

# New England Highway bypass of Singleton

Addendum review of environmental  
factors

October 2023

## 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 AECOM Australia Pty Ltd and Transport for NSW.

# Executive summary

## The proposed modification

Transport for NSW proposes to modify the New England Highway bypass of Singleton project by providing 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 (proposed modification). Key features of the proposed modification would include:

- Reconfiguration of the southern connection to include a bridge structure over the floodplain, with the southern connection northbound exit ramp to pass under the bridge structure.
- Increasing the total bridge length over the Main North railway line, Doughboy Hollow and Hunter River floodplain, Army Camp Road, Putty Road and the northbound entry and exit ramps at the Putty Road connection (bridge over the floodplain).
- Inclusion of a southbound entry ramp and northbound exit ramp at the Putty Road connection to create a full interchange via a new roundabout at Putty Road.

A Singleton Council water pump station located near Putty Road would also require relocation. The pump station would be relocated within the area assessed for the Waterworks Lane construction compound in the review of environmental factors (REF).

As part of the proposed modification, changes to construction ancillary facilities are proposed to avoid conflicts with the construction of the modified design. Additional signage would be installed to notify traffic of the upcoming bypass and the town.

## 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, an addendum REF for the New England Highway bypass of Singleton was prepared to facilitate general constructability and was determined on 2 May 2023.

This addendum REF provides a detailed description of the potential environmental impacts associated with the modifications proposed for the New England Highway bypass of Singleton.

## Need for the proposed modification

The proposed modification is consistent with the strategic needs discussed in Chapter 2 of the project REF. The proposed modification is needed to provide better access to Singleton town centre and improve the flood security of the New England Highway.

## Proposal objectives

Section 2.3 of the project REF identifies the project objectives that are applicable to the proposed modification. Additionally, the objectives of the proposed modification include:

- Respond to community feedback to provide full access to Singleton town centre from the bypass by way of a full interchange at Putty Road
- Minimise the impact of flooding and improving surface water flow in the vicinity of the southern connection.

## Options considered

The following options were considered for this addendum REF:

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

Option 2 was selected as the preferred option as it accommodates changes to provide flood security of the New England Highway corridor. It also address community feedback regarding the Putty Road connection by providing greater access to Singleton town centre and achieve both the objectives of the project REF and the proposed modification.

## Statutory and planning framework

Section 2.108 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 consulted with the community, including those directly affected by the project and proposed modification, and relevant stakeholders throughout the development of the project.

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 have been directly consulted during the development of the design for the proposed modification.

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 regarding 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

The proposed modification is consistent with the potential impacts to surface water quality identified in Section 6.2 of the project REF.

Changes to the southern connection and Putty Road connection would alter flood behaviour around the bypass to the south of the Hunter River. However, the overall flood impacts are generally minor, with both increases and decreases in peak flood level and velocity most apparent in the immediate vicinity of the bypass. The areas away from the bypass which are subject to minor increases in flood level are limited to primary production zoned land. There are also minor decreases in peak flood level across urban parts of Singleton, most notably in the one per cent annual exceedance probability event, as the bypass directs water away from town.

### **Traffic**

The proposed modification is unlikely to generate large volumes of additional construction traffic as the modifications consist of alterations to existing elements of the design and would form part of the overall construction program for the project.

Operational traffic modelling was carried out for the project incorporating the proposed modification into the design. The modelling results indicate a small increase in traffic utilising the bypass, however, the level of service of intersections would remain the same and the modified design would provide better access to Singleton town centre.

### **Noise and vibration**

An assessment of the potential noise and vibration impacts was carried out for the proposed modification. Noise impacts from construction for the proposed modification overall would increase noise management levels to nearby sensitive receivers during vegetation clearing, material stockpiling and establishment of the compounds. While a greater number of receivers exceed the noise management level, the severity of exceedances are lower than those predicted in the project REF. These impacts would be managed through the implementation of mitigation measures including consultation with the affected community where required.

The proposed modification would result in an increase to operational noise impacts given the increase in traffic travelling on the bypass, as determined by updated traffic modelling. Although this would result in further impacts to receivers, additional properties to those nominated in the project REF, would be considered for acoustic treatments to mitigate anticipated noise increases.

