of bridge with embankment at the Putty Road connection. These quantities are indicative only, where required less material would be excavated from borrow sites to ensure the cut and fill volumes are balanced, to minimise the potential for surplus or deficit of material.

Table 3-2: Indicative earthworks quantities

Area	Approved addendum REF (October 2023)		Proposed modification (this addendum REF)	
	Cut (m^3)	Fill (m^3)	Cut (m^3)	Fill (m^3)
Southern connection to Putty Road	7,300	164,900	50,208	180,632
Putty Road connection to Gowrie Gates	66,750	177,350	123,443	241,338
Gowrie Gates connection to northern connection	546,900	201,900	502,056	140,047
Total	555,800	540,100	675,707	562,017

3.3.5 Source and quantity of materials

The construction of the proposed modification would not require any materials in addition to those listed in Section 3.3.5 of the addendum REF (October 2023). However, it is likely that the proposed modification would alter the estimated quantities of required materials. The proposed modification is not expected to alter the availability of materials for the Project. Imported materials would be sourced from Transport pre-qualified commercial suppliers in nearby areas, wherever possible. The exact quantities of materials required for the Project, including the proposed modification, would be confirmed as detailed design progresses.

Material excavated to the north of Gowrie Gates and from borrow sites would be used as fill material across the Project. The Urban Design and Landscaping Plan will detail how the area will be revegetated and what the new areas will look like.

3.3.6 Traffic management and access

Traffic numbers, management and access during construction would be consistent with the arrangements discussed in Section 3.3.6 of the addendum REF (October 2023). Haulage routes remain unchanged and are shown on Figure 3-4 in Section 3.3.6 of the addendum REF (October 2023). The use of local roads including Ryan Avenue as shown in Figure 3-4 would be subject to continued consultation with Singleton Council.

3.4 Ancillary facilities

Minor changes to ancillary facilities have occurred during development of the Project to facilitate construction. These changes have been previously assessed through a REF consistency review that outlines the changes as being consistent with the approved project.

No additional changes are proposed as part of this modification.

3.5 Public utility and drainage adjustments

The nature of the proposed modification would be consistent with those described in Section 3.5 of the project REF (December 2019) and addendum REF (May 2023), the latter of which included modifications to public utility adjustments since the project REF (December 2019).

The proposed modification would require minor modifications to drainage with all changes within the project approval boundary and considered in this addendum REF. Modifications would predominantly include drainage channels influenced by the proposed modification design changes.

3.6 Property acquisition

No properties in addition to those identified in Section 3.6 of the project REF (December 2019) and addendum REF (May 2023) are proposed to be acquired as a result of the proposed modification.

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 (Infrastructure) of State Environmental Planning Policy (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 proposed modification is for a road and road infrastructure facilities and is to be carried out by Transport, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and 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) 2021
- State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
- 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.

Ongoing consultation, including consultation as required by SEPP (Transport and Infrastructure) (where applicable), is discussed in Section 5 of this addendum REF.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

The Biodiversity Assessment Report (BAR) for the approved project considered State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) for assessment of koala habitat. Since that time SEPP 44 has been replaced by State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) which includes two chapters providing for assessment, conservation, and management of koala habitat in NSW.

Chapter 3 Koala Habitat Protection 2020 of SEPP (Biodiversity and Conservation) applies to rural zoned land in non-metropolitan local government areas while Chapter 4 Koala Habitat Protection 2021 applies to metropolitan local government areas and non-rural zoned land in non-metropolitan land. The koala habitat protection chapters apply to development applications in the Singleton local government area.

Both chapters apply to different areas of land within and surrounding the proposed modification. The BAR carried out for the addendum REF (May 2023) assessed the potential for Koala habitat in accordance with the Biodiversity and Conservation SEPP. Overall, it was assessed that given the absence of historical and recent records and no evidence of Koalas being recorded during the assessment undertaken for the approved project, there is a low likelihood that a resident population of the Koala occurs within the Project area. No further assessment was required as part of the addendum REF (October 2023).

No further assessment was required as part of this proposed modification.

4.1.2 Local Environmental Plans

The proposed modification is located within the Singleton LGA. At the time of the approval of the Project, there were two local environmental planning instruments that applied to the Singleton LGA. These were the:

- Singleton Local Environmental Plan 1996 (Singleton LEP 1996)

- Singleton Local Environmental Plan 2013 (Singleton LEP 2013).

In December 2023, the Singleton LEP 2013 was amended to include the sites identified as deferred matters and the Singleton LEP 1996 was repealed. No elements of the proposed modification would be on land that was identified as a deferred matter in the Singleton LEP 2013.

Clause 5.10 of the Singleton LEP 2013 provides for the protection of heritage items within the Singleton LGA. The project REF (December 2019) identified four heritage items within the project area that are listed on the Singleton LEP 2013. The addendum REF (October 2023) completed an assessment to identify the potential impact of three of these items being the "Former Pumping Station", "Bebeah" and the "Woolpack Inn" as being located within the project approval boundary.

As outlined in Section 4.1.1, Section 2.109(1) of SEPP (Transport and Infrastructure) overrides the requirement for development consent from Singleton Council and therefore the consent requirements of the Singleton LEP 2013 do not apply.

Nevertheless, consideration of the objectives of the land use zones prescribed by the Singleton LEP 2013 that are relevant to the proposed modification are discussed below.

RU1 Primary Production

The proposed modification would primarily be located on land zoned RU1 Primary Production. The objectives of this zone under the Singleton LEP 2013 are to encourage diverse and sustainable primary industry production, to minimise the fragmentation of resource lands and to minimise conflict between land uses.

The proposed modification has been developed to minimise the fragmentation of resources land and would not involve adjustments to property acquisitions presented in the project REF (December 2019) and addendum REF (May 2023).

SP2 Infrastructure

The objectives of this zone under the Singleton LEP 2013 are to provide for infrastructure and related land uses and to prevent development that is not compatible with infrastructure.

The proposed modification would meet the objectives of this zone.

4.2 Other relevant NSW legislation

4.2.1 Roads Act 1993

Under section 143 of the *Roads Act 1993* (Roads Act), a roads authority can use a public road in the exercise of a function conferred by the Roads Act, so long as the function is exercised in a way that will not unduly interfere with the rights of passage and access that exist with respect to the public road.

As outlined in Section 6.2, there would be additional short-term impacts to traffic movements as a result of the proposed modification, however, safe access would be maintained throughout the construction period. Therefore, the proposed modification would not change the applicability of the Roads Act.

4.2.2 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community consistent with the principles of ecologically sustainable development.

An assessment of the potential impacts to biodiversity and measures to manage potential impacts are discussed in Section 6.5. The assessment found that the proposed modification is unlikely to have a significant impact on any threatened species or communities under the BC Act and therefore a Species Impact Statement (SIS) or a Biodiversity Development Assessment Report (BDAR) is not required for the proposal.

As outlined in Section 6.5.2, biodiversity impacts would be consistent with the project REF (December 2019) and addendum REF (May 2023).

4.2.3 Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) covers all biosecurity risks, including pest animals, plant diseases and noxious weeds and introduces the legally enforceable concept of a General Biosecurity Duty.

As outlined in Section 6.1 of the project REF (December 2019), a number of weed species have been identified in the proposed modification area. Consistent with the project REF (December 2019), management measures will be included as part of the CEMP to manage these weed species in accordance with the requirements of the Biosecurity Act.

4.2.4 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) provides for the protection of threatened fish and marine vegetation and for the management of associated threatening processes. Part 7A Division 4 of the FM Act prohibits, without a licence or permit, activities that damage habitats or harm threatened species, populations or ecological communities.

The proposed modification would not result in any changes to the previous requirements, which noted that notification of the proposed work to the Department of Primary Industries – Fisheries (DPI – Fisheries) is required, as well as a permit to obstruct fish passage should any in stream structures be required to obstruct the full width of the Hunter River (refer to Section 4.2.4 of the project REF (December 2019)).

Consultation regarding the project has already been carried out with the DPI – Fisheries as part of the project REF (refer to Section 5.5 of the project REF (December 2019)) and will be ongoing throughout construction delivery

4.2.5 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the management of surface water and groundwater in NSW.

The proposed modification may require the extraction and use of water from the Hunter River for dust suppression and other construction activities. Water extraction and use will require applicable approvals from the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) as per the NSW Water Management (General) Regulation 2018.

The proposed modification is within the Singleton declared floodplain under the Hunter Valley Flood Mitigation Scheme. A section 256 application is required for the proposed modification under the WM Act.

4.2.6 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) governs the establishment, preservation and management of national parks, state reserves, historic sites and certain other areas, and the protection of certain fauna, native plants and Aboriginal heritage.

The proposed modification is located wholly within the Aboriginal Heritage Impact Permit (AHIP) 4985 variation area presented in the addendum REF (October 2023). No further adjustment to the AHIP area is required for the proposed modification. An assessment of the potential impacts to Aboriginal heritage and measures to manage potential impacts are discussed in Section 6.5.

4.2.7 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to protect and conserve non-Aboriginal cultural heritage, including scheduled heritage items, sites and relics.

The proposed modification would not increase the impact to the heritage items identified in the project REF (December 2019). An assessment of potential impacts on non-Aboriginal heritage items is provided in Section 6.5 of this report.

The proposed modification would also not result in any changes to the previous requirement that prior to ground disturbance impacts at the Former Pumping Station (I21), a permit under Section 140 of the Heritage Act would be obtained where the potential for archaeological relics at this location exists.

4.2.8 Contaminated Lands Management Act 1997

The *Contaminated Lands Management Act 1997* (CLM Act) establishes a process for investigating and remediating land where required.

A Phase 1 Preliminary Site Investigation was carried out to inform the project REF (December 2019) and is summarised in Section 6.5 of the project REF (December 2019). A further Detailed Site Investigation was undertaken in January 2023. The proposed modification requires additional earthworks activities as part of the borrow sites. These sites are unlikely to alter the likelihood of encountering contaminated soil or groundwater from that described in the project REF (December 2019) and will be managed in accordance with the CEMP and associated unexpected finds protocols.

4.2.9 Protection of the Environment Operations Act 1997

The *NSW Protection of the Environment Operations Act 1997* (POEO Act) aims to protect, restore and enhance the environments of NSW and reduce potential risks to human health and the environment.

The proposed modification would not result in any changes to the previous requirements, which noted that an Environmental Protection Licence is required under Schedule 1, Clause 35 of the POEO Act.

4.2.10 Land Acquisition (Just Terms Compensation) Act 1991

The *Land Acquisition (Just Terms Compensation) Act 1991* (Land Acquisition Act) applies to the acquisition of land (by agreement or compulsory process) by a public authority authorised to acquire the land by compulsory process. It provides a guarantee that, when a public authority requires the acquisition of land, the amount of compensation will not be less than the market value of the land.

The Land Acquisition Act would apply to the acquisition of any land required for the project. There are no changes to property acquisition as a result of the proposed modification.

4.2.11 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALR Act) provides for the land rights for Aboriginal persons and for representative Aboriginal Land Councils in New South Wales.

The proposed modification would not change the applicability of the ALR Act.

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 A and Section 6 of the addendum REF (May 2023).

A referral is not required for proposed road actions 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 Section 6.1 of the addendum REF (May 2023) and Appendix A. The proposed modification is not expected to change impacts identified in the project REF (December 2019) and previous addendums (May 2023 and October 2023).

Findings – matters of national environmental significance (other than biodiversity matters)

The assessment of the proposed modification's impact on matters of national environmental significance and the environment of Commonwealth land found that there would be no change to the findings of the determined activity and would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of Climate Change, Energy, the Environment and Water is not required.

The assessment undertaken for the project REF (December 2019) found that there is likely to be a significant impact on the Central Hunter Valley eucalypt forest and woodland community, listed as critically endangered under the EPBC Act. The proposed modification does not change this outcome, nor does it have any other additional impact to nationally listed threatened species, endangered ecological communities (EEC), or migratory species.

4.3.2 Other relevant Commonwealth legislation

Native Title Act 1993

The *Native Title Act 1993* provides for the recognition and protection of native title for Aboriginal and Torres Strait Islander peoples.

Searches of the National Native Title Register, Register of Native Title Claims and Register of Indigenous Land Use Agreements were undertaken on 10 July 2024 for the Singleton LGA. These searches returned no registered native title claims, determinations, or Indigenous land use agreements. However, a recently filed native title claim NSD58/2022 (Application name: Scott Franks & Anor on behalf of the Plains Clans of the Wonnarua People and Attorney General of NSW (Plains Clans of the Wonnarua People)) applied to land within the proposed modification area. On 11 April 2022 NSD58/2022 was not accepted, and the application status was discontinued.

Aboriginal community consultation was undertaken for the Project. Consultation has followed Heritage NSW's Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010) and the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Transport, 2011). This involved consultation with 37 Registered Aboriginal Parties (RAPs), including Plains Clans of the Wonnarua People.

Ongoing consultation with the Aboriginal community would continue to occur throughout any further investigations for the Project as necessary.

4.4 Confirmation of statutory position

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

Transport is the determining authority for the proposed modification. This addendum REF fulfills Transport's obligation under clause 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

5.1 Consultation strategy

Transport has endeavored to keep the community and stakeholders informed and proactively consulted throughout the development, and proposed modification, of the Project. Consultation has been carried out in accordance with the Community and Stakeholder Engagement Plan prepared for the proposal. The purpose of consultation is:

- To keep community informed and increase understanding of the Project
- To gain local knowledge and consider comments and issues relating to the Project
- To ensure stakeholders potentially impacted by the Project are provided clear information
- To provide clear and timely information and advise the community on how they may obtain information and communicate concerns, complaints and suggestions.

5.1.1 Community consultation

The project REF (December 2019) was publicly displayed for comment from Monday 16 December 2019 and Sunday 1 March 2020. During which time, members of the community, government agencies and regulatory authorities provided a total of 154 submissions regarding the Project. A submissions report was prepared documenting the outcomes of this process, all submissions made during the display period have been addressed and responded to in the report that was published 7 August 2020.

The key issue raised in community submissions related to the proposal not being a dual carriageway. A response was provided to this in Section 2.2.1 of the submissions report.

The provision of a full interchange at Putty Road (with additional ramps) introduced as part of the addendum REF (October 2023) provides greater access to Singleton town centre and would address the concerns raised through Submission Report. The proposed modification remains consistent in delivering a full interchange at Putty Road and the outcomes raised as part of the submissions report.

5.1.2 Aboriginal community consultation

Aboriginal community consultation has been carried out in accordance with the requirements of Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010) and Transport's Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI), which is a staged process for investigating potential impacts to Aboriginal cultural heritage as a result of Transport's road planning, development, construction and maintenance activities. The four stages of the PACHCI are summarised in Section 5.3 of the project REF (December 2019).

Ongoing project consultation has included meetings (online and face to face), phone calls, general project updates, as well as direct communications between ACCIONA, Transport and Registered Aboriginal Parties.

Consultation with Registered Aboriginal Parties has continued throughout the investigation and salvage activities under the projects Aboriginal Heritage Impact Permit (AHIP) 4985. Transport will continue to consult with Registered Aboriginal Parties to determine the long term management arrangements for salvaged Aboriginal objects in accordance with the requirements of AHIP 4985. Aboriginal community consultation has and will continue throughout the detail design process to help guide the urban design outcomes of the project.

5.1.3 Landowners

Affected landowners have been consulted with throughout each phase of the Project. Any proposed changes to property accesses are subject to ongoing design development and further consultation and agreement with relevant property owners.

Those who are likely to be affected as a result of the proposed modification have been consulted with regards to changes to potential impacts on their property and will continue to be consulted in accordance with the Community and Stakeholder Engagement Plan.

No new properties to those identified in the project REF (December 2019) were identified for acquisition as a result of the proposed modification. Transport will continue to consult with all directly affected land-holders.

5.1.4 SEPP (Transport and Infrastructure) consultation

Ongoing consultation regarding the proposed modification has occurred with Singleton council and the NSW State Emergency Services (NSW SES) as per the requirements of SEPP (Transport and Infrastructure). Appendix B contains a consultation checklist that documents how SEPP (Transport and Infrastructure) consultation requirements have been identified. Transport has consulted with other relevant authorities throughout the development of the proposed modification.

Transport met with Singleton Council on 14 August 2024 as part of the ongoing consultation requirements of section 2.10, 2.11 and 2.12 of SEPP (Transport and Infrastructure) for impacting council infrastructure, developing near local heritage items and development on flood liable land. Singleton Council raised no objection to the proposed modification during this meeting.

The proposed modification continues to align with the response to issues raised as part of the previous SEPP (Transport and Infrastructure) consultation outlined in the addendum REF (October 2023). Existing flood conditions on the New England Highway at Doughboy Hollow is acknowledged, although it is noted that this section of the New England Highway is located beyond the scope of work for delivery of the Singleton bypass. The design of the Singleton bypass has been undertaken to minimise flood impacts associated with the Hunter River floodplain, including potential flood impacts to flow paths along Doughboy Hollow.'

The main carriageway of the bypass is still designed to be operational in a 1 in 100-year event (one per cent Annual Exceedance Probability (AEP)). The southern entry ramps are designed to be open to traffic up to and withstanding a 1 in 20-year event (five per cent AEP). The modification of the Putty Road interchange has considered floodwater flow paths of Doughboy Hollow to minimise obstructions where practical.

The NSW SES was consulted as part of the Singleton Local Emergency Management Committee meeting held on 15 August 2024 as per the requirement of section 2.13 for development on flood liable land. The proposed modification, overview of the flood modelling and changes to flood behaviour were discussed with no objections raised by the Local Emergency Management Committee (LEMC).

5.1.5 Ongoing or future consultation

The community and stakeholders would be informed about this addendum REF and the proposed modification with the addendum REF made available on the Transport project website.

Transport would continue to inform and consult with the community and relevant stakeholders during property acquisition processes and construction of the project.

Transport is continuing to liaise with key stakeholders including but not limited to landowners, Aboriginal groups, Emergency Services and Singleton Council.

6. Environmental assessment

This section of the addendum REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposed modification of the Project. All aspects of the environment potentially impacted upon by the proposed modification are considered. This includes consideration of the guidelines Roads and Related Facilities EIS Guideline (DUAP, 1996) and Is an EIS required? (DUAP, 1999) the factors specified in section 171 of the Environmental Planning and Assessment Regulation 2021. The factors specified in section 171(2) 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. A consolidated summary of these safeguards and measures is provided in Section 7.2.

6.1 Surface water, hydrology, and flooding

6.1.1 Methodology

A surface water, hydrology and flooding assessment was carried out for the project REF (December 2019) and addendum REF (October 2023) which documented potential impacts and proposed mitigation measures to minimise the impact of the Project.

The proposed modification includes changes to the Project that would affect surface water flows and in particular flood behaviour. To identify the potential impact the proposed modification would have on surface water movements, an updated flood impact assessment was carried out.

The flood impact assessment prepared by Aurecon in 2024 for the proposed modification is presented in Appendix C. The flood impact assessment considered mainstream flooding of the Hunter River and local catchment runoff from Doughboy Hollow floodplain. The flood impact assessment adopted the following methodology:

- Review the flood model developed as part of the addendum REF (October 2023) based on the Singleton Floodplain Risk Management Study and Plan (FRMSP)
- Undertake an assessment of the impact of the proposed modification design on flooding.

6.1.2 Existing environment

The existing surface water, hydrology and flooding environment relevant to the proposed modification is consistent with the description in Section 6.1 of the addendum REF (October 2023). Extra information relating to the study area and existing flooding conditions as presented in the flood impact assessment for the proposed modification are described below.

Study area

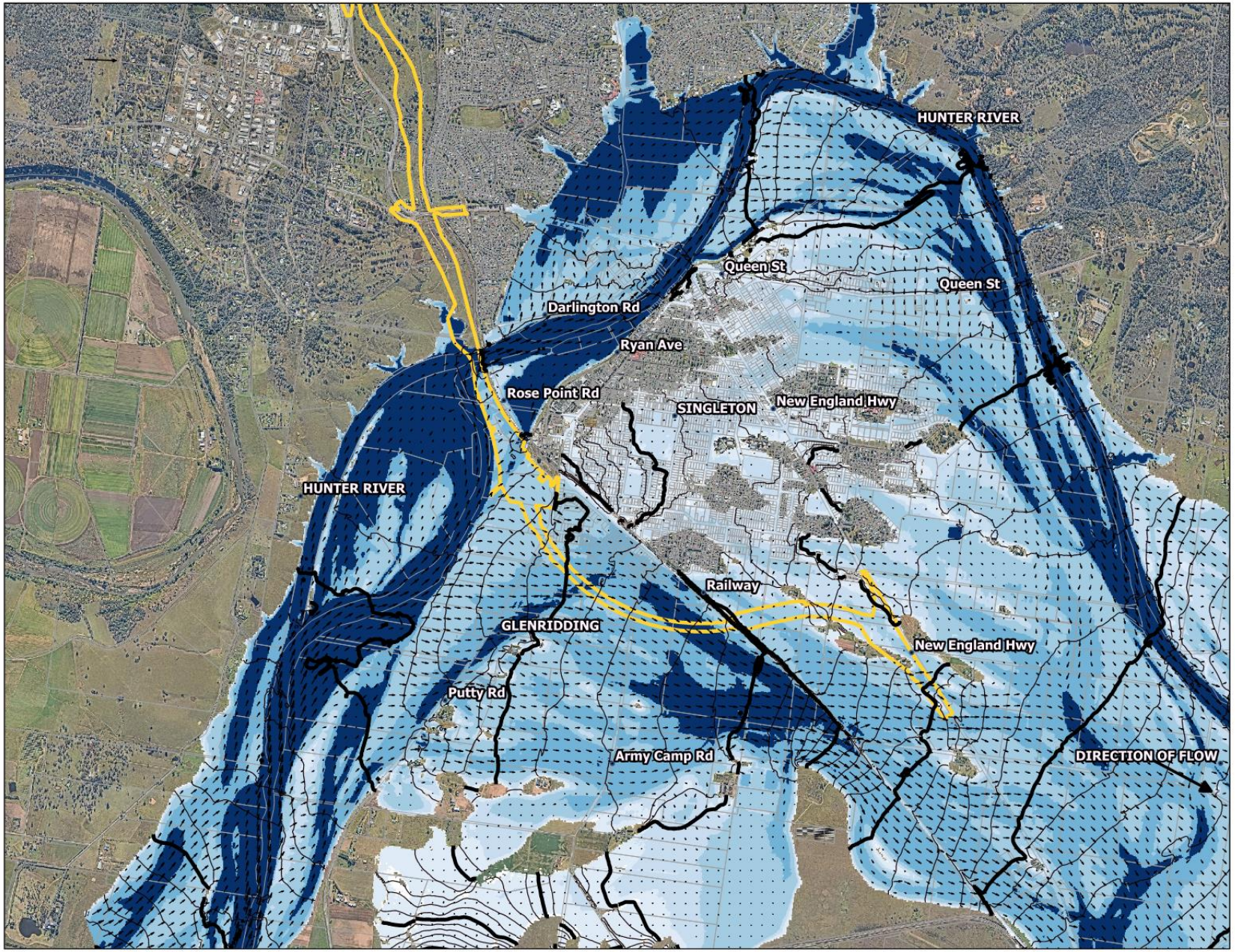
The study area for the flood impact assessment encompasses the town of Singleton and the floodplain of the Hunter River, extending from Hambledon Hill in the west to Lower Belford and Glendon in the east. The floodplain itself is bounded by steep terrain to the north and the Golden Highway to the south.