### **Air quality**

The range of construction activities undertaken for the proposed modification would be consistent with those assessed in the project REF. Therefore, the magnitude of unmitigated emissions from construction activities from the proposed modification are consistent with the project REF.

### **Landscape and visual**

The proposed modification would have impacts to landscape character and visual amenity that are consistent with those identified in the project REF. 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 where embankments were previously proposed, and the reconfiguration of the Putty Road connection. The significance of visual amenity impacts from the operation of the project were considered high in the project REF. The proposed modification is unlikely to change this rating as the location of infrastructure in the landscape would not generally change.

### **Socio-economic**

The proposed modification has sought to minimise potential impacts where feasible and has in fact increased positive impacts, such as the provision of a full interchange at Putty Road to provide better access to Singleton town centre. No newly affected properties would be acquired for the proposed modification.

Construction of the proposed modification would form part of the project's construction program and would largely be consistent with the previously identified impacts to the socio-economic environment of Singleton. Operation of the proposed modification would contribute further to the overall major positive impact of the project to the area, by providing better access to Singleton town centre from the bypass.

Through the implementation of mitigation and management measures outlined in Section 7.2, the proposed modification overall would have a negligible effect on Singleton's socio-economic environment. Ongoing consultation with affected landowners forms an important component of the project and would continue throughout the planning process.

## Justification and conclusion

The proposed modification is consistent with the project objectives as stated in section 2.3 of the project REF and section 2.2 of this addendum REF. The proposed modification would provide better access to Singleton town centre, and provide improved flood security of the New England Highway.

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, submissions report, and this addendum REF.

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# 1. Introduction

## 1.1 Proposed modification overview

Transport for NSW proposes to modify the New England Highway bypass of Singleton project by providing 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 (proposed modification). Key features of the proposed modification would include:

- Reconfiguration of the southern connection to include a bridge structure over the floodplain, with the southern connection northbound exit ramp to pass under the bridge structure
- Increasing the total bridge length over the Main North railway line, Doughboy Hollow and Hunter River floodplain, Army Camp Road, Putty Road and the northbound entry and exit ramps at the Putty Road connection (bridge over the floodplain)
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As part of the proposed modification, changes to construction ancillary facilities are proposed to avoid conflicts with the construction of the modified design. Additional signage would be installed to notify traffic of the upcoming bypass and the town.

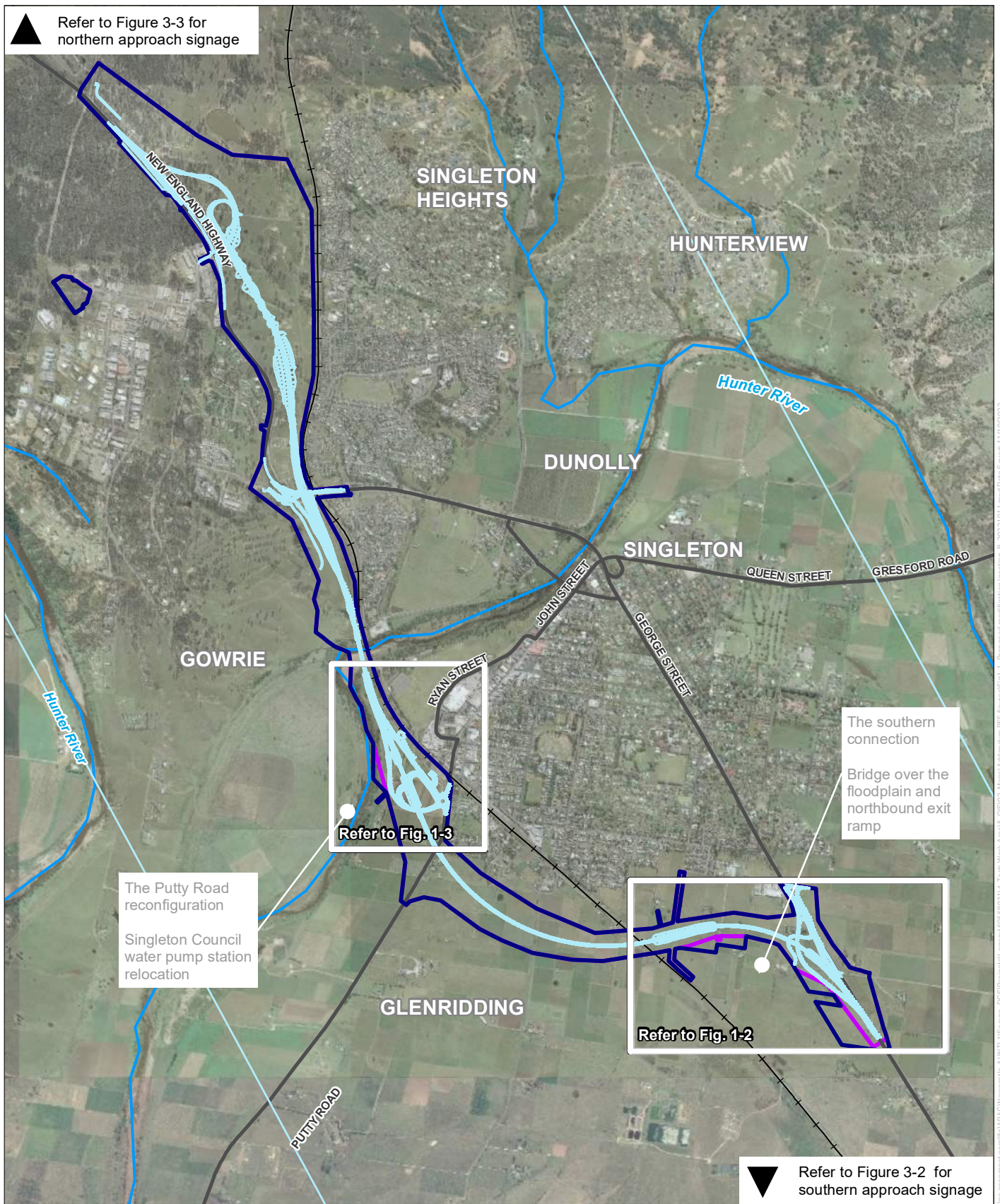
The location of the proposed modification is shown in Figure 1-1 and the key features of the proposed modification is shown in Figure 1-2. Section 3 describes the proposed modification in more detail.

A review of environmental factors (REF) was prepared for the New England Highway bypass of Singleton in December 2019 (referred to in this addendum REF as the project REF). The project REF 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.

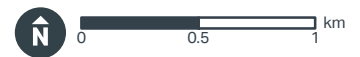
In addition, an addendum REF for the New England Highway bypass of Singleton was prepared to facilitate general constructability and was determined on 2 May 2023. Key features of the addendum REF included:

- Minor adjustments to existing property acquisitions in response to property owner consultation and to facilitate general project constructability.
- Additional and modified public utility works required following further consultation with utility providers.
- Change in alignment of the northern property access off Rix's Creek Lane following further consultation and agreement with the property owners.