Noteworthy geographical features and structures within the study area include the New England Highway and the Main North Railway Line, both of which traverse the Hunter River and Doughboy Hollow floodplains from Whittingham to Singleton. The existing levee system on the north-western side of the Singleton township, which intersects with the embankment of the Main North Railway Line at Glenridding, also impacts flood dynamics in the vicinity. Additionally, Doughboy Hollow is an area of natural prominence that becomes active during floods of the 10 per cent AEP event or greater. Several flow constrictions can be identified, including major bridge crossings provided along the Main North Railway Line, the New England Highway, Dunolly Road, and Queen Street. Many other drainage and flow control structures have been implemented beneath the Main North Railway Line and the New England Highway to facilitate the conveyance of flood flows across the Doughboy Hollow floodplain during significant flood events.

Existing design flood conditions

The existing flood conditions for the study area for a range of design flood events are presented in Appendix A of the flood impact assessment report (attached as Appendix C to this addendum REF). These form the baseline or existing flood conditions against which the proposed modification is assessed. The peak flood levels and depths associated with the one per cent AEP event under existing conditions is presented in Figure 6-1.

Peak flood depths in the Hunter River reach up to 15 metres in a one per cent AEP flood event. Across the Doughboy Hollow floodplain one per cent AEP flood depths are typically between 2 metres to 4 metres. Peak flood velocities of between 2 metres per second (m/s) and 4 m/s are typical in the Hunter River. This reduces to between 0.5 m/s and 1.5 m/s across the Doughboy Hollow floodplain.



acciona aurecon NSW GOVERNMENT

Legend

- Project Approval Boundary
- Property Boundary
- Major WSL Contours in m AHD (1m)
- Minor WSL Contours in m AHD (0.2m)

Existing 1%AEP Depth Grid (m)

- 0.05 - 0.10
- 0.10 -0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- > 3

Peak Velocity (m/s)

- 0.5
- 1.0
- 2.0
- 3.0

Notes:

Existing Run 122 EXG,
Design Run 134a DES

0 1,000 2,000 m

A3 Scale: 1:25,000

2/8/2024 GDA 94 MGA 56

Singleton Bypass Addendum REF

Figure 6-1: Singleton water surface levels and flood depths - one percent AEP event under existing conditions (Aurecon: 2024a)

Existing design flood constraints

The banks of the Hunter River channel, at Singleton, are elevated above the adjacent Doughboy Hollow floodplain. The natural flow path of major flood flows, which overtop the riverbanks, is away from the main Hunter River channel and across the Glenridding and Doughboy Hollow floodplains. The Main North railway line and New England Highway bisect this natural flow path across the floodplains. To protect against flooding, a flood levee was constructed along the riverbank in Singleton, initially in 1963, with subsequent extensions completed in 1982-1983 and again in 1987. The purpose of this levee is to withstand flood events similar to the historic 1955 event, and it effectively prevents overtopping by floods up to and including the one per cent AEP event.

However, according to the findings from the REF flood modelling analysis, the Main North railway line is susceptible to overtopping during the one per cent AEP flood event near John Street South and the railway station area. Furthermore, high tailwaters within the downstream reaches of the Hunter River, north of Singleton, back up into Singleton around Queen Street. The combined impact of these flood mechanisms results in extensive inundation of residential properties within Singleton. The modelling results also indicate a considerable damming effect caused by the railway embankment and a small ridge next to the Wastewater Treatment Works, leading to deeper flooding within the Doughboy Hollow floodplain.

In terms of flood protection, the New England Highway currently provides a limited level of immunity against floods. This ranges somewhere between the 20 per cent AEP and 10 per cent AEP.

Figure 6-2 presents an overview of the existing flood behaviour, visually displaying the spatial distribution of flood flows. The figure delineates the two primary flow path alignments within the region:

- The Hunter River channel and adjacent Hunter River floodplain, which wind around the northern side of Singleton
- The Doughboy Hollow floodplain, which diverges from the Hunter River at Glenridding, flows along the southern side of Singleton, and eventually merges with the Hunter River floodplain near Whittingham.

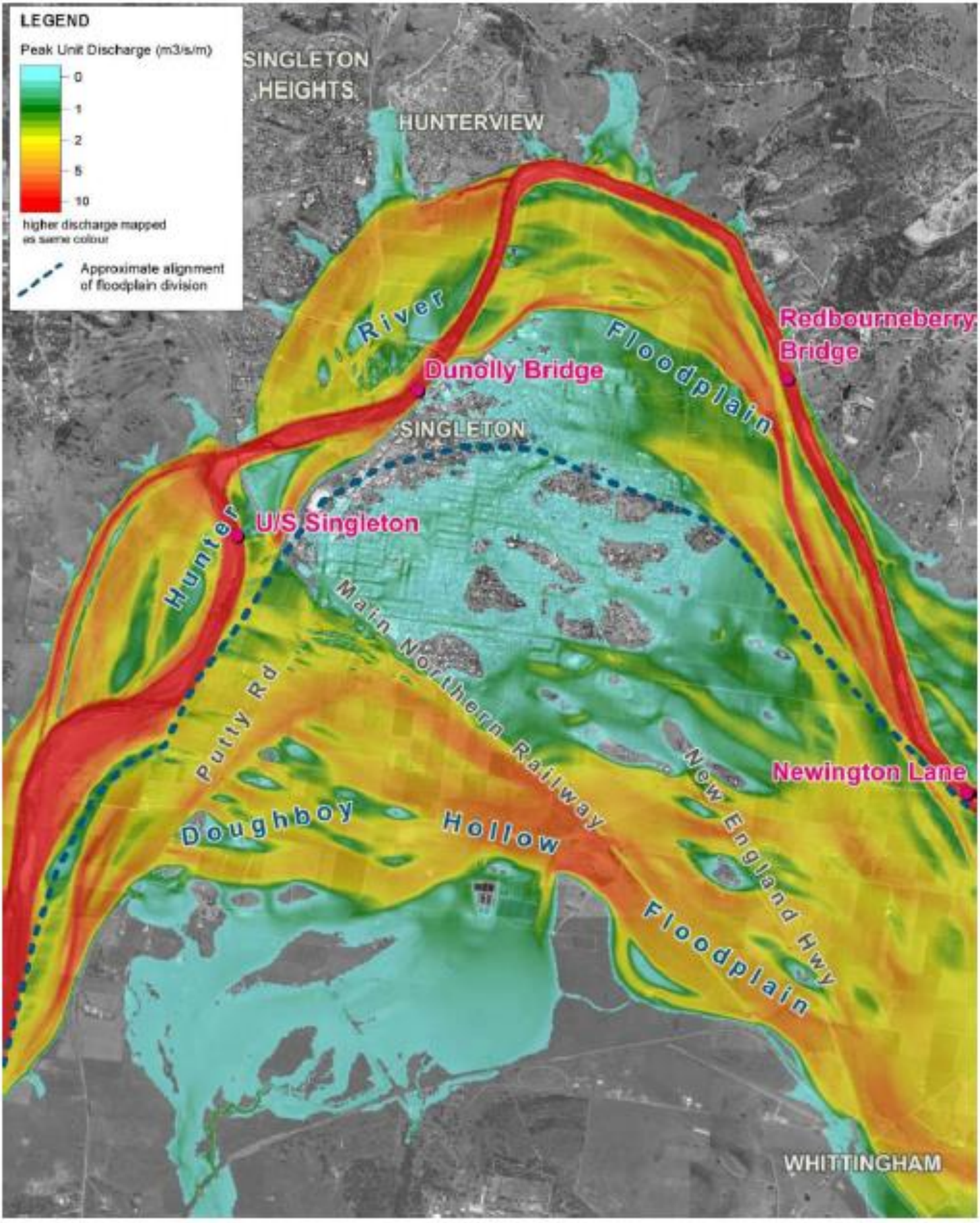


Figure 6-2: Singleton existing one per cent AEP Flood Flow Distribution (WBM, 2022)

6.1.3 Potential impacts

Construction

Surface Water Quality

Construction of the proposed modification is not expected to alter the potential impacts to water quality identified in Section 6.2 of the addendum AREF (October 2023).

Flooding

Temporary works associated with construction of the proposed modification is not expected to alter the potential impacts to flooding identified in Section 6.2 of the project REF (December 2019).

Water extraction and use – Hunter River

As indicated in the addendum REF (October 2023), the proposed modification may require the extraction and use of water from the Hunter River for dust suppression and other construction activities. Water extraction and use will require applicable approvals from the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) as per the NSW *Water Management Act 2000* and NSW Water Management (General) Regulation 2018.

Water extraction must not impact basic land-holder rights (stock and domestic) and must adhere to any water restrictions as per the Water Sharing Plan for the Hunter Regulated River Water Source 2016 or other restrictions as imposed for the water source.

Operation

Surface water quality

Potential risks to surface water quality during the operation of the proposed modification would be consistent with those identified in the addendum REF (October 2023). The design of the Project would still include containment basins to capture runoff prior to it entering the Hunter River.

Minor modifications to drainage are required as a result of the proposed modification. These changes ensure the water quality remains consistent with that of the existing drainage arrangements and are not considered likely to impact on surface water quality.

Flooding

Key design elements, implemented to aid flood impact mitigation, include a total of four bridge structures spanning across the Hunter River and Doughboy Hollow floodplain. These structures are designed to reduce any obstruction the Project might otherwise cause to the flows across the Hunter River and Doughboy Hollow floodplain. The final flood impact mitigation structures, adopted for the detailed design modification, are outlined below. The same structures were included in the addendum REF (October 2023). The proposed modifications are primarily limited to design refinement of the lengths of the bridge over the Doughboy Hollow floodplain, the bridge over Rose Point floodway and the bridge over the Hunter River. The length of the bridge over the bypass at the southern connection remains unchanged from the addendum REF (October 2023). The flood impact mitigation structures include the following:

- A 600 metre bridge (viaduct) over the bypass at the southern connection
- A 1,636 metre bridge (viaduct) over Doughboy Hollow floodplain
- A 98 metre bridge over Rose Point floodway
- A 190 metre bridge over the Hunter River.

The proposed modification includes the realignment of the Putty Road interchange to improve safety, flood immunity and maintenance. The Putty Road northbound exit ramp arrangement is also shortened and reconfigured to a conventional interchange arrangement for improved road safety, and the northbound entry and southbound exit flood immunity has been increased from 20 per cent AEP to 10 per cent AEP.

Throughout design development, a key consideration has been the minimisation of flooding impacts. Together, these impact mitigation structures (for the bridges spanning across the Hunter River and Doughboy Hollow floodplain) are designed to reduce any obstruction the Project might otherwise cause to the flows across the Hunter River and Doughboy Hollow floodplains.

Even with the proposed bridges, there remains a residual increase in flood levels at rural properties within the Hunter River and Doughboy Hollow floodplains, upstream of Singleton. The increases in flood levels compared to existing conditions, for flood events from the 10 per cent AEP up to the one per cent AEP, range from 0.03 metres to 0.09 metres within the Hunter River,

0.04 metres to 0.06 metres across Doughboy Hollow floodplain, and localised increases of up to 0.15 metres at properties immediately upstream of the Putty Road connection. At the same time, a reduction in flood levels of about -0.06 metres, compared to existing conditions, is achieved in the one per cent AEP across large portions of the town of Singleton. The increases in flood levels are primarily associated with the proposed Putty Road connection.

Figure 6-3 shows the modelled one per cent AEP event water surface levels and flood depths for the proposed modification.

The flood impact assessment of the proposed modification is summarised below.

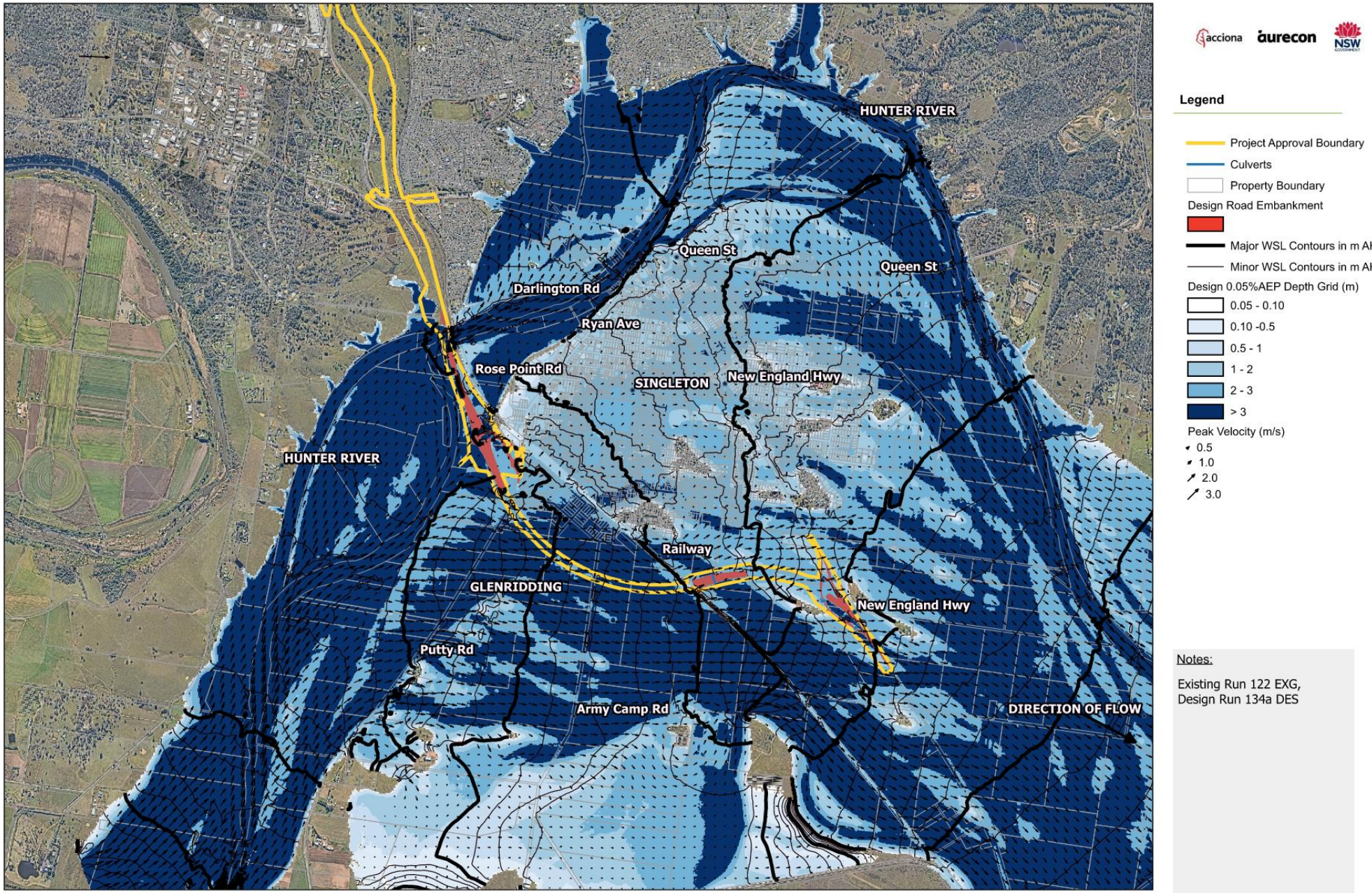


Figure 6-3: Proposed modification - one percent AEP event water surface levels and flood depths (Aurecon: 2024a)

Changes in peak flood level

Flood impact mapping was undertaken for a range of flood magnitudes addressing the relative change in peak flood level from existing conditions to the modelled design including the proposed modification.

Changes to peak flood level between the addendum REF and the proposed modification, and between the REF and the proposed modification, are summarised in Table 6-1.

Table 6-1: Changes in peak flood level

Flood event	Summary of changes resulting from the proposed modification compared to the approved project (as presented in the addendum REF (October 2023))	Summary of changes resulting from the proposed modification compared to the project REF (December 2019)
20% AEP	No change	No change
10% AEP	The proposed modification results in some increases in peak flood levels in lower-lying parts of Doughboy Hollow floodplain. These increases are primarily associated with the proposed Putty Road connection as it partially obstructs the Hunter River flows leading to a slight redistribution of flood water and impacting flood levels. The impacts occur to existing flow paths and the increases in peak flood levels are generally in the range of 0.01 metres across both the Hunter River and Doughboy Hollow floodplain. Localised differences in peak flood levels are identified immediately upstream of the Putty Road connection, with increases in peak flood levels of up to 0.04 metres as a result of the modification.	The proposed modification results in increases in peak flood levels of 0.02 metres in the Hunter River and 0.03 metres in lower-lying parts of Doughboy Hollow floodplain. These increases are primarily associated with the proposed Putty Road connection. Localised differences in peak flood levels are identified immediately upstream of the Putty Road connection, with increases in peak flood levels of up to 0.06 metres as a result of the modification.
5% AEP	The proposed modification results in increases in peak flood levels of about 0.01 metres within the Hunter River upstream (west) of the proposed Singleton bypass. Peak flood level increases of up to 0.04 metres also occur within the Doughboy Hollow floodplain. Localised increases in peak flood levels of up to 0.15 metres occur immediately upstream of the Putty Road connection as a result of the proposed modification. However, consistent with the approved project, dwellings at these locations are affected by deep flood waters and would not be significantly more impacted by the increases in flood levels associated with the proposed modification.	The proposed modification results in increases in peak flood levels of about 0.02 metres within the Hunter River upstream (west) of the proposed Singleton bypass. Peak flood level increases of up to 0.05 metres also occur within the Doughboy Hollow floodplain. Localised increases in peak flood levels of up to 0.08 metres occur immediately upstream of the Putty Road connection as a result of the proposed modification.
2% AEP	Peak flood level increases in the Hunter River of more than 0.02 metres extend further upstream as a result of the proposed modification. The proposed modification generally increases peak flood levels within this area by 0.02 metres compared with the approved project. Within the Doughboy Hollow floodplain, there are increases ranging from 0.02 metres to 0.03 metres. There is a reduction in peak flood level to multiple properties south and south-east of the Putty Road connection. These decreases are up to -0.08 metres at residential	Peak flood level increases in the Hunter River of more than 0.02 metres extend further upstream as a result of the proposed modification. The proposed modification generally increases peak flood levels within this area by 0.03 metres compared with the project REF. Within the Doughboy Hollow floodplain, there are increases ranging from 0.02 metres to 0.03 metres. There is a reduction in peak flood level to multiple properties south and south-east of the Putty Road connection. These decreases are up to -0.07 metres (when compared to existing conditions) at residential properties in Glenridding and are associated with the redistribution

Flood event	Summary of changes resulting from the proposed modification compared to the approved project (as presented in the addendum REF (October 2023))	Summary of changes resulting from the proposed modification compared to the project REF (December 2019)
	properties in Glenridding (when compared to existing conditions) and are associated with the redistribution of flow due to the Putty Road connection and the northern abutment of the bridge over the Doughboy Hollow floodplain. At the southern connection, there are increases in the range of 0.03 metres to 0.06 metres. The impacts are limited to rural properties. Impacts at existing residential dwellings do not result in new above floor flooding.	of flow due to the Putty Road connection and the northern abutment of the bridge over the Doughboy Hollow floodplain. At the southern connection, there are increases in the range of 0.04 metres to 0.06 metres. The impacts are limited to rural properties.
1% AEP	This event shows the largest change resulting from the proposed modification when compared to the approved project. This is illustrated in Figure 6-5 and Figure 6-6. At the one per cent AEP event the flood impacts near the Putty Road connection and the southern connection generally increase in extent and magnitude. Much of the land local to the connections has been acquired by Transport for the construction and operation of the Singleton bypass. Therefore, depending on the extent of land acquisition, the largest localised impact may not result in any adverse effects to private property. On the Hunter River upstream of the Singleton bypass, the increase in peak water level is typically 0.03 metres compared to the approved project. Localised increases of between 0.08 metres and 0.25 metres occur immediately upstream of the Putty Road connection. Increases of up to 0.02 metres are observed across the Doughboy Hollow floodplain. The impacts are limited to rural properties. Impacts at existing residential dwellings do not result in new above floor flooding. There is an overall reduction in peak flood level to urban areas of Singleton due to the proposed modification. The magnitude of the reduction has increased to -0.05 metres compared with -0.02 metres for the approved project.	The change resulting from the proposed modification, when compared to the project REF, is illustrated in Figure 6-4 and Figure 6-6. At the one per cent AEP event the flood impacts near the Putty Road connection and the southern connection generally increase in extent and magnitude. On the Hunter River upstream of the Singleton bypass, the increase in peak water level is typically 0.04 metres. Localised increases of up to 0.08 metres occur immediately upstream of Putty Road connection. Increases of up to 0.02 metres are observed across the Doughboy Hollow floodplain. There would be an overall reduction in peak flood level to urban areas of Singleton due to the proposed modification. The magnitude of the reduction has increased to -0.05 metres compared with -0.03 metres for the project REF. At the southern connection, there are increases of up to 0.15 metres. This increase is primarily due to the inclusion of the bridge over the bypass at the southern connection, compared with an embankment in the project REF. This now allows flow through to this area of the southern connection. The impacts are limited to rural properties. Impacts at existing residential dwellings do not result in new above floor flooding.