**FIGURE 1-1 Location of the proposed modification**



**Legend**

**Proposal features**

- Project REF area
- Proposal area
- Proposed modification design

**Other features**

- State roads
- + + + Main North railway line
- Watercourse

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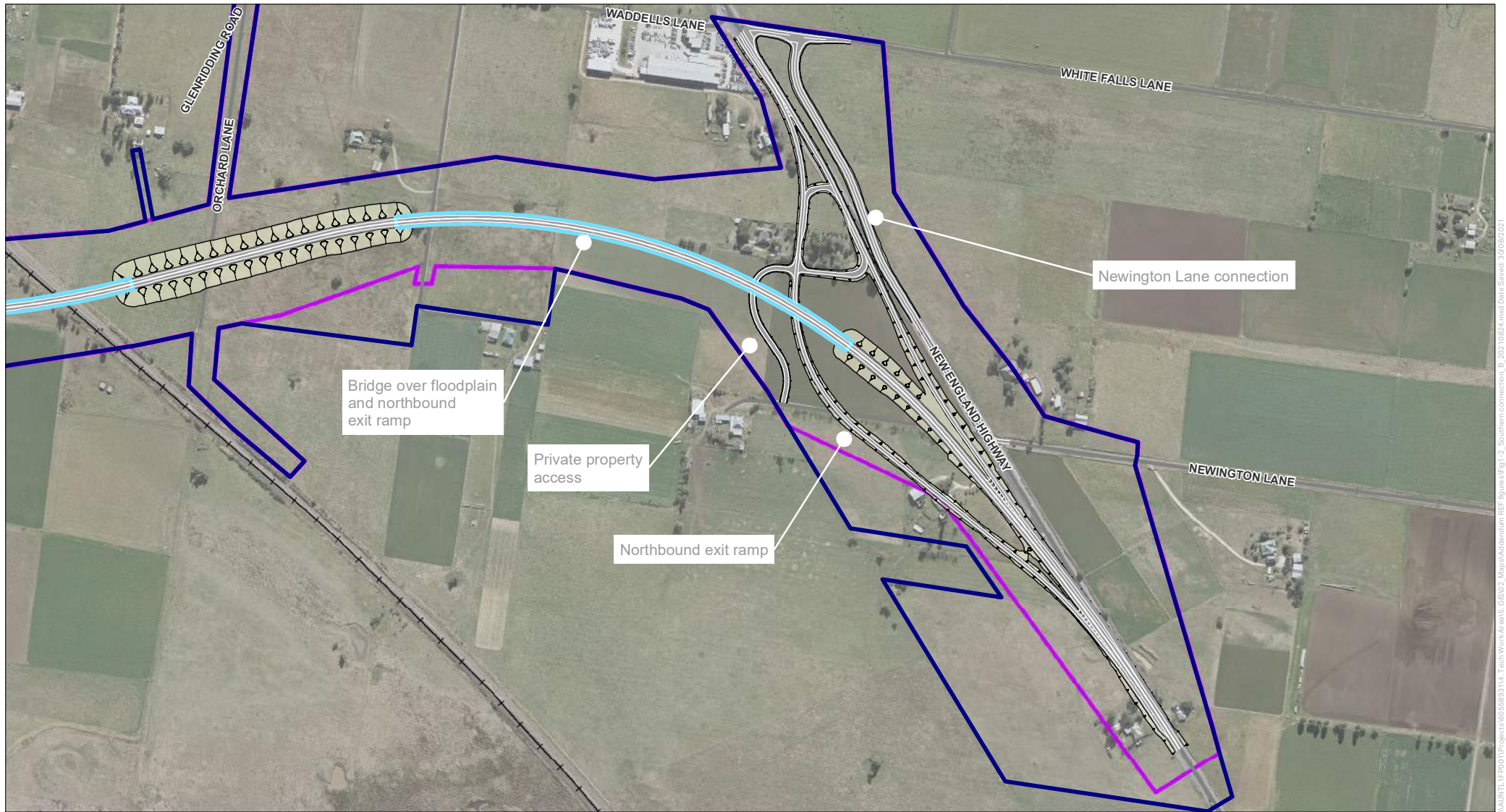
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**FIGURE 1-2 Southern connection**