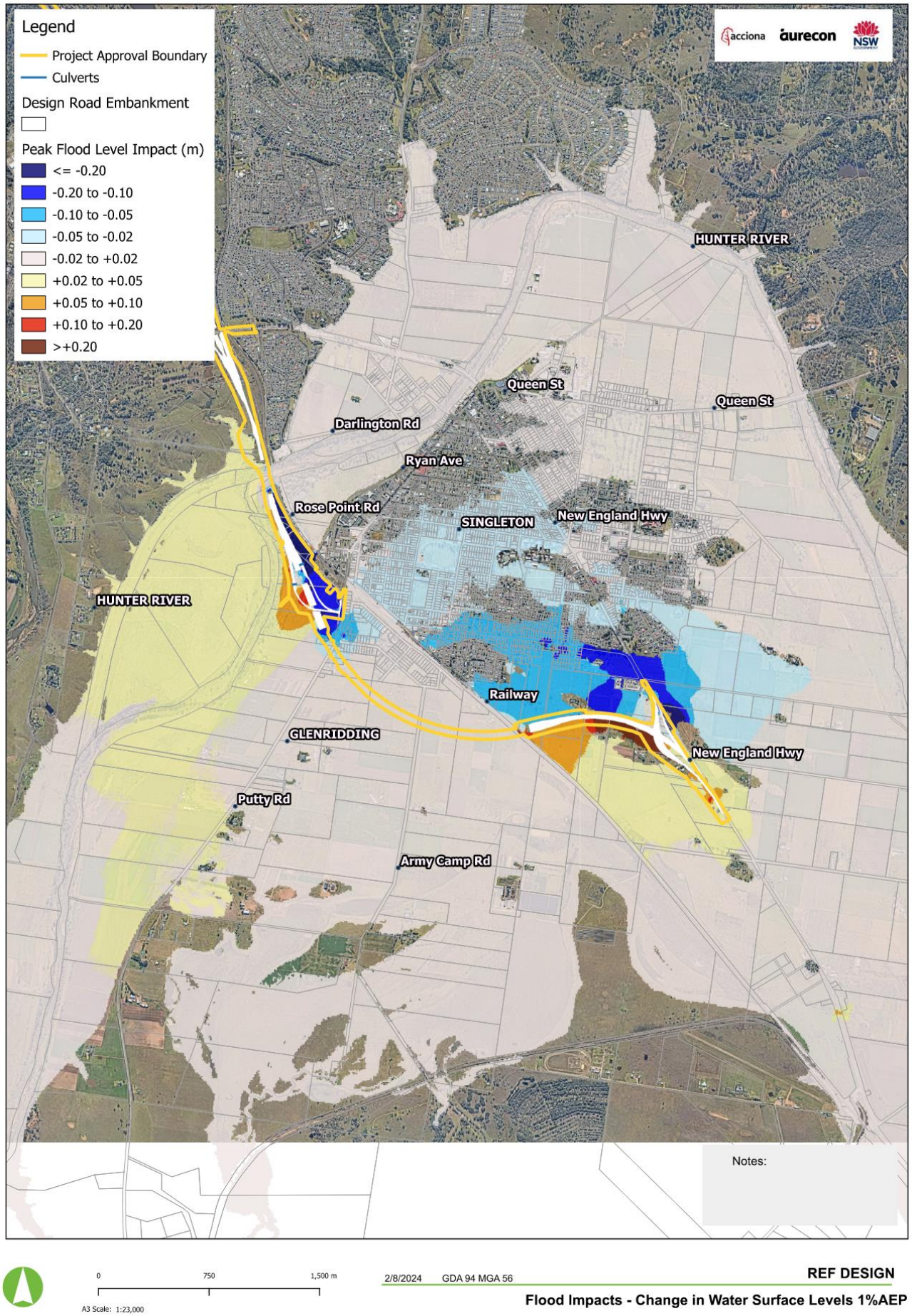


Figure 6-4: Project REF (December 2019) design – one per cent AEP peak flood level impact (Source: BMT, 2019)

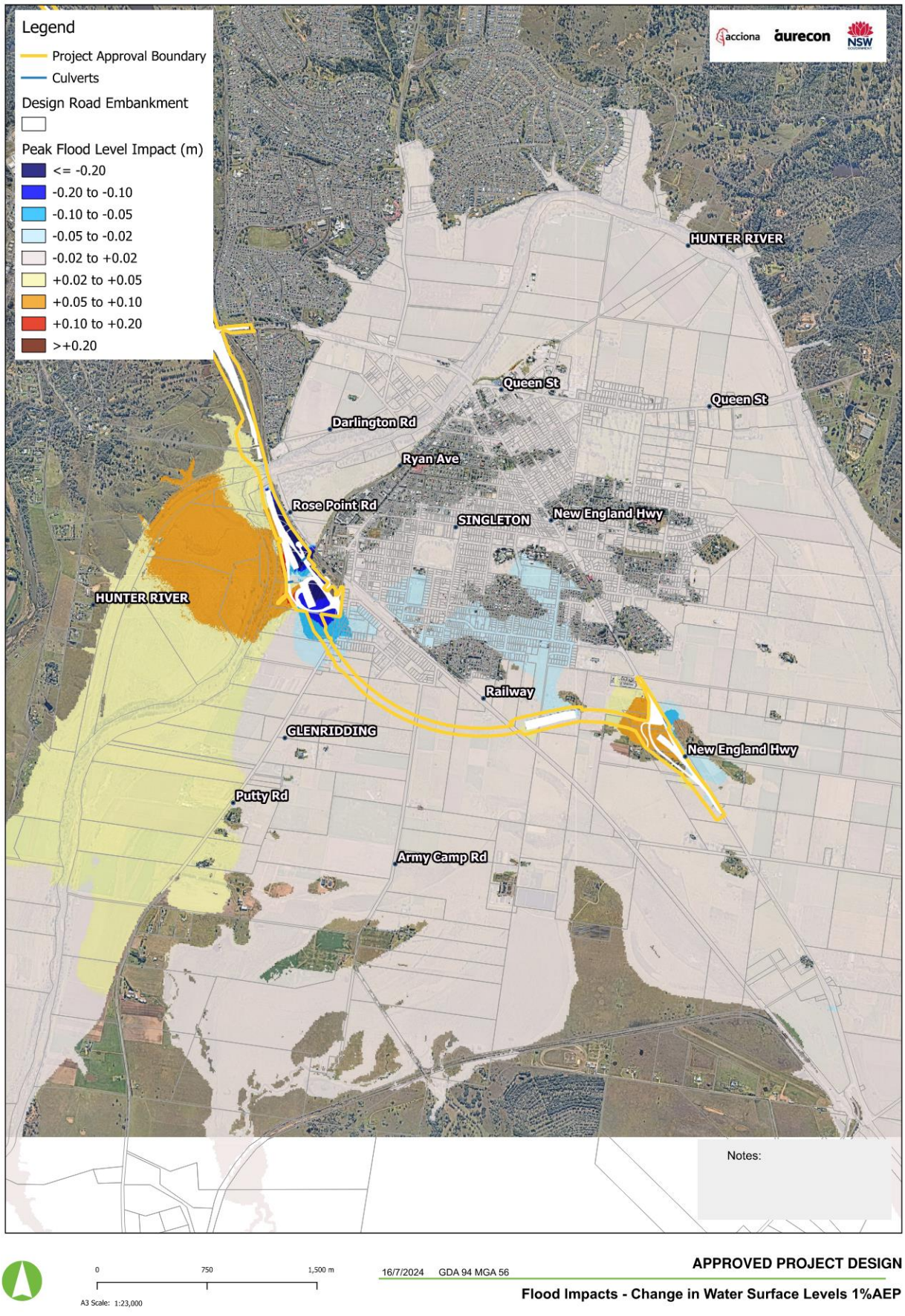


Figure 6-5: Approved project design (October 2023) – one per cent AEP peak flood level impact (Source: BMT, 2022)

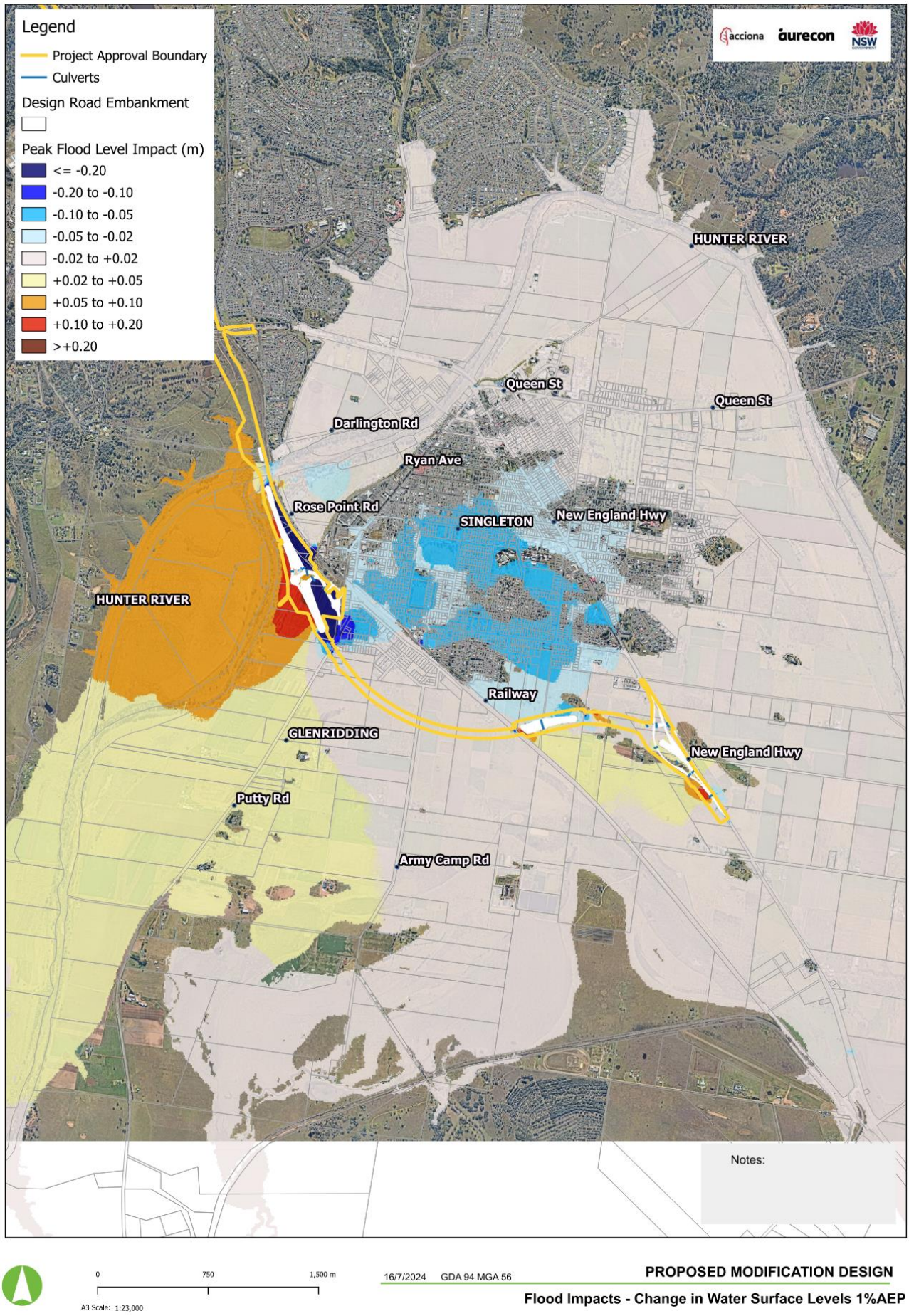


Figure 6-6: Proposed modification – one per cent AEP peak flood level impact (Source: Aurecon, 2024a)

Changes in peak flood velocity and scour potential

For the modelled design events, change in peak flood velocity distribution associated with the modification, was assessed. In general, changes in floodplain velocity distribution are primarily localised for all design events considered. These impacts are mainly linked to the local redistribution of flows around the southern abutment of the bridge over the Hunter River , the Putty Road connection, the northern abutment of the bridge over the Doughboy Hollow floodplain and the southern connection.

Changes to peak flood velocity between the approved project and the proposed modification is summarised below in Table 6-2.

The four bridge piers and abutments are designed considering the full depth of scour without any allowance for scour protection or remedial measures after a flood event. All piles are socketed in medium to high strength rock. Rock protection is provided at all bridge abutments and sized to withstand the Serviceability Limit State (SLS) floods.

Table 6-2: Changes in peak flood velocity

Flood event	Summary of changes resulting from the proposed modification compared to the approved project (as presented in the addendum REF (October 2023))	Summary of changes resulting from the proposed modification compared to the project REF (December 2019)
20% AEP	No change to the modelled peak flood velocities. Localised velocity increases of up to 0.7 metres per second (m/s) are observed at the southern abutment of the bridge over the Hunter River.	No change to the modelled peak flood velocities. Localised velocity increases of up to 0.7 metres per second (m/s) are observed at the southern abutment of the bridge over the Hunter River.
10% AEP	Minimal increases, typically less than 0.2 m/s, to the modelled peak flood velocities are observed at the southern abutment of the bridge over the Hunter River, the Putty Road connection and the northern abutment of the bridge over the Doughboy Hollow floodplain when compared to the approved project.	Minimal increases, typically less than 0.2 m/s, to the modelled peak flood velocities are observed at the southern abutment of the bridge over the Hunter River, the Putty Road connection and northern abutment of the bridge over the Doughboy Hollow floodplain when compared to the REF.
5% AEP	Localised velocity increases (compared against existing conditions) are still observed at the southern abutment of the bridge over the Hunter River, through the Hunter River Main channel, and at the northern abutment of the bridge over the Doughboy Hollow floodplain. At Rose Point floodway there are reductions in velocity of between -0.3 m/s and -1.0 m/s. There is an increase of less than 0.2 m/s at the southern abutment of the bridge over the Hunter River when compared to the approved project.	Localised velocity increases (compared against existing conditions) are still observed at the southern abutment of the bridge over the Hunter River, through the Hunter River Main channel, and at the northern abutment of the bridge over the Doughboy Hollow floodplain. Localised impacts at the bridge over the Hunter River are more extensive compared with the project REF, but are typically less than 0.3 m/s. At Rose Point floodway there are reductions in velocity of between -0.6 m/s and -1.3 m/s. There is an increase of less than 0.2 m/s at the southern abutment of the bridge over the Hunter River when compared to the project REF.
2% AEP	There is an increase in the extent of impacts at the bridge over the Hunter River. Localised peak velocity increases of up to 0.5 m/s can be observed adjacent to the southern abutment of the bridge over the Hunter River and immediately downstream of the Hunter River railway bridge. Through the bridge over Rose Point floodway, upstream of the railway, peak velocities are generally reduced by about -1.0 m/s. Localised increases are observed where water overtops the proposed connection ramps. The peak velocity in the floodway downstream of the railway decreases by about -0.4 m/s to -1.0 m/s, extending for about 800 m downstream of the bypass. Peak flood velocities also increase by up to 0.6 m/s at the northern abutment of the bridge over the Doughboy Hollow floodplain compared with the approved project. This is associated with Putty Road connection redistributing floodwater within the floodplain. At this abutment, the approved project increases velocities by 0.3 m/s compared to existing conditions. At the southern connection, impacts are generally localised within the project approval boundary. There are localised increases of about 0.3 m/s outside the	There is an increase in the extent of impacts at the bridge over the Hunter River. Localised peak velocity increases of up to 0.5 m/s can be observed adjacent to the southern abutment of the bridge over the Hunter River and immediately downstream of the Hunter River railway bridge. Through the bridge over the Rose Point floodway, upstream of the railway, there are localised increases in peak velocities of 1.0 m/s compared with the project REF. The peak velocity in the floodway downstream of the railway decreases by about -0.7m/s to -1.1 m/s, extending for about 800 m downstream of the bypass. Peak flood velocities also increase by up to 0.4 m/s at the northern abutment of the bridge over the Doughboy Hollow floodplain compared with the project REF. This is associated with Putty Road connection redistributing floodwater within the floodplain. At this abutment, the project REF increases velocities by 0.5 m/s compared to existing conditions. At the southern connection, impacts are generally localised within the project approval boundary. There are localised increases of about 0.3 m/s outside the boundary associated with the redistribution of flows around the southern connection.

Flood event	Summary of changes resulting from the proposed modification compared to the approved project (as presented in the addendum REF (October 2023))	Summary of changes resulting from the proposed modification compared to the project REF (December 2019)
	boundary associated with the redistribution of flows around the southern connection.	
1% AEP	There is an increase in the extent of impacts at the bridge over the Hunter River. Localised peak velocity increases of up to 0.6 m/s can be observed adjacent to the southern abutment of the bridge over the Hunter River and immediately downstream of the Hunter River railway bridge. Through the bridge over the Rose Point floodway, upstream of the railway, peak velocities are generally reduced by about -0.7 m/s. Localised increases are observed where water overtops the proposed connection ramps. The peak velocity in the floodway downstream of the railway decreases by about -0.4 m/s to -0.8 m/s, extending for about 800 m downstream of the bypass. Peak flood velocities also increase locally by up to 1.2 m/s at the northern abutment of the bridge over the Doughboy Hollow floodplain compared with the approved project. This is associated with Putty Road connection redistributing floodwater within the floodplain. These larger impacts are generally contained within the project approved boundary. Outside the boundary increases are less than 0.6 m/s. At this abutment, the approved project increases velocities by 0.7 m/s compared to existing conditions. Changes to velocity around the southern connection are generally localised within the project approval boundary.	There is an increase in the extent of impacts at the bridge over the Hunter River. Localised peak velocity increases of up to 0.6 m/s can be observed adjacent to the southern abutment of the bridge over the Hunter River and immediately downstream of the Hunter River railway bridge. Through the bridge over the Rose Point floodway, upstream of the railway, peak velocities are generally reduced by about -0.7 m/s. Localised increases are observed where water overtops the proposed connection ramps. The peak velocity in the floodway downstream of the railway decreases by about -0.4 m/s to -1.0 m/s, extending for about 800 m downstream of the bypass. Peak flood velocities also increase locally by up to 0.9 m/s at the northern abutment of the bridge over the Doughboy Hollow floodplain compared with the project REF. This is associated with Putty Road connection redistributing floodwater within the floodplain. These larger impacts are generally contained within the project approved boundary. Outside the boundary increases are less than 0.4 m/s. At this abutment, the project REF increases velocities by 0.6 m/s compared to existing conditions. Changes to velocity around the southern connection are generally localised within the project approval boundary.

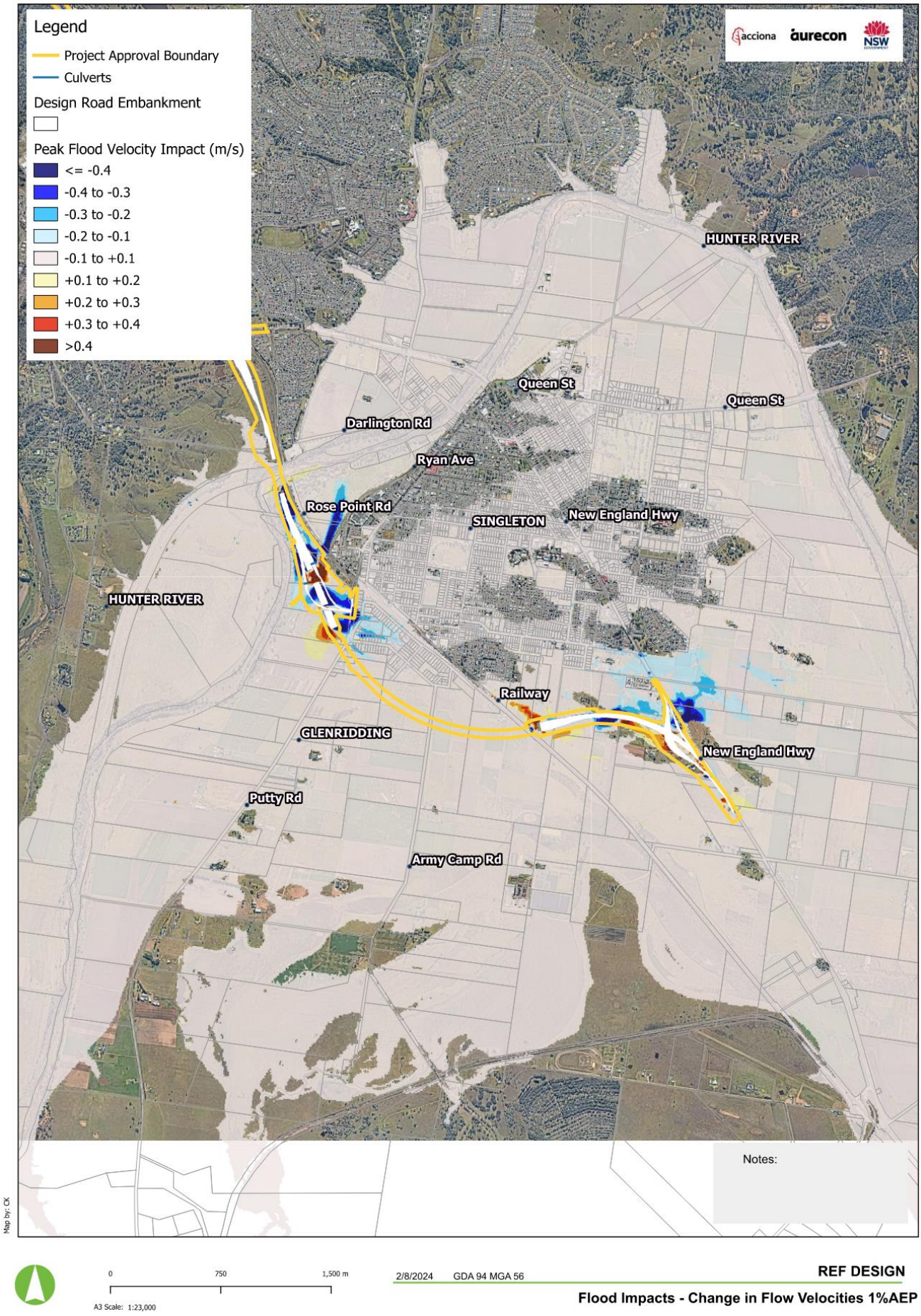


Figure 6-7: Project REF (December 2019) design – one per cent AEP peak flood velocity impact (Source: BMT, 2019)

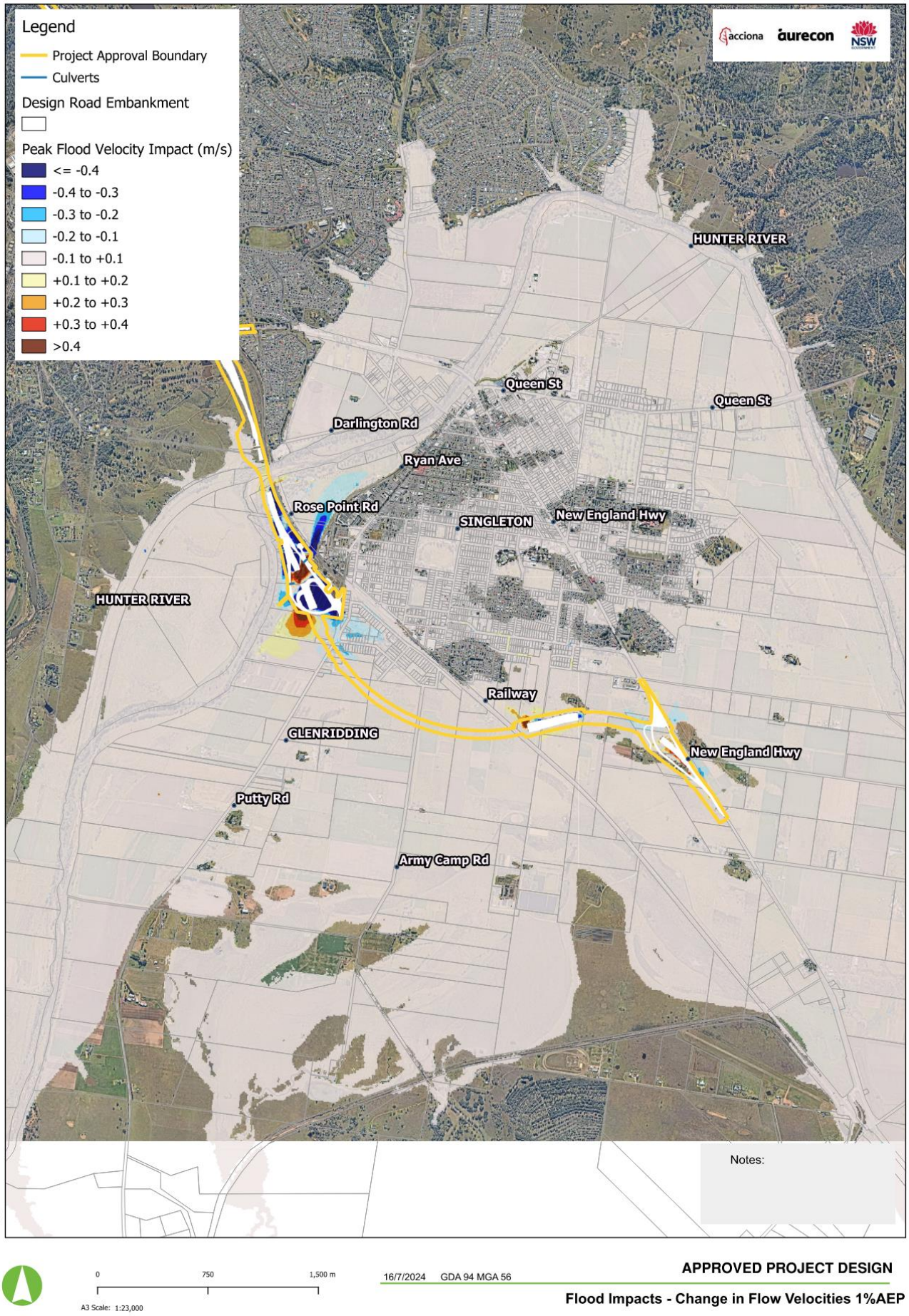


Figure 6-8: Approved project design (October 2023) – one per cent AEP peak flood velocity impact (Source: BMT, 2022)

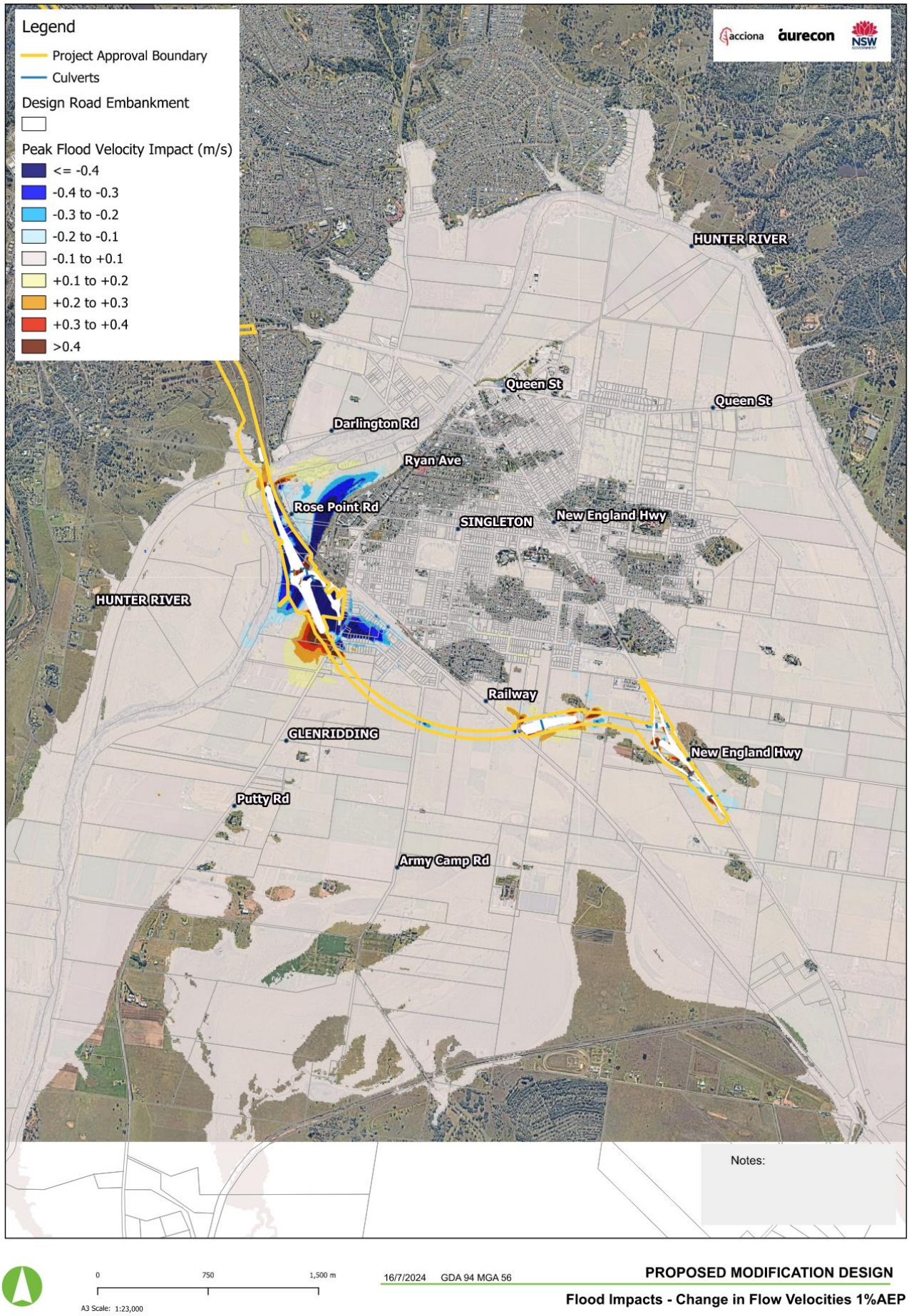


Figure 6-9: Proposed modification – one per cent AEP peak flood velocity impact (Source: Aurecon, 2024a)

Other impacts

Whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration on inundation. The Project would be advantageous to the community by allowing for local accessibility during a flood event. This remains consistent with the approved project.

Summary

The Project design has been assessed for flood impacts at various stages of design development from early concept design through to ongoing detailed design. Throughout this process the design development has considered minimising flooding impacts. The bridges across the Hunter River and Doughboy Hollow floodplain are designed to reduce any obstruction the Project might otherwise cause to the flows across the Hunter River and Doughboy Hollow floodplains.

Based on the one per cent AEP flood event, the flood impacts near the Putty Road connection and the southern connection generally increase in extent and magnitude for the proposed modification, when compared to the approved project. However, the extent of flood impacts is isolated to primary production zoned rural lands and the impacts are relatively minor compared to existing flood conditions. There is also an increase in peak water level on the Hunter River upstream of the Project, while there is an overall reduction in peak flood level to urban areas of Singleton due to the proposed modification.

Additionally, based on the one per cent AEP flood event, the proposed modification results in localised peak velocity increases adjacent to the southern abutment of the Hunter River railway bridge and immediately downstream of this location, as well as through the bridge over the bypass at the southern connection and the Rose Point floodway (upstream of the railway) when compared to the approved project. There is a reduction in peak velocity in the floodway downstream of the railway resulting from the proposed modification. Peak flood velocities adjacent to the northbound connection from Putty Road increase where the Putty Road connection redistributes floodwater within the floodplain. Changes to velocity around the southern connection are generally localised within the Project approval boundary.

Whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration on inundation.

6.1.4 Safeguards and management measures

No further safeguards and management measures are proposed. The measures provided in the addendum REF (October 2023) are considered suitable to manage the potential impacts of the proposed modification. These measures are provided in Chapter 7.

6.2 Traffic and Transport

This section of the addendum REF describes the potential impacts of the proposed modification on traffic and transport. It summarises the results of the traffic assessment for the proposed modification provided in Appendix D.

6.2.1 Methodology

The assessment of potential impacts of the proposed modification on traffic and transport was carried out following the methodology outlined in the addendum REF (October 2023). No further traffic counts were carried out for this addendum REF.

The traffic assessment modelled traffic performance at the Putty Road interchange as this is the only location of the proposed modification with a functional design change in traffic movements.

6.2.2 Existing environment

Section 6.2.2 of the addendum REF (October 2023) describes the existing traffic and transport environment for the New England Highway and is consistent with the proposed modification.

The New England Highway passes through Singleton providing links to Muswellbrook to the north and Maitland to the south. Between 18,000 and 28,000 vehicles per day (two-way) travel on the highway through Singleton. Putty Road was identified as a key intersection in the project REF (December 2019). Putty Road is a north-south route providing access to rural areas south-west of Singleton. The undivided road is one lane in each direction with a posted speed limit of 60 kilometres per hour.

6.2.3 Potential impacts

Construction

Impacts to traffic and transport during construction of the proposed modification would be largely consistent with the impacts discussed in the addendum REF (October 2023). The proposed modification consists of alterations to existing elements of the Project design and would form part of the overall construction program of the Project and is therefore not expected to substantially alter the duration of construction.

Traffic impacts

The number of construction vehicle movements as a result of the Project including the proposed modification is anticipated to be similar to that assessed in the addendum REF (October 2023), being up to 80 light vehicles and 140 heavy vehicles per day during peak construction periods across all ancillary facilities. The use of local roads for haulage routes during construction would be subject to ongoing consultation with Singleton Council.

The construction staging design for the Project has been developed to minimise the impact to road users during construction. The New England Highway and Putty Road are key transport routes for Singleton and the Hunter Valley. Construction works for the Project impact these roads predominately when lifting bridge girders, widening existing pavements and tie-in works. The proposed modification would not extend the duration of the Project and traffic impacts would be consistent with those assessed in the addendum REF (October 2023). A hierarchy of importance was adopted to mitigate the impacts to road users as follows:

- Ensure two lanes remain open to traffic during daytime and night-time hours
- Maximise separation between work areas and travel lanes
- Maintain existing road network capacity where possible
- Provide temporary roads to maintain connectivity.

Where impacts to public roads are unavoidable, construction staging would minimise impacts to traffic by establishing temporary barriers and undertaking nightworks for tie-in or existing pavement works.

All property owners impacted by construction of the proposed modification would be provided safe access through the construction zone where alternate property access cannot be provided. This is consistent with the addendum REF (October 2023).

Operation

Traffic Impacts

Due to the change to the Putty Road connection as part of the proposed modification, an operational assessment of traffic performance was carried out for the new configuration. Modelling adopted a bypass opening year of 2026 and examined the year of 2046, being the worst-case scenario, and compared this against the modelling results of the previous bypass layouts examined in the addendum REF (October 2023). The modelling indicated the reconfiguration of the interchange at Putty Road would slightly decrease traffic flows along the Singleton bypass, and through the Putty Road interchange. The proposed modification would have minimal impacts on the overall network performance, intersection performance and travel time results.

The proposed modification to Putty Road was compared to the future scenario presented in the addendum REF (October 2023) which was previously modelled.

The modelling outcomes for 2046, 20 years after the proposed opening, are summarised below. The complete traffic assessment report is provided in Appendix D.

Traffic impacts at the southern connection, Gowrie Gates connection and northern connection are considered negligible as a result of the proposed modification, when compared to the approved project, as new structures were not included in the approved project that would result in the redistribution of traffic.

Future intersection performance

Operational intersection performance is rated by the level of service (LoS) it provides. There are six levels of service, ranging from LoS A (the best) to LoS F (the worst). LoS D or better is considered to be an acceptable level of service.

Traffic modelling was undertaken to determine the expected LoS the proposed modification at Putty Road would have when compared to the previously considered scenarios. Table 6-3 and Table 6-4 summarises the performance of key intersections in each scenario during the peak morning and afternoon periods respectively.

The performance and LoS of the proposed modification are generally consistent with the other scenarios modelled.

Table 6-3: Summary of intersection performance of the proposed modification scenario during AM peak hours

Intersection performance	AM peak (05:30 – 06:30)				AM peak (08:30 – 09:30)			
	Approved project		Proposed modification		Approved project		Proposed modification	
Intersection	Avg. delay (sec/veh)	LoS	Avg. delay (sec/veh)	LoS	Avg. delay (sec/veh)	LoS	Avg. delay (sec/veh)	LoS
Putty Road interchange - eastern terminal roundabout	3	A	4 (+1)	A	6	A	3 (-3)	A
Putty Road interchange – western terminal roundabout	-	-	2 (+2)	A	-	-	2 (+2)	A
Combined Putty Road interchange	**3**	**A**	**6 (+3)**	**A**	**6**	**A**	**5 (-1)**	**A**

Table 6-4: Summary of intersection performance of the proposed modification scenario during PM peak hours

Intersection performance	PM peak (16:00 – 17:00)			
	Approved project		Proposed modification	
Intersection	Avg. delay (sec/veh)	LoS	Avg. delay (sec/veh)	LoS
Putty Road interchange - eastern terminal roundabout	6	A	4 (-2)	A
Putty Road interchange – western terminal roundabout	-	-	3 (+3)	A
Combined Putty Road interchange	**6**	**A**	**7 (+1)**	**A**

Traffic flows

The change in configuration and inclusion of a new roundabout interchange at Putty Road has minimal impacts on overall traffic flows for both the morning and afternoon peak periods. The modelling results indicate a slight decline in traffic flows along the Singleton bypass and through the Putty Road interchange. The reduction in traffic flows is due to there being two primary route options with similar preferences; to access the Singleton bypass via Putty Road or via New England Highway. The proposed modification slightly increases travel distance along the route via Putty Road and causes a slight increase in delay with the introduction of a second roundabout. However, overall, the declines are minor compared to the overall traffic flow on the bypass and the roundabout operates at similar levels of performance during all peak hours.

Travel times

The proposed modification at Putty Road has minimal impact on travel times when compared to the other bypass scenarios. There are slight increases and decreases in travel times due to shifts in traffic flow as a result of the proposed modification. Overall, the largest increase in travel time during the AM peak period was seven seconds (on New England Highway northbound), and the largest reduction in travel time was 17 seconds (on the Singleton bypass northbound). In the PM peak period, the largest increase in travel time was one second (on John Street/Queen Street southbound), and the largest reduction in travel time was 18 seconds (on New England Highway northbound) which is similar overall.

The operation of the proposed modification would not impact on-street parking.

Public transport

There are no anticipated impacts on local public transport as a consequence of the proposed modification.

Pedestrian and cycling facilities

The proposed modification would not impact any existing pedestrian or cycling facilities. Cyclists would be able to use the road shoulders on the bypass once operational.

Road user safety

The safety of all road users including pedestrians, cyclists and motorists would not be impacted by the proposed modification. The proposed modification is anticipated to improve road user safety, particularly for those in Singleton as through traffic would use the bypass.

Property access

All properties affected by the proposed modification would be provided with appropriate access, including the provision of new permanent access arrangements where necessary.

Summary

The traffic modelling results demonstrate that the proposed modification of the Putty Road connection would have minimal impacts on the overall network performance, intersection performance and travel time results. The proposed modification to the interchange layout results in a slight reduction in traffic flows along the Singleton bypass and through the Putty Road interchange. There would be a minor increase in vehicle delay during both peak periods when travelling through the Putty Road interchange, and slight increases and decreases in travel times in comparison to the addendum REF (October 2023).

The roundabout at the Putty Road connection is shown to perform at LoS A during all peak traffic periods. The modelling results indicate that the roundabout would have capacity to carry the expected traffic volumes from the bypass, on and off ramps, and along Putty Road.

6.2.4 Safeguards and management measures

No further safeguards and management measures are proposed. The measures provided in the addendum REF (October 2023) are considered suitable to manage the potential impacts of the proposed modification. These measures are provided in Chapter 7.

6.3 Noise and Vibration

This section of the addendum REF describes the potential noise impacts of the proposed modification. It summarises the results of the qualitative noise and vibration assessment carried out for the proposed modification.

6.3.1 Methodology

A qualitative assessment was undertaken to assess the construction noise and vibration, and operational noise impacts associated with the proposed modification. A review of the noise catchment areas was also undertaken to ensure that the grouping of receivers affected by the proposed modification was still consistent for use as part of this and future assessments, consultation, and notifications.

The construction noise and vibration assessment reviewed the location of construction activities along with any changes in construction methodologies associated with the proposed modification. The qualitative operational noise assessment looked at design changes associated with the proposed modification that may alter the current Project noise model including pavement surfaces and noise walls, along with the gradient and alignment of the roadway. The assessment looked at the consistency of these design changes with the addendum REF (October 2023) to determine if the current safeguards are appropriate.

6.3.2 Existing environment

A description of the existing acoustic environment around the Project was presented in the project REF (December 2019). In summary, the southern and northern ends of the noise study area are primarily influenced by traffic flows on the New England Highway. Mining activities contribute to the noise environment in the northern section and rail movements on the Main North railway line contribute within the lower section of the northern end.

The noise environment in the mid-section of the study area is generally rural/suburban with influential noise sources including local traffic and rail movements on the Main North railway line located to the north-east and mining activities to the north.

Since the addendum REF (October 2023) a small number of additional sensitive receivers have been identified (as a result of new construction) and have been considered in this assessment. These additional receivers would also be considered in any future assessments. Background noise levels were measured as part of the project REF (December 2019) and a description of the methodology and analysis of results is presented in the project REF (December 2019).

Criteria

The noise criteria for receivers within the noise catchment areas (NCAs) would be consistent with those identified in the project REF (December 2019). As such, no further criteria have been assessed for the proposed modification. A summary of the construction noise management levels is provided in Table 6-5 for reference.