**Legend**

**Proposal features**

- Project REF area
- Proposal area
- Bridge
- New road surface

Earthworks

**Other features**

- Roads
- Main North railway line



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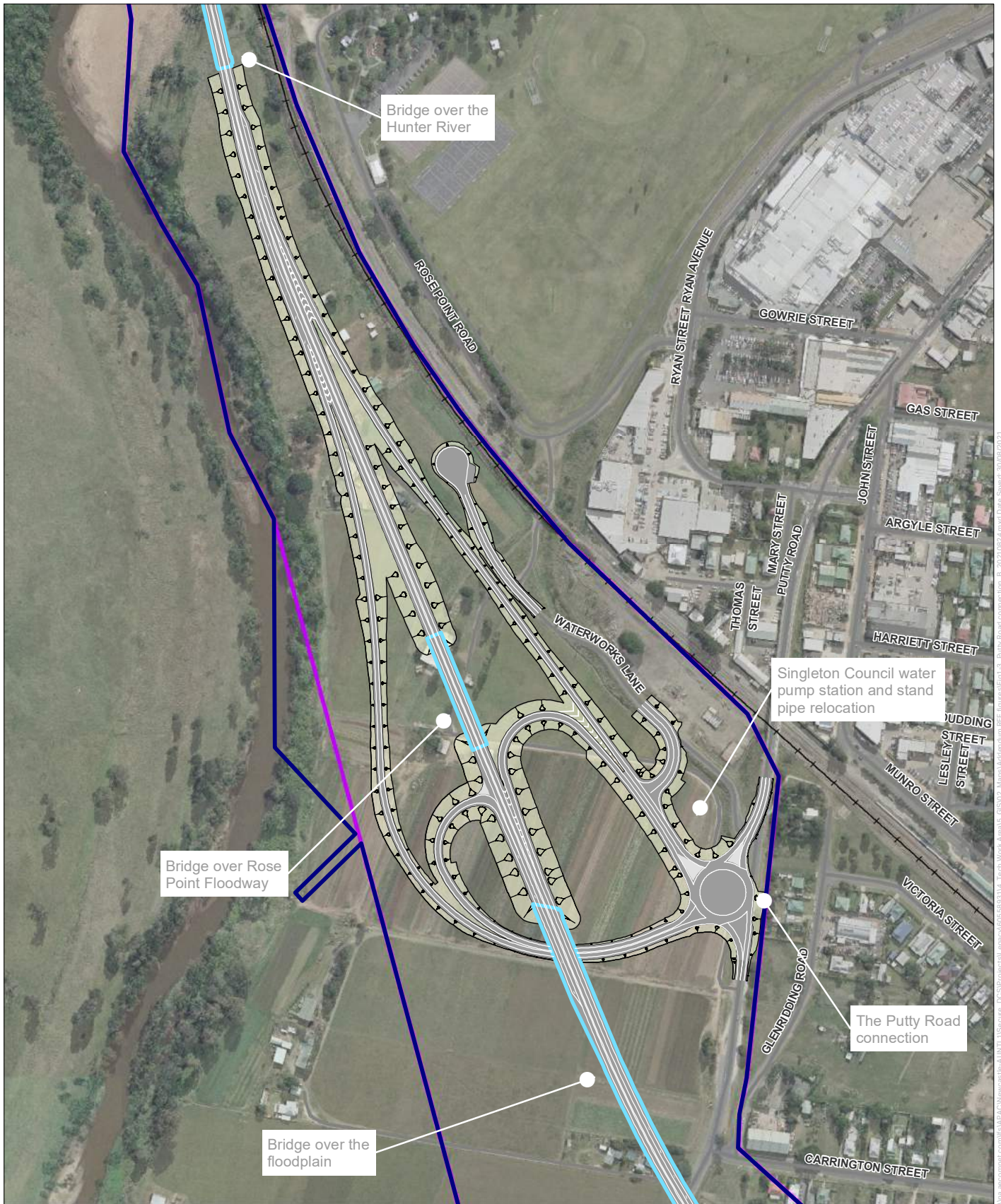
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**FIGURE 1-3 Putty Road connection**



**Legend**

**Proposal features**

- Project REF area
- Proposal area
- New road surface
- Median
- Bridge
- Earthworks

**Other features**

- Roads
- Main North railway line

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## 1.2 Purpose of the report

This addendum review of environmental factors (REF) has been prepared by AECOM Australia Pty Ltd (AECOM) on behalf of Transport for NSW Hunter Region. For the purposes of these works, Transport for NSW 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 2019 project REF, 2020 submissions report and previous addendum REF (April 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, the addendum REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act, including that Transport for NSW examines and takes 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 for NSW's activities on nationally listed threatened species, ecological communities and migratory species.

The findings of the 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 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 addresses the strategic need for the project, the project objectives and the options that were considered. The proposed modification described and assessed in this addendum REF is consistent with the strategic need for the project.