Table 6-5: Construction noise management levels

Noise catchment area	Construction noise management level dB(A)		
	Day (7am - 6pm)	Evening (6pm - 10pm)	Night (10pm - 7am)
NCA 1	44	39	39
NCA 2	45	40	35
NCA 3	46	41	37
NCA 4	46	41	37
NCA 5	49	44	36

6.3.3 Potential impacts

Construction noise

Construction noise and vibration impacts have been reviewed with reference to the construction activities assessed in the project REF (December 2019) and addendum REF (October 2023) to establish whether the proposed modification is consistent with the assessed construction methodologies and locations and whether additional mitigation measures are required.

In general, the proposed modification would have negligible increase in impacts experienced by the community, whether for works during or outside standard construction hours. Construction activities remain generally within the construction footprint assessed under the project REF (December 2019) and addendum REF (October 2023), meaning they would not move closer to receivers than what has previously been assessed. Similarly, construction methods and sound power levels of typical construction plant and equipment used for each construction scenario along with design alignment remain unchanged and are consistent with those assessed previously.

Changes to the substructures of the bridges across the Hunter River and Doughboy Hollow floodplain from a single column to dual column results in a reduction in the number of piles required from six (6) to two (2) 900 mm diameter piles. The assumed operation duration of each piling rig for each pile would remain unchanged as outlined in the addendum REF (October 2023). However, the duration of piling schedule for these bridges is anticipated to reduce due to the removal of the total number of piles required for each substructure. Other bridge design changes as part of the proposed modification including reductions in the number and size of girders may also result in a reduction in the size and duration of lifting equipment used during construction.
All impacts will be managed in accordance with the approved Construction Noise and Vibration Management Plan (CNVMP), consistent with the mitigation measures described in the project REF (December 2019) and addendum REF (October 2023). No additional mitigation measures would be required.

Construction sleep disturbance

Construction hours and the project schedule remain consistent with what was presented in the project REF (December 2019) and addendum REF (October 2023) with the majority of sleep disturbance exceedances associated with out of hours works in the vicinity of NCA 1, NCA 2 and NCA 3. The need for, and management of, works outside standard hours to minimise disruption to daily traffic and disturbance to surrounding landowners and businesses remain consistent with those previously assessed including:

- Construction activities within the rail corridor during rail possessions
- Delivery of construction materials such as precast bridge structures
- Intersection and tie-in activities of the bypass to existing roads
- Installation and adjustment of barriers and signage for construction zones during each construction stage
- Construction of the bridge over the New England Highway at Gowrie Gates
- Operation of construction compounds to support the above work.

The construction methodologies and typical plant and equipment for works outside standard hours remains unchanged. Design changes associated with the proposed modification for the bridge over the New England Highway at Gowrie Gates includes a reduction in the number and size of girders compared to the addendum REF (October 2023).

Construction associated with the proposed modification would largely be carried out during standard construction working hours. Any works carried out outside of standard construction hours would be in accordance with the Project EPL, relevant Noise Management Level (NML), and assessed for compliance using a predictive noise tool and noise monitoring.

Construction road traffic noise

The proposed modification would not alter the numbers of construction vehicle movements outlined in the addendum REF (October 2023), estimated to be up to 80 light and 140 heavy vehicles per day (up to 12 per hour) during peak construction periods across all ancillary facilities. Vehicles would access the site primarily via the New England Highway. Heavy vehicles would only access the site from approved heavy vehicle routes.

To minimise the construction noise levels and reduce the risk of impacts occurring, construction traffic would be managed as part of the Construction Noise and Vibration Management Plan. Safeguards outlined in the project REF (December 2019) and addendum REF (October 2023) remain appropriate to manage risks associated with construction road traffic noise arising from the proposed modification.

Construction vibration

Construction vibration impacts are unlikely to alter from that described and assessed in the project REF (December 2019) and addendum REF (October 2023). The road alignment and construction footprint of the proposed modification remains relatively unchanged and is not anticipated to result in additional intensive vibratory equipment operating closer to sensitive receivers than considered in the project REF (December 2019) and addendum REF (October 2023).

It is unlikely that vibration intensive works would be undertaken within the cosmetic damage minimum working distances (up to 30 metres for vibratory pile drivers) as part of the proposed modification. The reduction in the number of piles required for the twin pier design in the proposed modification compared to the addendum REF (October 2023) would reduce the total duration of vibration intensive piling works during construction.

As noted above, the proposed modification alignment remains relatively unchanged to the addendum REF (October 2023). Alignment works continue to result in vibration intensive activities that may occur within the human comfort minimum working distances during earthworks, bridge construction and pavement works as outlined in the addendum REF (October 2023). Advance notification should be given to all potentially affected receivers.

Heritage and other sensitive structures (including any with Aboriginal significance) remain unlikely to be impacted with no vibration intensive works likely to be undertaken within the minimum working distances as listed in Section 3.5 of the Noise and Vibration Technical Report Addendum (September 2023) prepared for the addendum REF (October 2023).

The safeguards outlined in the addendum REF (October 2023) would continue to be appropriate to manage risks associated with construction vibration arising from the proposed modification.

Operational noise

The Road Noise Policy requires the assessment of road traffic noise at the year of opening (2026 indicative) and at the design year (2036 indicative) for daytime and night-time periods. Operational noise assessments were undertaken as part of the project REF (December 2019) and addendum REF (October 2023) in accordance with the Road Noise Policy.

The proposed modification has not resulted in significant changes to the road alignment or gradient. The modification does not introduce any new road connections to those previously assessed. At the southern connection, an increase in road curvature of the bypass and modification of connecting roads between Newington Lane and White Falls Lane has shifted the proposal further away from several sensitive receivers.

At the Putty Road connection, road geometry of the northbound exit ramp provides for a greater length of deceleration, and the proposed roundabout with Putty Road has shifted west, moving the intersection away from sensitive receivers in Glenridding Road. The proposed modification does not change the pavement wearing type or reduce the height or extent of at road mitigation measures such as noise walls outlined in Section 6.3.3 of the addendum REF (October 2023).

There is no change to the horizontal alignment of the northern cut through McDougalls Hill with only minor changes to the cut depth which is not anticipated to influence impacts to sensitive receivers. Additionally, a minor shift to the roundabout at Gowrie Gates to the west is unlikely to alter the anticipated noise impacts outlined in the addendum REF (October 2023).

The anticipated noise impacts considering predicted noise levels in both Year 2026 and Year 2036 during the daytime and night-time periods with the noise barriers as detailed in the addendum REF (October 2023) are not anticipated to significantly change as a result of the proposed modification. The number of sensitive receivers exceeding the predicted road traffic noise level LAeq noise criterion is expected to remain consistent with the addendum REF (October 2023).

6.3.4 Safeguards and management measures

No further safeguards and management measures are proposed. The measures provided in the project REF (December 2019) and addendum REF (October 2023) are considered suitable to manage the potential impacts of the proposed modification. These measures are provided in Chapter 7.

An operational noise report will be prepared as part of the detail design process. The report will be in accordance with the Road Noise Policy providing an updated assessment of road traffic noise at the year of opening (2026 indicative) and at the design year (2036 indicative) for daytime and night-time periods. The report will determine the extents of at road noise treatments and provide an updated number and location of properties which are eligible for consideration of at property noise treatments.

To confirm that the noise level targets are achieved, a post-construction noise monitoring program will be carried out in accordance with the Noise Mitigation Guideline (Roads and Maritime 2014d). The program will provide further validation of the

design noise levels based on actual traffic during operation to determine the final number and location of properties which are eligible for consideration of at property noise treatments.

6.4 Landscape character and visual impacts

6.4.1 Methodology

A detailed landscape character and visual impact assessment (LCVIA) was carried out in November 2019 for the project REF (December 2019), hereafter known as the LCVIA (November 2019). A LCVIA was carried out for the addendum REF (October 2023) in October 2022, hereafter known as the LCVIA (October 2022). The LCVIA was carried out in accordance with the Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment (TfNSW, 2023).

The LCVIA was revised to include consideration of the features of the proposed modification. The revised LCVIA is included in Appendix E. A summary of the landscape character and visual impacts of the proposed modification is provided below.

The overall level of impact on the existing landscape character of an area is based on the sensitivity of individual Landscape Character Zones (LCZs). The LCZs represent the built, natural and cultural values of an area, and the magnitude of change at each LCZ.

For the assessment of landscape character, sensitivity is the degree to which the landscape is susceptible to a specific type of change. The magnitude of change is the combination of the scale, extent and duration of the change.

For the assessment of visual impacts, sensitivity is dependent on the location, number and expectations of receptors, and the quality of the existing view. The magnitude of change is the scale, size and character of a proposal, the extent of visibility and the contrast with the existing view.

Definitions of sensitivity and magnitude are described in further detail in Appendix E. Sensitivity and magnitude are combined to give an impact rating of high, moderate, low or negligible.

6.4.2 Existing environment

The existing environment surrounding the proposed modification includes an agricultural floodplain, pockets of native vegetation and the Hunter River. The town of Singleton includes low-density residential and low to medium-density commercial premises, with the New England Highway passing through the town.

Landscape character zones

The LCZs remain consistent with those identified in Section 6.5.2 of the addendum REF (October 2023) and are described in Table 6-6.

Table 6-6 Landscape Character Zones

LCZ	Description
1 Enclosed Rural Landscape	Heavily vegetated remnant bushland of Ironbark-Spotted Gum- Grey Box Forest, creating a sense of an enclosed landscape with tall vertical scale.
2 Open Rural Landscape	A predominantly open rural setting with remnant and regrowth tree stands scattered throughout an undulating to rolling landform of pasture land. The character ranges from areas with no trees, to areas that have moderate stands of trees.
3 Industrial	Typical industrial character including large factory-style bulky buildings, wide streets and no structured landscape works or substantial street tree planting. Most of the industrial area is hidden from view from the existing highway.
4 Large Lot Residential	Small acreage lots varying from mostly cleared, to heavily-wooded with trees creating a rural / bushland residential setting. The rural setting is highlighted with multiple properties with rural style post, rail and wire fencing. Streets have open drains, degraded road edges and wide grass verges. The area is mostly screened from view from the existing highway.
5 New Residential Suburbs	Comprises mostly low to medium density residential development with standard amenities such as schools, parks, sporting facilities and local shops set within a curving street pattern influenced by the landform. The streetscape is characterised by front yard gardens of varying styles and plant species.
6 Agricultural Floodplain	The main features comprise the winding Hunter River with sections of treelined embankments and patchwork patterns of the agricultural alluvial floodplain. The valley floor contrasts the grasslands of rolling hills and the urban development. Houses are sporadically located in elevated positions and the rural setting is further emphasised by rural roads, gravel driveways and agricultural fences.
7 Singleton Old Town	The Singleton town centre is broadly encompassed by the Main North railway line, Hunter River and the New England Highway. It comprises a vibrant 'high street' commercial and retail strip with recent streetscape upgrades. Formal parks and botanic gardens reminiscent of a Victorian era and the combination of urban patterns, dominant tree species and architectural styles of historic buildings are reminders of early European settlement.

The proposed modification is located predominantly within LCZ 6 Agricultural Floodplain, with the northern approach signage located in LCZ 1 Enclosed Rural Landscape and LCZ 2 Open Rural Landscape.

An assessment of the sensitivity of each of these LCZs and the magnitude of impacts was undertaken, and an overall landscape character impact rating was assigned. A summary of this assessment is provided below.

6.4.3 Potential impacts

Construction

Landscape character impact

The impacts on landscape character from the construction of the proposed modification would be consistent with the approved project. No construction impacts would occur on the identified LCZs.

Visual impacts

Visual impacts from the construction of the proposed modification would be consistent with the approved project. These are assessed in Section 6.5.3 of the addendum REF (October 2023).

Operation

The design features of the proposed modification are consistent with the visual elements of the approved project. Minor changes to the design, including, road signage and other utilities, road furniture, drainage and earthworks including landscaping would be consistent with the impacts of the approved project and would be typical of the visual elements of a road corridor.

Landscape character impact

In the context of the approved project, the proposed modification would have a negligible to minor impact on the surrounding landscape character. The form and scale of new structures and alterations to infrastructure elements already approved would not be perceptually different from the approved project in the open landscape setting.

There would be no additional substantial elements that would detract from the landscape character of the area. The only landscape character zone that is impacted to any significant degree by the proposed modification is LCZ6 Agricultural Floodplain. This is due to LCZ6 including Putty Road connection, the southern connection and the viaduct. The pair of columns on the three bridges rather than single columns, and the access track alongside the viaduct would be consistent with the landscape character impacts of the approved project.

A summary of the landscape character impact of the LCVIA (October 2022) and the proposed modification for LCZ6 is provided in Table 6-7.

The significance of impact on landscape character remains consistent with the findings of the addendum REF (October 2023).

Table 6-7: Landscape character assessment – LCZ6 Agricultural Floodplain

Landscape character assessment	LCVIA (October 2022)	Proposed modification
Sensitivity	High	High
Magnitude of change	Moderate	Moderate
Impact	High to moderate	High to moderate

Moreover, the proposed modification, and the Project in its entirety, includes appropriate landscaping sympathetic to the agricultural and rural landscape character of the area. The proposed landscaping is described in Appendix E.

Visual impacts

Seven representative viewpoints were identified in the LCVIA (November 2019). An eighth viewpoint was added in the LCVIA (October 2022). Viewpoint 8 (Waterworks Lane) was included for assessment of the proposed changes at the Putty Road connection. Only three of the viewpoints are located where there are changes associated with the proposed modification.

A summary of the visual impact of the approved project and the proposed modification of the three viewpoints impacted is provided in Table 6-8.

The significance of impact on Viewpoint 3 – Army Camp Road, Viewpoint 7 – Mitchell Avenue, and Viewpoint 8 – Waterworks Lane remains consistent with the findings of the LCVIA (October 2022).

The proposed modification would not alter the positive impact assessed by the approved project in reducing traffic volumes through Singleton town centre, which would likely improve visual amenity along the existing New England Highway.

Table 6-8: Visual Impact Assessment summary

Viewpoint	LCVIA (October 2022) VP 3 – Army Camp Road	Proposed modification VP 3 – Army Camp Road	LCVIA (October 2022) VP 7 – Mitchell Avenue	Proposed modification VP 7 – Mitchell Avenue	LCVIA (October 2022) VP 8 – Waterworks Lane	Proposed modification VP 8 – Waterworks Lane
Sensitivity	Moderate	Moderate	High	High	Moderate	Moderate
Magnitude of change	Moderate	Moderate	High	High	High	High
Impact	Moderate	Moderate	High	High	High to Moderate	High to Moderate

Changes associated with the proposed modification would mostly be at Viewpoints 3, 7 and 8, as a result of embankments, bridges and vehicle movements associated with the full interchange at the Putty Road connection and the bridge structure at the southern connection.

Viewpoint 3 has been rated as having a moderate impact which is consistent with the LCVIA (October 2022). This is because of the unchanged nature of the main components of the Project within this view, namely: the slenderness of the bridge structure, openness of views underneath, and the angle of view for viewers. The change to a pair of piers rather than one pier doubles the number of vertical elements but this is offset by their relative slenderness compared to a single heavy pier, and by the reduced headstock. As the viaduct is perpendicular to Army Camp Road, the view is 'head on', meaning that the paired piers are lined up on approach, such that they are not markedly breaking up the view underneath. In addition, noise barriers are proposed to be transparent in this location rather than coloured, which supports the overarching principle of minimising the apparent height of the bridge. The character is therefore visually compatible with the existing view, and the design quality comparable to the LCVIA (October 2022).

A permanent access track alongside the viaduct would form part of the view of road users on approach to and travelling underneath the viaduct. During construction this is proposed to be about 10 metres wide. Post-construction, the track will be narrowed next to the public road and designed with a landscape treatment to blend back more into the existing surroundings, making the view consistent with that shown in the LCVIA (October 2022).

Viewpoint 7 has been rated as having a high impact which is consistent with the LCVIA (October 2022). No built works of the proposed modification would be visible from this viewpoint. The approved project consists of removing mature trees at the top of the hill and proposed tree planting for reinstatement of the view. The proposed modification does not involve tree planting at this location due to access constraints for planting and maintenance. Vegetation on the lower slopes of the hill would be retained as per the approved project. The magnitude of this change is consistent with the LCVIA (October 2022).

Viewpoint 8 has been rated as having a high-moderate impact, consistent with the LCVIA (October 2022). This is because the bridge and embankment in this view are substantially the same as for the LCVIA (October 2022). The bridge is a long, low element curving across the patchwork pattern of the agricultural landscape. The vertical alignment allows for views to the landscape when the road is on structure. The embankment interrupts the view, as it does in the approved project. The proposed modification is for pairs of piers rather than a single pier. Because of the oblique angle of view this would somewhat obscure the openness of the views below the deck across the landscape. However, the noise walls are proposed to be clear rather than coloured. This gives a higher degree of transparency which serves to reduce the visual bulk of the bridge superstructure and enable views through and across the landscape. With the new alignment, part of the Putty Road interchange is now in the foreground of the view. There is additional paving and road furniture (lights give way sign) in the foreground. However, new tree planting supplements existing trees and serves to partially screen the new embankment and viaduct structure as well as lining the road. These are considered to make a positive contribution to this viewpoint.

To assist with the visual impact assessment, visualisations from the LCVIA (October 2022), including the proposed modification, at Viewpoints 7 and 8 were developed and are provided in full in Appendix E. Viewpoints 3, 7 and 8, are shown on Figure 6-10 to Figure 6-14.

Figure 6-10: LCVIA (October 2022) view of Army Camp Road for the approved project (Viewpoint 3)

Figure 6-11: LCVIA (October 2022) view of Mitchell Avenue for the approved project (Viewpoint 7)

Figure 6-12: Indicative view of Mitchell Avenue as a result of the proposed modification (Viewpoint 7)

Figure 6-13: LCVIA (October 2022) view of Waterworks Lane for the approved project (Viewpoint 8) (hatched rectangle shows location of the Singleton Council water pump station and standpipe included in the LCVIA (October 2022))

Figure 6-14: Indicative view of Waterworks Lane as a result of the proposed modification (Viewpoint 8)

6.4.4 Safeguards and management measures

No further safeguards and management measures are proposed. The measures provided in the addendum REF (October 2023) are considered suitable to manage the potential impacts of the proposed modification. These measures are provided in Chapter 7.

6.5 Other impacts

6.5.1 Existing environment and potential impacts

For the remaining environmental aspects where the potential impact of the proposed modification was considered to be negligible to minor, a brief discussion and assessment is undertaken for each, and the results summarised in Table 6-9. These remaining environmental aspects include:

- Biodiversity
- Aboriginal heritage
- Groundwater
- Soils and contamination
- Non-Aboriginal heritage
- Property and land use
- Socio-economic
- Resource use and waste management
- Air quality
- Climate change
- Hazard and risk
- Cumulative impacts.

Safeguards and management measures identified in the project REF (December 2019), submissions report, and previous addendum REFs (May and October 2023) are detailed in Chapter 7.

6.5.2 Existing environment and potential impacts

Table 6-9: Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Biodiversity	The proposed modification is located within the existing project approval boundary and impact area as per the addendum REF (October 2023). The existing environment is consistent with that described in Section 6.1.2 of the project REF (December 2019) and Section 6.1.2 of the addendum REF (May 2023). There was no change to the existing environment in the addendum REF (October 2023).	**Construction** The biodiversity impacts and native vegetation clearing limits, for construction of the proposed modification, would be consistent and not increase the overall clearing limits identified in the project REF (December 2019) and addendum REF (May 2023). **Operation** Operational biodiversity impacts of the proposed modification would be consistent with those identified in the project REF (December 2019). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Aboriginal heritage	The proposed modification is located within the existing project approval boundary and AHIP boundary as per the existing AHIP #4895 (as varied). The existing environment is consistent with that described in Section 6.7 of the project REF (December 2019) and Section 6.2 of the addendum REF (May 2023). There was no change to the existing environment in the addendum REF (October 2023).	**Construction** The proposed modification is unlikely to increase or cause additional impacts to Aboriginal heritage items during construction and would be consistent with the impacts outlined in the project REF (December 2019), addendum REF (May 2023) and the existing AHIP #4985 (as varied). Refer to the Aboriginal Cultural Heritage Advice provided in Appendix F. **Operation** Operational Aboriginal impacts of the proposed modification would be consistent with those identified in the project REF (December 2019) and addendum REF (May 2023). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF. All works shall be undertaken in accordance with the existing AHIP conditions.
Groundwater	The proposed modification is located on the superficial alluvial aquifer to the south of the Hunter River and on the bedrock aquifer to the north of the Hunter River.	**Construction** Construction of the proposed modification has the potential to encounter groundwater during the construction of bridge piles associated with the new bridge structure over the floodplain and northbound exit ramp. Groundwater may also be encountered during bridge pile works associated with the Putty Road connection. The methodology for construction of these elements would be consistent with the project REF (December 2019).

Environmental factor	Existing environment	Potential impacts
	The existing environment is consistent with that described in Section 6.3 of the project REF (December 2019). There was no change to the existing environment in the addendum REF (October 2023).	No further impacts to groundwater users are likely to occur as a result of the proposed modification. The proposed modification would not increase the likelihood or risk of groundwater contamination during construction. **Operation** There are no expected impacts to groundwater during operation. **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Soils and contamination	The existing environment including geology, soils and potential sources of contamination described in Section 6.4 of the project REF (December 2019) applies to the proposed modification. There was no change to the existing environment in the addendum REF (October 2023).	**Construction** **Erosion and sedimentation** Potential erosion and sedimentation impacts of the proposed modification are consistent with those identified in the project REF (December 2019). **Contamination** The proposed modification does not alter the likelihood of encountering contaminated soil or groundwater from that described in the project REF (December 2019). **Operation** **Erosion and sedimentation** During operation of the proposed modification, the risk of soil erosion would be minor as all disturbed areas would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring. **Contamination** Contamination risks associated with the operation of the proposed modification would be consistent with those identified in the project REF (December 2019), being spill incidents arising from motor vehicle crashes. **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Non-Aboriginal heritage	The non-Aboriginal heritage located within and in the area surrounding the Project is described in section 6.8 of the project REF (December 2019).	**Construction** Construction of the proposed modification would not increase the impact to the heritage items identified in the project REF (December 2019).

Environmental factor	Existing environment	Potential impacts
	There was no change to the existing environment in the addendum REF (October 2023).	**Operation** The operation of the proposed modification is not expected to introduce or increase impacts to non-Aboriginal heritage identified in the project REF (December 2019). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1of this addendum REF.
Property and land use	The existing property and land use environment of the proposed modification is consistent of that described in Section 6.11 of the project REF (December 2019). There was no change to the existing environment in the addendum REF (October 2023). Land use zones that occur within the proposed modification area include: • RU1 (Primary production) • SP2 (infrastructure) The majority of the land within the proposed modification is zoned RU1 (Primary production).	**Construction** Construction of the proposed modification would result in long term impacts on land use and property from land acquisition and modified property access arrangements. There are no new acquisitions or adjustments required as part of this modification beyond those identified in the project REF (December 2019). **Operation** No additional properties to those presented in the project REF (December 2019) would be acquired for the proposed modification. The proposed modification requires adjustments to the extent of land required within the land already acquired for the Project. All properties with access arrangements affected as a result of the proposed modification would be provided with restored or new permanent access arrangements during operation. The proposed modification would result in a permanent change in land use from existing land uses to a road corridor, consistent with the project REF (December 2019). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1of this addendum REF.
Socio-economic	The existing socio-economic environment is consistent with that described in Section 6.6 of the project REF (December 2019) and Section 6.6 of the addendum REF (October 2023).	**Construction** The socio-economic impacts for the construction of the proposed modification would be generally consistent with those identified in the project REF (December 2019), submissions report and addendum REF (October 2023). Minor changes to ancillary facilities have occurred during development of the Project to facilitate construction. These changes have been previously assessed through a REF consistency review that outlines the changes as being consistent with the approved project. No additional changes are proposed as part of this modification. Amenity impacts related to traffic, noise and vibration and visual are captured in Sections 0, 6.3 and 0, respectively.

Environmental factor	Existing environment	Potential impacts
		Operation Operational socio-economic impacts of the proposed modification would be generally consistent with those identified in the project REF (December 2019), submissions report and addendum REF (October 2023). Impacts to access and connectivity arising from the operation of the proposed modification are anticipated to be consistent with the project REF (December 2019). All properties affected by changed access arrangement as a result of the proposed modification would be provided with restored or new permanent access arrangements during operation, including properties that would be fragmented. **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Resource use and waste management	The existing environment is consistent with that described in Section 6.13 of the project REF (December 2019). There was no change to the existing environment in the addendum REF (October 2023).	**Construction** Resource use and waste streams generated by the construction of the proposed modification are expected to be generally consistent with that identified in the project REF (December 2019). It is likely that the exact quantities of materials required for construction and the volume of waste generated across the entire Project would be altered as a result of the proposed modification. This would be determined during ongoing detailed design and this difference is not anticipated to be substantial. Locally excavating material from borrow sites would reduce the need to import materials to site, minimising impacts on the road network and improving environmental sustainability outcomes by using less fuel. Cut and fill volumes would be balanced where possible to avoid a surplus or deficit of material to minimise the need for import or disposal of material. **Operation** No further impacts to resource use and waste management would occur from the operation of the proposed modification. **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Air quality	Existing air quality in the vicinity of the proposed modification are consistent with those described in Section 6.9 of the project REF (December 2019).	**Construction** The air quality impacts for the construction of the proposed modification would be consistent with those identified in the project REF (December 2019) and addendum REF (October 2023). **Operation** Operational air quality impacts of the proposed modification would be consistent with those identified in the project REF (December 2019) and addendum REF (October 2023).

Environmental factor	Existing environment	Potential impacts
	There was no change to the existing environment in the addendum REF (October 2023).	**Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Climate change	The existing environment in the context of climate change is included in Section 6.14 of the project REF (December 2019). There was no change to the existing environment in the addendum REF (October 2023).	**Construction** The emission of greenhouse gases during construction of the proposed modification would be negligible in addition to that described in the project REF (December 2019). **Operation** No further impacts are anticipated during operation of the proposed modification. **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Hazard and risk	Existing hazards and risks in the vicinity of the proposed modification are consistent with those described in Section 6.15 of the project REF (December 2019), including the existing road network, the Main North railway line and flooding hazards associated with the Hunter River. There was no change to the existing environment in the addendum REF (October 2023).	**Construction** The hazards and risks for the construction of the proposed modification would be consistent with those identified in the project REF (December 2019). **Operation** Operational hazards and risks of the proposed modification would generally be consistent with those identified in the project REF (December 2019). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.
Cumulative impacts	N/A	**Construction** Cumulative impacts were assessed in Section 6.16 of the project REF (December 2019). The key cumulative impacts identified for construction included: • Increased construction vehicle traffic on local roads • Cumulative air and noise impacts associated with multiple construction activities • Temporary changes to visual amenity. The proposed modification would not materially alter cumulative impacts for traffic, air, noise and visual amenity.

Environmental factor	Existing environment	Potential impacts
		Operation The cumulative impacts associated with the operation of the proposed modification would be consistent with those identified in the project REF (December 2019). **Safeguards and management measures** The impacts of the proposed modification would be managed through the implementation of the safeguards and management measures identified in Table 7-1 of this addendum REF.

7. Environmental management

7.1 Environmental management plans (or system)

Multiple safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposed modification. Should the proposed modification proceed, these management measures would be addressed if required during detailed design and incorporated into the Contractors Environmental Management Plan (CEMP) and applied during the construction and operation of the proposed modification.

7.2 Summary of environmental safeguards and management measures

Environmental safeguards and management measures for the Project are summarised in Table 7-1. Safeguards and management measures are presented as per the addendum REF (October 2023). No additional safeguards and management measures were identified in the addendum REF (October 2023) or this addendum REF. The safeguards and management measures will be incorporated into the detailed design phase of the proposed modification, the CEMP and implemented during construction and operation of the proposed modification, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

Table 7-1: Summary of safeguards and management measures

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
GEN1	General - minimise environmental impacts during construction	A Construction Environment and Management Plan (CEMP) will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Manager prior to commencement of the activity. As a minimum, the CEMP will include the following: (a) A Surface Water Management Plan (SWMP) (b) Any requirements associated with statutory approvals (c) Details of how the proposal will implement the safeguards outlined in the project REF (d) Issue-specific environmental management plans (e) Roles and responsibilities (f) Communication requirements (g) Induction and training requirements (h) Procedures for monitoring and evaluating environmental performance, and for corrective action (i) Reporting requirements and record-keeping (j) Procedures for emergency and incident management (k) Procedures for audit and review.	Construction contractor	Pre-construction / construction
B1	Biodiversity	A Flora and Fauna Management Plan will be prepared and implemented as part of the CEMP. It will address terrestrial and aquatic matters and will include, but not necessarily be limited to: (a) plans for the construction site and adjoining area showing native vegetation, flora and fauna habitat, threatened species and threatened ecological communities; (b) plans showing areas to be cleared and areas to be protected, including exclusion zones and protected habitat features (e.g. hollow-bearing trees), and areas for rehabilitation or re-establishment of native vegetation. The limits of clearing within the construction site and protected habitat features will be clearly delineated using appropriate signage, barriers, fencing or markings; (c) requirements set out in the Landscape Design Guideline (RMS 2018); (d) procedures addressing relevant matters specified in the Biodiversity Guidelines - Protecting and managing biodiversity on RTA projects (RTA 2011) including but not limited to: • pre-clearing, including the outcomes of final flora and fauna species checks, establishment of exclusion zones and on-ground identification of specific habitat features to be retained (such as hollow-bearing trees) • vegetation clearing and bushrock removal, including staged habitat removal and any specified seasonal limits on clearing activities • fauna handling and unexpected threatened species finds	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		• rehabilitation, revegetation, re-use of soils, woody debris and bushrock, and other habitat management actions • weed, pathogen and pest management. (e) procedures addressing relevant matters specified in the NSW DPI (Fisheries) Policy and guidelines for fish habitat conservation and management (f) monitoring during construction (g) adaptive management measures to be applied if monitoring indicates unexpected adverse impacts. The Flora and Fauna Management Plan will also include the following measures to reduce potential for fauna entrapment within the pipeline trenches: • Minimising to the period of time the trench is open • Provide opportunities for fauna to exit the trench such as trench plugs or other appropriate measures, at a minimum of every 500 m • Installation of fauna shelter devices, such as sawdust filled bags, at 250 m intervals along the trench • Daily pre-start inspections of the open trench, and removal of trapped fauna by suitably qualified personnel as required • Welded pipe strings will be end capped to prevent fauna entry.		
B2	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be considered during the detailed design stage and implemented where practicable and feasible. Measures to avoid and minimise impacts should be prioritised in the following order: • critical habitat • threatened species, endangered ecological communities, groundwater dependent ecosystems or their habitat • native vegetation and habitat supporting flora and fauna connectivity and/or that supports other environmental objectives such as protecting water quality, hydrology or erosion and sediment controls • native vegetation of higher quality condition other native vegetation.	Construction contractor	Pre-construction / construction
B3	Biodiversity	Consistent with the Biodiversity Guidelines - Protecting and managing biodiversity on RTA projects (RTA 2011), and any specific requirements of the approved Flora and Fauna Management Plan, management arrangements will be implemented to ensure unavoidable vegetation and bushrock removal minimises biodiversity impacts as far as practicable. As a minimum that will include: • no vegetation clearing or bushrock removal beyond limits identified in this proposal • avoiding identified exclusion zones and protected habitat features. • avoiding mixing of topsoil with woody debris materials • separation of woody vegetation suitable for re-use during construction and rehabilitation or revegetation works • implementation of staged clearing • trimming and pruning to be undertaken in accordance with relevant Australian Standards • in riparian zones: avoiding clearing during likely flood periods; ensuring cleared vegetation does not enter the waterway; installation of suitable sedimentation and erosion control; retaining roots and stumps to maintain bank stability; applying the hierarchy for snag management set out in the Guidelines.	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
B4	Biodiversity	Prior to the commencement of construction, carry out: • Targeted surveys to confirm the presence of the following along the Hunter River and unnamed tributary to the north of the Hunter River within the area to be impacted by the proposal – River red gum (Eucalyptus camaldulensis) (endangered population - BC Act) – Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions (EEC – BC Act) • Threatened flora survey, fauna habitat assessments and ground-truthing of vegetation mapping, between the Hunter River and the southern extent of the area surveyed by Umwelt (2019), north of the New England Highway near Gowrie Gates, within the area to be impacted by the proposal • Ground truthing surveys of the regional vegetation mapping within the McDougalls Hill ancillary facility to confirm presence of: – Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions EEC (BC Act) – Central Hunter Valley Eucalypt Forest and Woodland CEEC (EPBC Act) No clearing of threatened native vegetation is to be carried out within the McDougalls Hill ancillary facility. Subject to the outcomes of the above, a consistency review or environmental assessment may be required.	Construction contractor	Pre-construction
B5	Biodiversity	The unexpected species find procedure is to be followed under Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	Construction contractor	Construction
B6	Biodiversity	A Habitat Replacement Strategy would be developed and implemented during the detailed design stage in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011). The strategy is to consider, where suitable, the use of: (a) artificial hollow creations. (b) reinstallation of suitable hollows removed by the proposal. (c) installation of nest boxes	Construction contractor	Detailed design
B7	Biodiversity	Prior to the commencement of construction, carry out monitoring to determine the presence of threatened microbats in the culverts that are part of the former Great Northern Railway. If threatened microbats are identified, collect the following information: (a) Species present. (b) Total number of individuals and groups per occupied roost site. (c) Description of occupied roost sites. (d) Breeding status of the colony, including approximate adult to juvenile ratios.	Construction contractor	Pre-construction
B8	Biodiversity	A Microbat Management Plan is to be developed and implemented. The Microbat Management Plan is to be prepared by a microbat specialist and include the following: (a) A monitoring program for both during and outside of breeding periods. (b) Details of construction activities to be monitored that may affect microbat habitat, particularly light, noise, vibration, alteration of drainage into culverts. (c) Mitigation measures to be implemented during construction, including regular inspections of impacts from	Construction contractor	Pre-construction / construction / post-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		sedimentation and weed encroachment to culvert entrances, consider timing and nature of immediately adjacent works in relation to known breeding period of relevant threatened microbats. (d) Adaptive management measures to be implemented if monitoring indicates a decline in bat numbers or if bats are observed leaving the roost during construction activities. (e) A process for evaluating the effectiveness of management measures.		
B9	Biodiversity	In accordance with Section 199 of the FM Act, Transport would notify DPI Fisheries in writing of any proposed dredging or reclamation in the Hunter River and its tributary. Transport would consider any matters raised by the Minister.	Transport	Pre-construction
B10	Biodiversity	In accordance with Section 219 of the FM Act, Transport would seek a permit from DPI Fisheries for any temporary blockage of fish passage. Transport would consider any matters raised by the Minister.	Transport	Pre-construction
B11	Biodiversity	Instream silt curtains would be implemented and maintained for construction in the Hunter River. Silt curtains would be installed such that they do not block fish passage.	Construction contractor	Construction
B12	Biodiversity	Changes to existing surface water flows would be minimised through detailed design. Any rock platform required to be constructed within the Hunter River bridge would be designed and constructed to prevent blocking the main river channel. The platform would be designed to ensure that flow of the main river channel and fish passage is maintained even during low flow periods. The Department of Primary Industries (DPI) would be consulted on the final design.	Construction contractor	Detailed design
B13	Biodiversity	A wildlife connectivity strategy would be finalised and implemented during the detailed design stage in accordance with the draft Transport Wildlife Connectivity (a) Description of occupied roost sites. (b) Breeding status of the colony, including approximate adult to juvenile ratios.	Construction contractor	Detailed design
B14	Biodiversity	Notwithstanding the Revised Impact Area, clearing of trees in areas mapped as a Threatened Ecological Community (TEC) or habitat features would be avoided for the following activities unless within the design footprint of the bypass: • Geotechnical investigations • Construction compound sites including stockpiling and material laydown areas • Temporary infrastructure including security and exclusion fencing, erosion and sediment controls • Utility relocations. If the removal of trees for the above activities cannot be avoided, a Tree Removal Application would be prepared for approval. The application would include a review of options considered, justification for why removal is required, and total areas of TEC and habitat features to be removed. Transport approval of the application would be required prior to commencing the activity.	Transport / Construction contractor	Pre-construction / construction
B15	Biodiversity	A Tree and Hollow Replacement Plan will be prepared in accordance with the Transport Tree and Hollow Replacement Guidelines (2022) for tree removal not subject to the Biodiversity Offset Strategy. The plan will exclude hollow replacement otherwise addressed by the Habitat Replacement Strategy.	Construction contractor	Construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
W1	Surface water and flooding	A Soil and Water Management Plan will be prepared in accordance with QA Specification G38 and implemented as part of the CEMP. The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the activity and describe how these risks will be managed and minimised during construction. That will include arrangements for managing pollution risks associated with spillage or contamination on the site and adjoining areas and monitoring during and post-construction.	Construction contractor	Pre-construction / construction
W2	Surface water and flooding	A flood response management plan will be prepared as part of the CEMP. The Flood Response Management Plan will address, but not necessarily be limited to: • Processes for monitoring and mitigation flood risk • Steps to be taken in the event of a flood warning including removal or securing of loose material, equipment, fuels and chemicals.	Construction contractor	Construction
W3	Surface water and flooding	A site specific Erosion and Sediment Control Plan(s) will be prepared and implemented and included in the Soil and Water Management Plan. The Plan(s) will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including, but not necessarily limited to: runoff, diversion and drainage points; sediment basins and sumps; scour protection; stabilising disturbed areas as soon as possible, check dams, fencing and swales; and staged implementation arrangements. The Plan will also 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.	Construction contractor	Construction
W4	Surface water and flooding	Stockpiles will be designed, established, operated and decommissioned in accordance with the RTA Stockpile Site Management Guideline 2011.	Construction contractor	Construction
W5	Surface water and flooding	The rehabilitation of disturbed areas will be undertaken progressively as construction stages are completed, and in accordance with: • Landcom's Managing Urban Stormwater: Soils and Construction series • RTA Landscape Guideline • RMS Guideline for Batter Stabilisation using Vegetation (2015).	Construction contractor	Construction
W6	Surface water and flooding	Consistent with any specific requirements of the approved Soil and Water Management, control measures will be implemented to minimise risks associated with erosion and sedimentation and entry of materials to drainage lines and waterways. That will include, but not necessarily be limited to: • Sediment management devices, such as fencing, hay bales or sandbags • Measures to divert or capture and filter water prior to discharge, such as drainage channels and first flush and sediment basins • Scour protection and energy dissipaters at locations of high erosion risk • Installation of measures at work entry and exit points to minimise movement of material onto adjoining roads, such as rumble grids or wheel wash bays • Appropriate location and storage of construction materials, fuels and chemicals, including bunding where appropriate.	Construction contractor	Construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
W7	Surface water and flooding	Batters will be designed and constructed to minimise risk of exposure, instability and erosion, and to support long-term, on-going best practice management, in accordance with Transport 'Guideline for Batter Surface Stabilisation using vegetation' (2015).	Transport / construction contractor	Detailed design / construction
W8	Surface water and flooding	Two spill containment basins with a minimum volume of 25,000 Litres are to be provided on the north and south side of the Hunter River.	Transport / construction contractor	Detailed design / pre- construction / construction
W9	Surface water and flooding	A Spill Management Plan will be prepared and implemented as part of the CEMP to minimise the risk of pollution arising from spillage or contamination on the site and adjoining areas. The Spill Management Plan will address, but not necessarily be limited to: • Management of chemicals and potentially polluting materials • Any bunding requirements • Maintenance of plant and equipment • Emergency management, including notification, response and clean-up procedures.	Construction contractor	Pre-construction / construction
W10	Surface water and flooding	A water quality monitoring program would be developed and implemented as part of the Soil and Water Management Plan in accordance with Transport Guideline for Construction Water Quality Monitoring (Roads and Maritime, 2003). The monitoring program is to include: • Visual monitoring of local water quality • Up and down stream water quality monitoring of the Hunter River prior to the start of construction • Monthly up and down stream water quality monitoring for the duration of working within and over the Hunter River.	Construction contractor	Construction
W11	Surface water and flooding	Any dewatering activities will be undertaken in accordance with the RTA Technical Guideline: Environmental management of construction site dewatering in a manner that prevents pollution of waters.	Construction contractor	Detailed design / construction
E1	Contamination	The CEMP will include an unexpected finds protocol for potentially contaminated material encountered during construction work.	Construction contractor	Construction
E2	Contamination	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. This may include but not be limited to: • Diversion of surface runoff • Capture of any contaminated runoff • Temporary capping. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport Environment Manager and/or the EPA.	Construction contractor	Construction
E3	Contamination	An Asbestos Management Plan will be developed and implemented to manage asbestos and asbestos containing material if encountered during the construction. The plan will include: • Identification of potential asbestos on site • Procedures to manage and handle any asbestos	Construction contractor	Construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		• Mitigation measures if asbestos is encountered during construction • Procedures for disposal of asbestos in accordance with NSW EPA guidelines, Australian Standards and relevant industry codes of practice.		
E4	Soils	An Acid Sulfate Materials Management Plan will be prepared and implemented as part of the CEMP. The Plan will be prepared in accordance with the RTA Guidelines for the Management of Acid Sulfate Materials.	Construction contractor	Construction
T1	Traffic and transport	Disruptions to property access and traffic will be notified to landowners at least five days prior in accordance with the relevant community consultation processes outlined in the Traffic Management Plan.	Transport	Detailed design
T2	Traffic and transport	Where any legal access to property is permanently affected, arrangements for appropriate alternative access will be determined in consultation with the affected landowner and local road authority.	Construction contractor / Transport	Detailed design
T3	Traffic and transport	Access to properties will be maintained during construction. Where that is not feasible or necessary, temporary alternative access arrangements will be provided following consultation with affected landowners and the relevant local road authority.	Construction contractor / Transport	Construction
T4	Traffic and transport	A detailed construction traffic management plan will be prepared in accordance with Traffic Control at Work Sites Manual Version 6.1 (Transport, 2022) and Specification G10 - Control of Traffic. The plan will provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction. The plan will include: • Access and haulage routes • 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 including identifying and consulting with receivers that may be affected by construction road traffic noise • 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 • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic; and • Monitoring, review and amendment mechanisms.	Construction contractor	Pre-construction
T5	Traffic and transport	Consultation with Singleton Council will occur regarding the use of local roads as construction haulage routes. Where practical, heavy vehicle movements would be outside the traffic peak hours to minimise impacts on the existing road network operation during construction.	Transport Construction contractor	Pre-construction / Construction
T6	Traffic and transport	Preparation of pre-construction and post construction road condition reports for local roads likely to be used during construction. Any damage resulting from construction (not normal wear and tear) will be repaired unless alternative	Construction contractor	Pre-construction / post- construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		arrangements are made with the relevant road authority. Copies of road condition reports will be provided to the local roads authority.		
T7	Traffic and transport	Pedestrian and cyclist access will be maintained throughout construction. Where that is not feasible or necessary, temporary alternative access arrangements will be provided following consultation with affected landowners and the local road authority.	Construction contractor	Construction
N1	Noise and vibration	A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the Construction Environmental Management Plan. The CNVMP would identify: • all potential significant noise and vibration generating activities associated with the activity • noise and vibration sensitive receptors • measures to be implemented during construction to minimise noise and vibration impacts, such as restrictions on working hours, staging, placement and operation of work compounds, parking and storage areas, temporary noise barriers, haul road maintenance, and controlling the location and use of vibration generating equipment • feasible and reasonable mitigation measures to be implemented, taking into account the Transport's Beyond the Pavement urban design policy, process and principles • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures • an out of hours works procedure, including approval process and proposed mitigation measures.	Contractor	Pre-construction / post- construction
N2	Noise and vibration	All sensitive receivers likely to be affected will be notified at least five days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will include details of: • the Project • construction period and construction hours • contact information for Project management staff • complaint and incident reporting and how to obtain further information.	Contractor	Construction
N3	Noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant Project specific and 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