The proposed modification is needed to accommodate several design changes following determination of the project. In response to community feedback, the proposed modification will deliver on the commitment announced by the Deputy Premier of NSW on 16 April 2021 to provide better access to Singleton town centre from the bypass by providing a full interchange at the Putty Road connection.

Following public exhibition and determination of the project REF, Transport further considered the flooding impacts around the southern connection to ensure flood security of the New England Highway corridor.

Transport is committed to delivering a solution for both motorists and the Singleton community. By modifying the project there would be greater access to Singleton town centre and 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 identifies the overarching project objectives and development criteria that also apply to the proposed modification. Additional objectives relevant to the proposed modification include:

- Respond to community feedback and deliver the NSW Government commitment to making it easier to access Singleton town centre from the bypass by providing a full interchange at Putty Road
- Minimise the impact of flooding and improve surface water flow in the vicinity of the southern connection.

### 2.3 Alternatives and options considered

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

#### 2.3.1 Methodology for selection of preferred option

Following community feedback, the announcement made by the Deputy Premier on 16 April 2021 and internal investigations, Transport considered the feasibility of modifying the proposal as presented in the project REF.

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 REF)
- Option 2 – Modify the design.

### 2.3.3 Analysis of options

#### Option 1 – Do nothing

This option would consist of the construction of the Singleton bypass as presented in the project REF. Although this would provide a bypass of Singleton, it would not resolve the following issues identified following the project's determination.

##### Southern connection

Transport has further considered the flooding impacts around the southern connection and has identified opportunities to further reduce flooding impacts in parts of this area. The do nothing option would not allow for these potential reduced surface water flow and flood performance impacts of the bypass.

##### Bridge over the floodplain

The extension of the bridge over the floodplain is necessary to accommodate the full interchange at the Putty Road connection. The do nothing option for this feature would not allow for this change to the Putty Road connection to be delivered and would result in higher costs for the project.

##### Putty Road connection

The traffic modelling undertaken for the project REF indicated that traffic demand for these ramps would be low. However, following community feedback, the NSW Deputy Premier announced on 16 April 2021 that a full interchange at the Putty Road connection would be delivered as part of the Singleton bypass project. The do nothing option would not meet expectations of the community following the NSW Government's commitment to providing better access to Singleton town centre from the bypass. The Putty Road connection would remain as presented in the project REF and a full interchange would not be delivered.

##### Conclusion

This option is not considered further given it would not meet the additional objectives identified in Section 2.2. Updated information and feedback that became available following determination of the project REF supports a modification to the project.

#### Option 2 – Modify the design

This option consists of modifying the design at key locations to resolve issues identified following the project's determination and address community feedback. These locations and the modifications are discussed below.

##### Southern connection

The design as presented in the project REF consists of a northbound exit ramp bridge over the bypass at the southern connection. In this option, the configuration at the southern connection would include a bridge structure over the floodplain as part of the bypass, with the northbound exit ramp to Singleton now passing under the bridge. This modification reduces the embankments necessary for the design and allows surface water to flow under the bridge and through embankment culverts.

##### Bridge over the floodplain

The extension of the bridge over the floodplain would be necessary to accommodate the full interchange at the Putty Road connection due to the addition of a second ramp conflicting with the approach embankment of the bridge over the Putty Road northbound entry ramp.

##### Putty Road connection

The Putty Road connection would be modified to improve access to Singleton town centre with the provision of a full interchange. This includes the addition of a southbound entry ramp and a northbound exit ramp, accompanying the southbound exit ramp and northbound entry ramp presented in the project REF. The bridge over the Putty Road northbound entry ramp would be removed, as the bridge over the floodplain to the south would be extended to the Putty Road connection.

##### Conclusion

This option would meet the objectives of the project REF as well as the additional 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 design as described in Section 2.3 as this would accommodate changes necessary to ensure flood security of the New England Highway corridor. It would also address community feedback regarding the Putty Road connection and achieve both the objectives of the project REF and the proposed modification.

This option would provide a better outcome for both motorists and the Singleton community, by providing greater access to Singleton town centre and ensuring flood security of the New England Highway when compared to the project REF.