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
N4	Noise and vibration	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. Any variations to the standard construction hours will follow the approach RTA Environmental Facts Sheet - Noise Management and Night Works, including consultation with the affected local community.	Contractor	Construction
N5	Noise and vibration	Where reasonable ~~ad~~ **and** feasible, high noise generating activities (75dB(A)Leq at receiver) be used during standard construction hours and in continuance blocks of no more than three hours with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receiver.	Contractor	Construction
N6	Noise and vibration	Where high noise generating activities (75 dB(A) Leq at receiver) are required out of hours the following will be implemented: • The equipment will be used prior to 10pm where reasonable and feasible • Where the above cannot be achieved the equipment will be used prior to midnight where reasonable and feasible. It is not proposed to apply a three hour on and a one hour off respite approach in an effort to ensure that the use of such equipment is completed as early in the night as possible.	Contractor	Construction
N7	Noise and vibration	Where properties have been identified for architectural treatment and these properties would be impacted by noise from construction works, Transport would consult with those property owners on the early installation of treatments to provide noise mitigation during the construction of the proposal.	Transport	Pre-construction
N8	Noise and vibration	The following will be implemented for deliveries ~~the~~ **to** and from the proposal: • Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. • Dedicated loading/unloading areas to be shielded if close to sensitive receivers. • Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. • Construction sites would be arranged to limit the need for reversing associated with regular/repeatable movements	Contractor	Construction
N9	Noise and vibration	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.	Contractor	Construction
N10	Noise and vibration	The noise associated with the operation of construction ancillary facilities would primarily result from the operation of fixed and mobile plant and truck movements. Consideration would be given to the layout of the site in order to maximise distance and shielding to nearby receivers.	Contractor	Pre-construction / construction
N11	Noise and vibration	Where practicable, work should be scheduled to avoid major student examination periods such as before or during Higher School Certificate and at the end of higher education semesters.	Contractor	Construction
N12	Noise and vibration	At compound sites, consider positioning site sheds, earth bunds and hoarding to maximise shielding to residential receivers.	Contractor	Construction
N13	Noise and vibration	In circumstances where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures are required.	Contractor	Construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		These measures include the following: • Monitoring • Notification (letterbox drop or equivalent) • Specific notifications • Phone calls • Individual briefings • Respite Offers • Respite Periods • Duration Respite • Alternative Accommodation.		
N14	Noise and vibration	Vibration intensive equipment size would be selected to avoid working within the structural damage minimum working distances. The use of less vibration intensive methods of construction or equipment would be considered where feasible and reasonable.	Contractor	Construction
N15	Noise and vibration	Where the use of vibration intensive equipment within the relevant minimum working distances cannot be avoided, prior to the commencement of vibration intensive work, a detailed inspection will be carried out and a written and photographic report prepared to document the condition of buildings and structures within the minimum working distances. A copy of the report will be provided to the relevant landowner or land manager.	Contractor	Pre-construction
N16	Noise and vibration	To confirm that the noise level targets are achieved, a post-construction noise monitoring program be carried out in accordance with the Noise Mitigation Guideline (TfNSW, 2023).	Transport	Operation
AH1	Aboriginal heritage	A total of 16 Aboriginal archaeological sites, detailed in Table 6-37 of the project REF will be impacted by the proposal. Transport should apply for an 'all of area' AHIP for land to be impacted by the proposal (the 'AHIP area' shown on Figure 38, Appendix D of the previous addendum REF (~~April~~ **May** 2023)). This AHIP will allow impacts to these sites.	Transport	Detailed design / pre- construction
AH2	Aboriginal heritage	Impacted open artefact site Singleton bypass OAS19 (37-6-3903, 37-6-1466 and 37-6- 1468) has been assessed as being of moderate scientific significance and will be partially impacted by the proposal. To mitigate the impact of the proposal on this site, an archaeological salvage program incorporating surface collection and excavation is recommended for the impacted portion of this site. Salvage activities within OAS19 can only occur after an AHIP has been obtained and should be completed in accordance with the research design and methodology provided in Appendix E of AECOM's Aboriginal Archaeological Report.	Transport	Detailed design
AH3	Aboriginal heritage	Impacted open artefact sites Singleton bypass OAS2 (37-6-3895), OAS7 (37-6-3889), OAS9 (37-6-3887), OAS10 (37-6-3886), OAS11 (37-6-3892), OAS12 (37-6-3891), OAS13 (37-6-3900), OAS15 (37-6-3898), OAS17 (37-6-3905), OAS18 (37-6-3904), McDougall Hill 2 (37-6-0789) and McDougall Hill 3 (37-6-0788) have been assessed as being of low scientific significance. Regardless, in recognition of their cultural significance, community collection is recommended for these sites, with collection to be limited to the impacted portion of each site. Community collection can only occur after an AHIP has been obtained from OEH and should be completed in accordance with research design and methodology provided in Appendix E of AECOM's Aboriginal Archaeological Report.	Transport	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
AH4	Aboriginal heritage	Impacted subsurface artefact scatter sites Singleton bypass OAS21 and OAS22 have been assessed as being of low scientific significance. No further management or mitigation actions are recommended for these sites.	Transport	Detailed design
AH5	Aboriginal heritage	Should the requirement for impacts to AHIMS registered potential Aboriginal scarred tree 37-6-0681 be confirmed during the detailed design or construction phases of the proposal, a qualified arborist should be engaged to undertake a removal/relocation feasibility assessment of the tree. Subsequent mitigation will depend on the results on this assessment, as follows: • Should the engaged arborist determine that 37-6-0681 is not suitable for relocation (i.e., due to the health of the tree and/or other factors), a detailed archival recording of the tree and its associated scars should be undertaken by a qualified archaeologist. A minimum of one RAP field representative will be invited to participate in the archival recording. • Should the engaged arborist determine that 37-6-0681 is suitable for removal/relocation, the relocation procedure outlined in section 10.1 of Appendix D of the project REF should be employed. All RAPs should be given the opportunity to review and comment on the arborist's relocation assessment report and if required, the removal methodology (including equipment), keeping place and ongoing access arrangements.	Contractor	Detailed design / pre- construction
AH6	Aboriginal heritage	Ten Aboriginal archaeological sites, listed in Table 6-37 of the project REF will not be impacted by the proposal and should be conserved in situ. The protection of these sites to be retained and those sites identified for partial impact will occur in accordance with the measures outlined in the adopted Aboriginal Heritage Management Plan.	Contractor	Detailed design / pre- construction
AH7	Aboriginal heritage	Cultural Site A: Gathering Place (Railway Bridge Camps) will be partially impacted by the proposal. Protective fencing should be erected between the zone of construction activity and the unimpacted area(s) of this site prior to any construction activities, with the unimpacted area(s) of the site to be clearly marked on all operational maps as 'no go zones' of environmental and heritage sensitivities. The location of the fencing at Cultural Site A: Gathering Place (Railway Bridge Camps) should be confirmed by a cultural heritage values consultant to ensure that it accurately reflects the mapped site. Fencing should be maintained throughout the duration of works.	Contractor	Pre-construction
AH8	Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared and implemented as part of the CEMP. The AHMP will provide specific guidance on measures and controls to be carried out to avoid and mitigate impacts on Aboriginal cultural heritage during construction. This will include protection measures to be applied during construction, as well as contractor training in general Aboriginal cultural heritage awareness and management of Aboriginal heritage values. Site locations will be identified in the proposal's CEMP and marked as environmentally sensitive areas or no-go zones. The management recommendations detailed in the Addendum ACHAR will be included in the Project's AHMP.	Contractor	Detailed design / pre- construction
AH9	Aboriginal heritage	All relevant staff and contractors working on site are to receive training to ensure awareness of the requirements of the AHMP and relevant statutory responsibilities. Site-specific training is to be given to personnel when working in the vicinity of identified Aboriginal heritage sites.	Contractor	Pre-construction
AH10	Aboriginal heritage	In the event that construction works within the study area uncover any unexpected Aboriginal objects, the relevant provisions of Transport's Standard Management Procedure for Unexpected Heritage Items (Roads and Maritime, 2015) should be followed.	Contractor	Pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
AH11	Aboriginal heritage	A Project specific Aboriginal cultural heritage interpretation plan will be developed to promote understanding and awareness of the cultural heritage values of the study area. The strategy should be prepared in accordance with Transport's draft Heritage Interpretation Guideline (2016) in consultation with the RAPs and identified Aboriginal knowledge holders. The Aboriginal heritage interpretation Project plan will include: a. Interpretative signage (or similar) relevant to Cultural Site A: Gathering Place (Railway Bridge Camps) and how it sits within the wider cultural landscape. The content of the signage is to be developed by a cultural heritage specialist in consultation with the identified Aboriginal knowledge holders. b. Opportunities for input into (aesthetic) design elements of the proposal such as noise walls, bridge piers or abutments to include the interpretation of the Aboriginal cultural values of the area. c. Provisions for rehabilitation and revegetation of the impacted portion of Cultural Site A: Gathering Place (Railway Bridge Camps) with local Indigenous plant species. The identification of the plant species should be undertaken in consultation with the identified Aboriginal knowledge holders. Opportunities should be provided to local Aboriginal organisations for involvement and potential engagement in the revegetation and landscaping process.	Transport	Detailed design / pre- construction
AH12	Aboriginal heritage	An educational booklet (or similar) would be developed by a cultural heritage specialist on the cultural values and historical records relating to the broader cultural landscape of which Cultural Site A: Gathering Place (Railway Bridge Camps) is one element. As part of this process the photographic recording of the cultural landscape should occur prior to any construction impacts. The final content of the booklet (or similar) to be developed in consultation with the RAPs and identified Aboriginal knowledge holders. To assist in the production of the recommended educational booklet, photographic recording of the cultural landscape by a cultural values specialist at Cultural Site A: Gathering Place (Railway Bridge Camps) should occur prior to any construction impacts.	Transport	Detailed design / pre- construction
AH13	Aboriginal heritage	In accordance with Requirement 16B of the Code of Practice, all stone artefacts recovered from the proposal area as part of the test excavation program detailed in the Aboriginal Archaeological Report is to be stored temporarily at AECOM's head office (Level 8, 420 George Street, Sydney) while options for their long term management are being investigated, as determined through consultation with RAPs. Requirement 26 of the Code of Practice provides standard procedures for the deposition of stone artefacts dealt with under AHIPs and the Code of Practice. These procedures will be strictly adhered to.	AECOM / Transport	Detailed design / pre- construction
AH14	Aboriginal heritage	Any Aboriginal objects removed from the study area as a result of test excavation and salvage activities authorised by the Code of Practice or an AHIP should be reburied upon completion of all post-excavation analyses, with the location of the reburial to be determined in consultation with RAPs.	Transport	Construction
AH15	Aboriginal heritage	Impacted surface artefact scatter site Singleton bypass OAS3 (37-6-3819) has been assessed as being of low scientific significance and will be partially impacted by the proposed modification. To mitigate this impact, it is recommended that the impacted portion of this site be subject to archaeological salvage. Salvage should take the form of surface collection and be undertaken in accordance with the surface collection methodology provided in Appendix E of AECOM's (2022b) updated Aboriginal Archaeological Report) for the Project.	Transport	Detailed design
AH16	Aboriginal heritage	Impacted subsurface artefact scatter site Singleton bypass OAS23 (37-6-4219) has been assessed as being of high scientific significance and will be partially impacted by both the Project and proposed modification. To mitigate this impact, an archaeological salvage program is recommended for the impacted portion of this site. Salvage activities	Transport	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		within OAS23 can only occur after Transport's AHIP variation application has been approved by Heritage NSW and should be completed in accordance with the research design and methodology provided in Appendix E of the Addendum ACHAR.		
AH17	Aboriginal heritage	The portion of Singleton bypass OAS23 (37-6-4219) located outside of the revised disturbance area should be conserved in situ, with associated protective measures outlined in the AHMP.	Transport / contractor	Detailed design
AH18	Aboriginal heritage	PAD site Singleton bypass PAD4 (37-6-4215) will not be impacted by the Project or proposed modification. The PAD should be conserved in situ, with associated protective measures outlined in the AHMP.	Transport / contractor	Detailed design
H1	Non-Aboriginal heritage	A heritage management plan should be produced and included with in the Construction and Environment Management Plan measures to manage the identified heritage items in relation to the proposed works, including: • Heritage protection measures • An induction program for construction personnel on the management of non- Aboriginal heritage values • Procedures to be implemented if previously unidentified non-Aboriginal relics or heritage items are discovered during construction, in accordance with the Transport's Standard Management Procedure - Unexpected Archaeological Finds.	Contractor	Construction
H2	Non-Aboriginal heritage	If the use of vibration intensive plant cannot be avoided within the minimum working distance for cosmetic damage the following procedure would occur as a minimum: • Notification of the works to the affected residents and community • Works would not proceed until attended vibration measurements are undertaken. Vibration monitors are to provide real-time notification of exceedances of levels approaching cosmetic damage criteria If ongoing works are required a temporary relocatable vibration monitoring system would be installed, to warn operators (via flashing light, audible alarm, short message service (SMS) etc) when vibration levels are approaching the cosmetic damage objective.	Contractor	Detailed design / construction
H3	Non-Aboriginal heritage	Singleton Council should be informed of the proposed impacts to heritage items and their records relating to the corresponding LEP listings should be updated accordingly.	Transport	Construction
H4	Non-Aboriginal heritage	Should any heritage items, archaeological remains or potential relics of Non-Aboriginal origin be encountered, then construction work that might affect or damage the material will cease and notification provided to Transport's as per Transport Standard Management Procedure - Unexpected Archaeological Finds. Work will only re- commence once the requirements of that Procedure have been satisfied.	Contractor	Construction
H5	Non-Aboriginal heritage	Transport will investigate the need to salvage heritage fabric from listed items removed by the proposal for possible reuse in heritage reinterpretation in consultation with Singleton Council.	Transport	Detailed design
H6	Non-Aboriginal heritage	An archival recording of the Former Pumping Station (I21) will be prepared prior to the removal of the item. The recording will be prepared in accordance with guidelines published by the Heritage Division, Department of Premier & Cabinet.	Contractor	Construction
H7	Non-Aboriginal heritage	Prior to ground disturbance impacts at the Former Pumping Station (I21), a permit under Section 140 of the Heritage Act 1977 would be obtained given the potential for archaeological relics at this location.	Transport / contractor	Detailed design / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
A1	Air quality	An Air Quality Management Plan will be prepared and implemented as part of the CEMP. The Plan will identify: • Potential sources of air pollution (such as dust, vehicles transporting waste, plant and equipment) during construction • Air quality management objectives consistent with any relevant published EPA and/or ~~DPIE~~ **DCCEEW** guidelines • Mitigation and suppression measures to be implemented, such as spraying or covering exposed surfaces, provision of vehicle clean down areas, covering of loads, street cleaning, use of dust screens, maintenance of plant in accordance with manufacturer's instructions • Methods to manage works during strong winds or other adverse weather conditions • A progressive rehabilitation strategy for exposed surfaces • When the air quality, suppression and management measures need to be applied, who is responsible, and how effectives will be assessed • Community notification and complaint handling procedures.	Construction contractor	Construction
A2	Air quality	As part of the Air Quality Management Plan, a monitoring program would be developed for monitoring construction dust from the proposal. The monitoring plan would be implemented prior to construction and during the construction period to assess effective implementation of air quality safeguards, identify any unexpected or inadvertent impacts, and identify recommended revisions or improvements.	Construction contractor	Construction
LV1	Landscape and visual	All plant material to be locally sourced (seed collection preferred), with any seed collection to commence within three months of construction contract award, where possible.	Transport	Detailed design
LV2	Landscape and visual	An Urban Design Plan will be prepared as part of the CEMP. The Plan will include: • Location and identification of vegetation in the proposal area to be retained and proposed landscaped areas • Details of the staging of built elements including retaining walls, bridges and noise walls • Details of the staging of landscape works • Maintenance measures for landscaped or rehabilitated areas, including timings • A landscape monitoring program including an inspection program with frequency.	Construction contractor	Pre-construction
P1	Property acquisition	Property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2014) and the Land Acquisition (Just Terms Compensation) Act 1991.	Transport	Detailed design
P2	Property acquisition	Transport will complete property adjustments including fencing, driveways/access and other property infrastructure impacted by the proposal in consultation with affected property owners.	Transport	Detailed design
P3	Property acquisition	Transport will investigate the possibility of licencing land beneath the bridge to impacted landholders to enable continued access for fragmented properties.	Transport	Detailed design
SE1	Social and economic	Landowner surveys will be carried out to: Gather information about the current use and activities carried out on their property • Identify how the proposal would affect ongoing land use and activities on their property • Inform the development of appropriate mitigation measures.	Transport	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
SE2	Social and economic	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to ensure provision of timely and accurate information to the community during construction. The CP will include (as a minimum): • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints • How the Project webpage will be maintained for the duration of the proposal. • Minimum consultation activities to be carried out • A complaints handling procedure.	Transport / construction contractor	Detailed design / construction
SE3	Social and economic	Transport will develop a signage strategy for the entrances to Singleton, in consultation with Singleton Council to encourage motorists to visit Singleton. This will include signage showing: • The travel distances and estimated times for travelling routes via the bypass compared to travelling via the Singleton town centre • Services and facilities available within the Singleton township • Any visitor attractions within the Singleton township.	Transport	Detailed design
SE4	Social and economic	Transport will engage with Singleton Council and local businesses regarding the progress of the proposal to allow businesses time to prepare for changed traffic conditions through the town.	Transport	Detailed design / construction
M1	Resource use	Use of recycled-content materials would be considered during the detailed design	Transport	Detailed design
M2	Construction waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will provide specific guidance on measures and controls to be implemented to support minimising the amount of waste produced and appropriately handle and dispose of unavoidable waste. The WMP will include, but not necessarily be limited to: • Measures to avoid and minimise waste associated with the Project. • Classification of wastes generated by the Project and management options (re- use, recycle, stockpile, disposal). • Classification of wastes received from off-site for use in the Project and management options. • Identifying any statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions. • Procedures for storage, transport and disposal. • Monitoring, record keeping and reporting, including any documentation management obligations arising from resource recovery exemptions. The WMP would be prepared taking into account the Roads and Maritime Environmental Procedure – Management of Wastes on Roads and Maritime Services Land and relevant Transport Waste Fact Sheets.	Construction contractor	Pre-construction / construction
M3	Construction waste	The following resource management hierarchy principles will be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). • Disposal will be a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
CC1	Climate change	Construction equipment, plant and vehicles will be appropriately sized for the task, serviced frequently and will not be left idling when not in use.	Construction contractor	Construction
R1	Hazard and risk	Emergency response plans will be incorporated into the construction environmental management plan.	Construction contractor	Pre-construction / construction
R2	Hazard and risk	A Hazard and Risk Management Plan will be prepared and implemented as part of the CEMP. The Plan will identify: • Details of hazards and risks associated with the activity • Measures to be implemented during construction to minimise these risks • Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • A monitoring program to assess performance in managing the identified risks, including "equipment checking and maintenance requirements contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations”.	Construction contractor	Pre-construction / construction

7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the Project and when they need to be obtained are listed in Table 7-2. Additional or changed licenses and approval requirements identified in this addendum REF are indicated by underlined and/or struck out font. No additional licensing or approval is required as a result of the proposed modification.

Table 7-2: Summary of licensing and approval required

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s43)	Environment protection licence (EPL) for scheduled activities from the EPA.	Prior to start of the activity.
Fisheries Management Act 1994 (s199)	Notification to the Minister for Primary Industries prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of work.
Fisheries Management Act 1994 (s219)	Permit to obstruct the free passage of fish (temporary or permanent) from the Minister for Primary Industries.	Prior to start of the activity.
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit from the Chief Executive of Heritage Division, Department of Premier & Cabinet. An AHIP variation application was approved on 5 May 2023. No further variation to AHIP 4985 is required as part of this addendum REF.	Prior to start of the activity.
Crown Lands Act 1989 (s6)	Licence to occupy areas of Crown land.	Prior to start of the activity
Water Management Act 2000 (s256)	Project within the Singleton declared floodplain under the Hunter Valley Flood Mitigation Scheme. A Section 256 application is required.	In consultation with NSW DCCEEW - Hunter Valley Flood Mitigation Scheme.

8. Conclusion

8.1 Justification

The New England Highway is of key importance to national and regional economic growth, development and connectivity. The strategic need for the Project stems from the importance of the New England Highway in providing safe and efficient access as a major freight and commuter route for the Upper and Lower Hunter. The proposed modification would improve connectivity of the bypass to Singleton town centre while also maintaining the New England Highway as a safe and efficient freight and commuter route. The proposed modification is considered consistent with the strategic planning and policy frameworks, as outlined in Section 8.1 of the addendum REF (October 2023).

The proposed modification is also consistent with the objectives stated in Section 2.2 of the addendum REF (October 2023) and Section 2.2 of this addendum REF.

The proposed modification would potentially result in some increases to environmental impacts including impacts to noise, flooding and amenity. Regarding flooding, increases in peak flood levels and flood velocity as a result of the proposed modification are expected when compared to the approved project. However, whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration of inundation. The existing safeguards and management measures provided in Section 7.2 would avoid, minimise or mitigate potential impacts arising from the proposed modification.

The proposed modification would have long-term benefits including better access to Singleton town centre, and improved road safety and maintenance of the Project.

8.1.1 Social factors

Potential social impacts as a result of the proposed modification include the temporary disruptions and permanent adjustments to private property access, amenity impacts including noise and air emissions, and landscape and visual changes. However, no extra properties would need to be acquired to those presented in the addendum REF (October 2023). Long-term benefits of the proposed modification include improving road safety while also maintaining the New England Highway as an important freight and commuter route and improving travel through Singleton.

8.1.2 Biophysical factors

The proposed modification has sought to minimise impacts to biodiversity where reasonable and feasible. The proposed modification would not result in the additional direct removal of native vegetation other than the amount identified in the project REF (December 2019) and addendum REF (May 2023). The addendum REF (October 2023) did not identify any further vegetation for removal. The proposed modification would not result in additional impacts to biodiversity in the context of the approved project and as identified in the project REF (December 2019) and addendum REF (May 2023).

8.1.3 Economic factors

The Project (including the proposed modification) has been designed to be low maintenance and economically viable. The Project would improve transport connections, reduce commuting times and lower vehicle operating costs between employment and tourist destinations. This section of the New England Highway is a major transport artery for freight travelling between the Port of Newcastle and the Hunter Valley and has supported the substantial growth in transportation for coal and agricultural industries and employment in NSW.

8.1.4 Public interest

The proposed modification is considered to be in the public interest as it would improve access to Singleton town centre and improve road safety and the flood performance of the bypass. While the community would experience some minor increases in impacts as a result of the proposed modification, including noise and vibration, amenity and property, most would be temporary and would be minimised with the implementation of safeguards provided in Chapter 7.

8.2 Objects of the EP&A Act

Objects of the EP&A Act	Comment
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 proposed modification would promote social welfare in the Singleton community by providing better access to the town centre from the bypass. Where feasible, the Project would limit its use of natural and artificial resources and would source materials locally where possible.
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 is considered in Section 8.3. The proposed modification would comply with the principles of ecologically sustainable development.
1.3(c) To promote the orderly and economic use and development of land.	The proposed modification would form part of the Project. It would involve minimal additional use and development of land to that in the addendum REF (October 2023).
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.	The proposed modification would not result in the removal of additional native vegetation. The proposed modification is consistent with the outcomes of the Project BAR and Project addendum BAR. The cumulative impact from the approved project and proposed modification is not likely to have a significant impact under the BC Act or FM Act. The cumulative impact from the approved project and proposed modification is likely to still result in a significant impact under the EPBC Act, consistent with the project REF (December 2019) and addendum REF (May 2023). The addendum REF (October 2023) did not identify any further vegetation for removal.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposed modification is not expected to increase impacts to non-Aboriginal heritage. Impacts to Aboriginal heritage would be managed in accordance with an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW. Safeguards and management measures would also be employed to appropriately mitigate any further potential impacts arising from the proposed modification.
1.3(g) To promote good design and amenity of the built environment.	The principal drivers of the design of the proposed modification are to improve amenity in the form of improved road safety and maintenance and improved flood immunity of the Putty Road connection and associated ramps.
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.

Objects of the EP&A Act	Comment
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Consultation with the community and relevant government agencies has occurred throughout the development of the Project, including this proposed modification.

8.3 Ecologically sustainable development

8.3.1 The precautionary principle

The precautionary principle states 'if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.

The assessment of potential environmental impacts arising from the proposed modification has not identified any threats of serious or irreversible environmental damage as a result of the construction or operation of the Project. The safeguards and management measures detailed in Section 7.2 would be implemented to minimise and manage potential environmental impacts during construction and operation of the proposed modification.

8.3.2 Intergenerational equity

This principle states, 'the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations'.

The Project and proposed modification would result in amenity impacts for some residents of Singleton and road users however would not result in any impacts that are likely to impact on the health, diversity or productivity of the environment for future generations. The proposed modification would benefit future generations by improving road safety and maintenance of the bypass as well as improving flood performance of the bypass.

Should the Project and proposed modification not proceed, the principle of intergenerational equity may be compromised, as public safety may be affected by continued freight and through-traffic within Singleton town centre.

8.3.3 Conservation of biological diversity and ecological integrity

This principle states the 'diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival'.

The environment in which the proposed modification would be located primarily comprises cleared agricultural land and exotic or planted vegetation. An assessment of the existing local environment was carried out to identify and manage any potential impacts of the proposed modification on biodiversity. The design of the proposed modification has sought to minimise impacts on vegetation where feasible.

It is noted that the addendum REF (October 2023) concluded that a significant impact was likely on a Commonwealth listed threatened ecological community, however, would not threaten its long-term survival. This impact would be suitably offset in accordance with the Biodiversity Offset Strategy for the Project. The proposed modification would not increase this impact, nor would it have a significant impact on biological diversity and ecological integrity.

8.3.4 Improved valuation, pricing and incentive mechanisms

This principle requires 'costs to the environment should be factored into the economic costs of a project'.

The project REF (December 2019) and submissions report as well as the addendum REF (May 2023) and addendum REF (October 2023) has examined the environmental impacts and benefits of the Project and identified mitigation measures to manage the potential for adverse impacts. No additional mitigation measures have been identified as a result of proposed modification presented in this addendum REF. The requirement to implement these mitigation measures would result in an economic cost to Transport. Incorporating environmental mitigation measures into the physical design and contractual requirements ensures that the costs of environmental impacts and mitigation are recognised by the Project.

The Project design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the Project is being developed with an environmental objective in mind.

8.4 Conclusion

This addendum 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 modification.

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, populations 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 Federal EPBC Act.

Multiple potential environmental impacts from the proposed modification have been avoided or reduced during the design development and options assessment. The proposed modification as described in this addendum REF best meets the Project objectives however still results in some impacts to flooding and amenity. Whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration on inundation. Further assessment of the operational noise impacts will be confirmed as part of finalisation of the detail design and post-construction noise monitoring program. Safeguards and management measures as detailed in this addendum REF would mitigate or minimise these expected impacts. The proposed modification would also improve road safety, maintenance and flood performance of the Project.

8.4.1 Significance of impact under NSW legislation

The proposed modification would not result in a change to the findings of the project REF (December 2019), submissions report and previous addendum REFs (May 2023 and October 2023) and would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and 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 for the proposed modification. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

8.4.2 Significance of impact under Australian legislation

The proposed modification would not likely cause a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the EPBC Act. A referral to the Australian Government Department of Agriculture, Water and the Environment is not required.

It was noted in the addendum REF (October 2023) that the project REF (December 2019) concluded that a significant impact was likely on a Commonwealth listed threatened ecological community, however, would not threaten its long-term survival. This impact would be suitably offset in accordance with the Biodiversity Offset Strategy for the Project.

9. Certification

This addendum review of environmental factors provides a true and fair review of the proposed modification 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 proposed modification.

Anthony Lusher
Position title, Director, Environment and Planning
Aurecon

Date: 22/08/2024

I have examined this addendum review of environmental factors and accept it on behalf of Transport for NSW.

Peter Wood
Senior Project Manager
Transport for NSW

Date: 22/08/2024

10. EP&A Regulation publication requirement

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

11. Terms and acronyms used in this addendum REF

Term / acronym	Description
ACHAR	Aboriginal Cultural Heritage Assessment Report
addendum REF (May 2023)	The addendum REF, determined in May 2023, which was prepared to adjust the proposal area following consultation and to facilitate general constructability.
addendum REF (October 2023)	The addendum REF, determined in October 2023, which was prepared to provide a full interchange at Putty Road for ease of access to Singleton's town centre from the bypass, extending the bridge over the floodplain and reconfiguring the approved project at the southern connection.
AEP	Annual Exceedance Probability
AHIP	Aboriginal Heritage Impact Permit
AHMP	Aboriginal Heritage Management Plan
ALR Act	*Aboriginal Land Rights Act 1983*
approved project	The project that was assessed in the addendum REF (October 2023)
AusLink	Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions.
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016 (NSW)*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015*
borrow site	An area, other than cuttings and specified excavations, from which material may be excavated for us in the Project works.
CECC	Critically endangered ecological community
CEMP	Construction / Contractor's environmental management plan
CLM Act	*Contaminated Lands Management Act 1997*
CNVIS	Construction Noise and Vibration Impact Statement
CNVMP	Construction Noise and Vibration Management Plan
CP	Communication Plan
DPI	Department of Primary Industries
DUAP	Department of Urban Affairs and Planning
EEC	Endangered ecological communities
EIA	Environmental impact assessment
EIS	Environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW.
EPA	NSW Environment Protection Authority

Term / acronym	Description
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.
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)
FRMSP	Floodplain Risk Management Study and Plan
Heritage Act	*Heritage Act 1977* (NSW)
LALC	Local Aboriginal Land Council
Land Acquisition Act	*Land Acquisition (Just Terms Compensation) Act 1991*
LCVIA	Landscape character and visual impact assessment
LCZ	Landscape Character Zones
LEMC	Local Emergency Management Committee
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LGA	Local Government Area
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NCA	Noise Catchment Area
NES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
NML	Noise Management Level
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
OAS	Open artefact site
OOHW	Out of hours work
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
POEO Act	*NSW Protection of the Environment Operations Act 1997*
project REF	The REF that was prepared for the project in December 2019 and determined on 10 August 2020.
proposed modification	The detailed design being assessed in this addendum REF (this document).
RAP	Registered Aboriginal Party
REF	Review of environmental factors
Roads Act	*Roads Act 1993*

Term / acronym	Description
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all functions are now managed by Transport for NSW
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 44	State Environmental Planning Policy 44 (Koala Habitat Protection)
SEPP (Biodiversity and Conservation)	State Environmental Planning Policy (Biodiversity and Conservation) 2021
SEPP (Planning Systems)	State Environmental Planning Policy (Planning Systems) 2021
SEPP (Precincts – Central River City)	State Environmental Planning Policy (Precincts – Central River City) 2021
SEPP (Precincts – Eastern Harbour City)	State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
SEPP (Precincts – Regional)	State Environmental Planning Policy (Precincts – Regional) 2021
SEPP (Resilience and Hazards)	State Environmental Planning Policy (Resilience and Hazards) 2021
SEPP (Transport and Infrastructure)	State Environmental Planning Policy (Transport and Infrastructure) 2021
SEPP (Precincts – Western Parkland City)	State Environmental Planning Policy (Precincts – Western Parkland City) 2021
SES	NSW State Emergency Services
SIS	Species Impact Statement
SLS	Serviceability Limit State. Identifies conditions impacting the usual function of a structure.
SSD	Substantial detailed design
SWMP	Surface Water Management Plan
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
the Project	The New England Highway bypass of Singleton project.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Transport for NSW.
WM Act	*Water Management Act 2000*
WMP	Waste Management Plan

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Appendix A

Consideration of section 171(2) factors and matters of National Environmental Significance and Commonwealth land

Section 171(2) checklist

In addition to the requirements of the Is an EIS required? (1995/1996) guideline and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996) as detailed in the addendum REF, the following factors, listed in section 171(2) of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposed modification on the natural and built environment.

Factor	Impact
Any environmental impact on a community? The proposed modification will require total and partial acquisition of land, but would not have additional impacts to what was assessed in the project REF (December 2019) or previous addendum REFs (May 2023 and October 2023). Property acquisition would be carried out in accordance with the Land Acquisition Information guide (Roads and maritime, 2013) and the Land Acquisition (Just Terms Compensation) Act 1991.	Short-term negative
Construction of the proposed modification would result in altered visual amenity and access for some residents, as well as noise and air quality impacts. However, construction of the proposed modification would not have additional impacts to what was assessed in the project REF (December 2019) or previous addendum REFs (May 2023 and October 2023). These impacts would be temporary and managed with the implementation of the mitigation measures outlined in Section 7.2 of this addendum REF.	Short-term negative
Aboriginal heritage sites would be impacted by the proposed modification and have previously been salvaged to mitigate these impacts. The proposed modification would, however, not have additional impacts to what was assessed in the project REF (December 2019) or previous addendum REFs (May 2023 and October 2023).	Long-term negative
Operation of the proposed modification would improve traffic flow, travel times and safety through Singleton by reduced traffic volumes and improve the movement of heavy freight vehicles. However, operation of the proposed modification would not have additional impacts to what was assessed in the project REF (December 2019) or previous addendum REFs (May 2023 and October 2023).	Long-term positive
Any transformation of a locality? Amenity impacts including noise and air quality impacts would temporarily transform the locality. However, construction of the proposed modification would not have additional amenity impacts to what was assessed in the project REF (December 2019) or previous addendum REFs (May 2023 and October 2023). These impacts would be managed through the implementation of the mitigation measures identified in Section 7.2 of this addendum REF.	Short-term negative
The proposed modification would result in a permanent change in land use from the existing land uses to a road corridor. This would remove the ability of the land to be developed for residential or agricultural purposes in the future. The proposed modification is assessed as having a higher impact rating of high to moderate instead of moderate for Viewpoint 3 – Army Camp Road when compared to the addendum REF (October 2023) due to the inclusion of a maintenance access track, about 10 metres wide. No additional mitigation measures have been proposed and landscaping and urban design elements have been incorporated into the design to minimise these impacts.	Long-term negative
Any environmental impact on the ecosystems of the locality? The proposed modification would not involve any further impacts to ecosystems than those assessed in the project REF (December 2019) and addendum REF (May 2023).	Nil

Factor	Impact
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposed modification would have some temporary impacts during construction associated with visual amenity, access arrangements for some residents and noise and vibration. These impacts would be short-term and minimised through the implementation of the safeguards provided in this addendum REF.	Short-term negative
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 proposed modification would impact Aboriginal heritage sites, including the loss of value and removal of some sites. The proposed modification has been designed to reduce impacts to these aspects as far as practical. Mitigation measures including salvage activities would help to conserve the heritage value of some sites.	Long-term negative
Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The proposed modification would not result in any additional clearing of native vegetation requiring removal than outlined in the project REF (December 2019) and addendum REF (March 2023).	Nil
Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposed modification would not endanger any species of animal, plant or other form of life.	Nil
Any long-term effects on the environment? Operation of the proposed modification would improve traffic flow, travel times and safety through Singleton by reducing traffic volumes in the town and improve the movement of heavy freight vehicles.	Long-term positive
Any degradation of the quality of the environment? The proposed modification would have some temporary impacts during construction associated with visual amenity, dust and noise and vibration. These impacts would be short-term and minimised through the implementation of the safeguards provided in this addendum REF.	Short-term negative
Operation of the proposed modification is unlikely to result in the ongoing degradation of the environment.	Long-term neutral
Any risk to the safety of the environment? Operation of the proposed modification would improve safety for road users, especially through Singleton by reducing traffic volumes and improving traffic flow and travel times. The proposed modification would also see an increase in safety for pedestrians and access throughout Singleton. Whilst there may be minor impacts to local drainage patterns, when compared to existing conditions, the proposed modification does not have an impact on the overall duration of inundation.	Long-term positive
Any reduction in the range of beneficial uses of the environment? The proposed modification would result in the acquisition and a permanent change in land use from the existing land uses to a road corridor. This would remove the ability of the land to be developed for residential or agricultural purposes in the future.	Long-term negative

Factor	Impact
Any pollution of the environment? The proposed modification would have some temporary impacts during construction associated with visual amenity, dust and noise and vibration. The proposed modification could also result in minor impacts to water quality from erosion and sedimentation impacts and from potential oil or fuel spills from construction machinery. These impacts would be short-term and minimised through the implementation of the safeguards provided in this addendum REF.	Short-term negative
Operational pollution is likely to be consistent with the existing New England Highway.	Long-term neutral
Any environmental problems associated with the disposal of waste? Construction of the proposed modification would result in a number of waste streams being generated, consistent with that of the project REF (December 2019) and previous addendum REFs (May 2023 and October 2023). Mitigation measures for the disposal of waste streams likely to be produced during construction are detailed in this project REF.	Short-term negative
Waste generation during operation of the proposed modification is likely to be minor, consistent with the operation of the existing New England Highway.	Long-term neutral
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? Resources required are readily available and are not in short supply. The proposed modification is therefore unlikely to affect any resources that are or are likely to become in short supply.	Nil
Any cumulative environmental effect with other existing or likely future activities? Resources required are readily available and are not in short supply. The proposed modification is therefore unlikely to affect any resources that are or are likely to become in short supply.	Short-term negative
The operation of the proposed modification would have a positive cumulative impact on travel times, road safety and efficiency. The proposed modification would result in improved safety for Singleton by reducing congestion and heavy vehicle volumes through the town.	Long-term positive
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposed modification is located about 70 kilometres from the coast. The proposed modification would not impact coastal processes or hazards including those predicted under climate change conditions.	Nil
Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1. The project as a whole was identified in the NSW Government's Rebuilding NSW plan through which the NSW Government committed $92 million towards the New England Highway bypass of Singleton and a further $2.7 million in 2019-2020. The project in its entirety is also generally consistent with the objectives of other State strategic documents, including the Hunter Regional Plan 2036. In particular, Direction 4 of the Hunter Regional Plan seeks to enhance inter-regional linkages to support economic growth. The project would contribute to this Direction by reducing travel times on the New England Highway, a major road in NSW that links important regional centres between Newcastle and the Queensland border.	Long-term positive

Factor	Impact
The project supports local strategic planning in the Singleton LGA. The Singleton Socio-economic Development Strategy includes a strategic focus area of infrastructure, in which it cites the Singleton bypass as a priority infrastructure project for the region.	
In considering the potential impacts of the proposed modification, all relevant environmental factors have been considered. Refer to Chapter 6 of this addendum REF.	Nil

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 proposed modification should be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water.

Under the EPBC Act strategic assessment approval a referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are assessed in detail as part of this addendum REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
Any impact on a World Heritage property? The proposed modification would not impact on a World Heritage property.	Nil
Any impact on a National Heritage place? The proposed modification would not impact on a National Heritage place.	Nil
Any impact on a wetland of international importance? One wetland of international importance was identified being the Hunter estuary wetlands. This occurs 45 to 50 kilometres downstream of the proposed modification.	Nil
Any impact on a listed threatened species or communities? The project REF identified a significant impact on one threatened ecological community, being the Central Hunter Valley Eucalypt Forest and Woodland critically endangered ecological community. The proposed modification would not result in an increase in the clearance of this CEEC. The proposed modification would not increase or introduce a new impact to any EPBC Act listed threatened species or community already identified as part of the project REF (December 2019), submissions report, and addendum REF (May 2023).	Nil
Any impacts on listed migratory species? An assessment of significance under the EPBC Act was undertaken as part of the project REF (December 2019) for one migratory species, being the White-throated Needletail (*Hirundapus caudacutus*). The assessment concluded that the Project is unlikely to substantially impact this species and previous addendum REFs (May 2023 and October 2023) did not identify any additional impacts. Similarly, the proposed modification is unlikely to impact any migratory species, including the White-throated Needletail, given that no adjustments to the project approval boundary are required. No important habitat would be substantially modified or destroyed, the lifecycle of an ecologically significant proportion of the population of White-throated Needletail would not be disrupted and no invasive species would be introduced that would be harmful to the White-throated Needletail becoming established within the project approval boundary.	Nil
Any impact on a Commonwealth marine area? The proposed modification would not impact on a Commonwealth marine area.	Nil
Does the proposed modification involve a nuclear action (including uranium mining)? The modification does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposed modification would not impact (either directly or indirectly) on 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	Singleton Council	Section 2.110
Bus depots	Does the project propose a bus depot?	No	Singleton Council	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	Singleton Council	Section 2.110

Development within the Coastal Zone

Issue	Description	Yes / No / N/A	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?	N/A	Singleton Council	Section 2.14

Note: See interactive map Coastal management - (nsw.gov.au). 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 the relevant local council(s).	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?	Yes	Singleton Council	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?	Yes	Singleton Council	Section 2.10
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of any part of the system?	Yes	Singleton Council	Section 2.10
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?	Yes	Singleton Council	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?	Yes	Singleton Council	Section 2.10
Road and 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?	Yes	Singleton Council	Section 2.10

Local heritage items

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	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?	Yes	Singleton Council	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?	Yes	Singleton Council	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	Yes	State Emergency Services Email: erm@ses.nsw.gov.au	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 the relevant local council(s).	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?	No	DPE	Section 2.15
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	DPE	Section 2.15
Aquatic reserves and marine parks	Are the works adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No	Department of Industry	Section 2.15
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*?	No	Sydney Harbour Foreshore Authority	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	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

SEPP (Precincts – Central River City) 2021 and SEPP (Precincts – Western Parkland City) 2021

Development type	Potential impact	Yes / No	If 'yes' consult with the relevant local council(s).	SEPP (Transport and Infrastructure) section
Clearing native vegetation	Do the works involve clearing native vegetation (as defined in the Local Land Services Act 2013) on land that is not subject land (as defined in cl 17 of schedule 7 of the *Threatened Species Conservation Act 1995*)?	No	NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW)	Section 3.24

NSW GOVERNMENT