## 3. Description of the proposed modification

### 3.1 The proposed modification

Transport for NSW proposes to modify the New England Highway bypass of Singleton project to provide a full interchange at Putty Road for ease of access to Singleton's town centre from the bypass, extend the bridge over the floodplain and reconfiguring the design at the southern connection. The proposed modification is shown in Figure 1-2 and Figure 1-3.

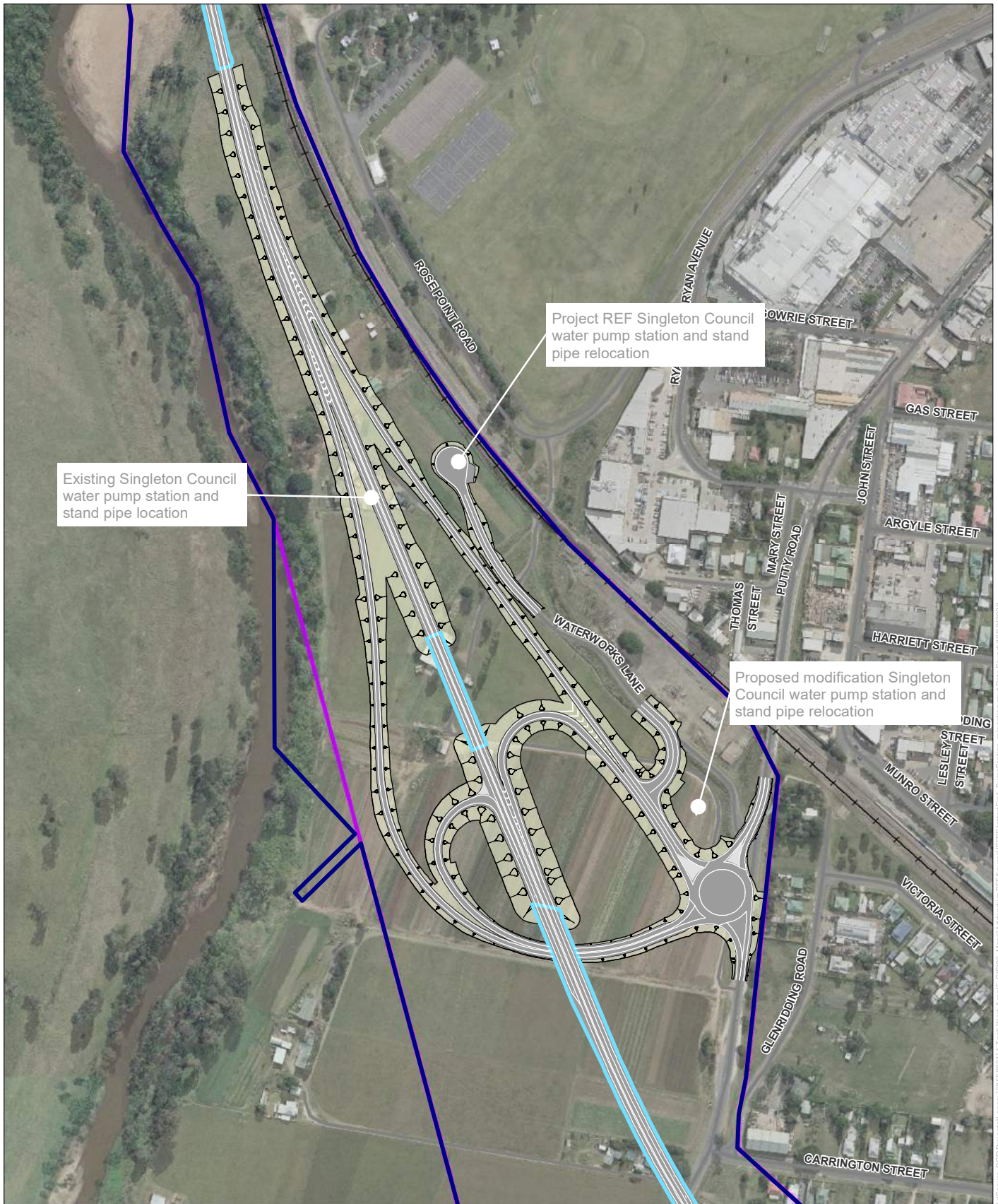
Key features of the proposed modification would include:

- Reconfiguration of the southern connection to include a bridge structure over the floodplain, with the southern connection northbound exit ramp to pass under the bridge
- Increasing the total bridge length over the Main North railway line, Doughboy Hollow and Hunter River floodplain, Army Camp Road, Putty Road and the northbound entry and exit ramps at the Putty Road connection (bridge over the floodplain)
- Inclusion of a southbound entry ramp and northbound exit ramp at the Putty Road connection to create a full interchange via a new roundabout at Putty Road.

A Singleton Council water pump station located near Putty Road would also require relocation, see Figure 3-1. The pump station would be relocated within the area assessed for the Waterworks Lane construction compound in the REF.

As part of the proposed modification, changes to construction ancillary facilities are proposed to avoid conflicts with the construction of the modified design. Additional signage would be installed to notify traffic of the upcoming bypass and the town.





**FIGURE 3-1 Singleton Council water pump station and standpipe relocation**

**Legend**

**Proposal features**

- Project REF area
- Proposal area
- New road surface
- Median
- Bridge
- Earthworks

**Other features**

- Roads
- Main North railway line

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## 3.2 Design

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

### 3.2.1 Main features of the modification

#### **Reconfiguration of the southern connection at Whittingham**

The approved design for the southern connection consists of a bridge over the bypass for vehicles continuing north to Singleton. The connection has been changed to increase the bridge structure forming part of the bypass with the northbound exit ramp to Singleton passing under the new bridge. The bridge design would be consistent with the design of the bridge over the floodplain described in section 3.2.3 of the project REF. The Newington Lane connection would not be altered by the reconfiguration however the modification has resulted in minor changes to the design of private property access arrangements described further below.

The reconfiguration of the southern connection is shown on Figure 1-2.

#### **Increasing the length of the bridge over the floodplain**

The length of the bridge over the floodplain has been increased to accommodate the full interchange at Putty Road. The bridge over the Putty Road northbound entry ramp has been removed, and the bridge over the floodplain to the south extended to the Putty Road connection. The bridge design would remain consistent with that described in the project REF.

#### **Full interchange at Putty Road connection**

The previous connection at Putty Road included a northbound entry ramp and a southbound exit ramp only. The proposed modification of the Putty Road connection allows for all movements including a southbound entry ramp and a northbound exit ramp, in addition to the southbound exit ramp and northbound entry ramp described in the project REF. This would provide better access to Singleton town centre from the bypass. Transport is committed to delivering a suitable solution for both motorists and the Singleton community.

The reconfiguration of the Putty Road connection is via a new roundabout at Putty Road and is shown on Figure 1-3.

#### **Drainage adjustments**

The proposed modification would require minor modifications to drainage (refer to Section 3.5 for detail).

#### **Approach signage**

Directional and tourist signage is required to notify traffic of the upcoming bypass and the township of Singleton. Guidance signage (such as notices for Highway exits) is to be installed at predetermined intervals to the north and south of the bypass (see Figure 3-2 and Figure 3-3). A general tourist information sign for Singleton would also be installed on approach to the bypass, the contents of which will be representative of the township (such as an important landmark or trait) and summarise the available amenities (such as the presence of petrol stations, motels etc.). The contents of the signage, as shown on Figure 3-2 and Figure 3-3 are indicative at this time, and will be determined in consultation with Singleton Council.

A total of eight approach signs would be installed along the New England Highway. The signs may require the installation of a safety barrier along the shoulder of the Highway to protect motorists from potentially contacting the rigid posts holding up the sign. Works (if required) to install the safety barrier would be minor, no road widening is anticipated in order to accommodate the barriers.

#### **Singleton Council water pump station and standpipe relocation**

Singleton Council's water pump station and standpipe was proposed to be relocated as part of the project REF. The proposed modification would relocate the pump station and standpipe closer to Putty Road to provide better access for Council and private vehicles using the facility. The existing location, REF relocation and proposed modification to the water pump station and standpipe location are shown on Figure 3-1.







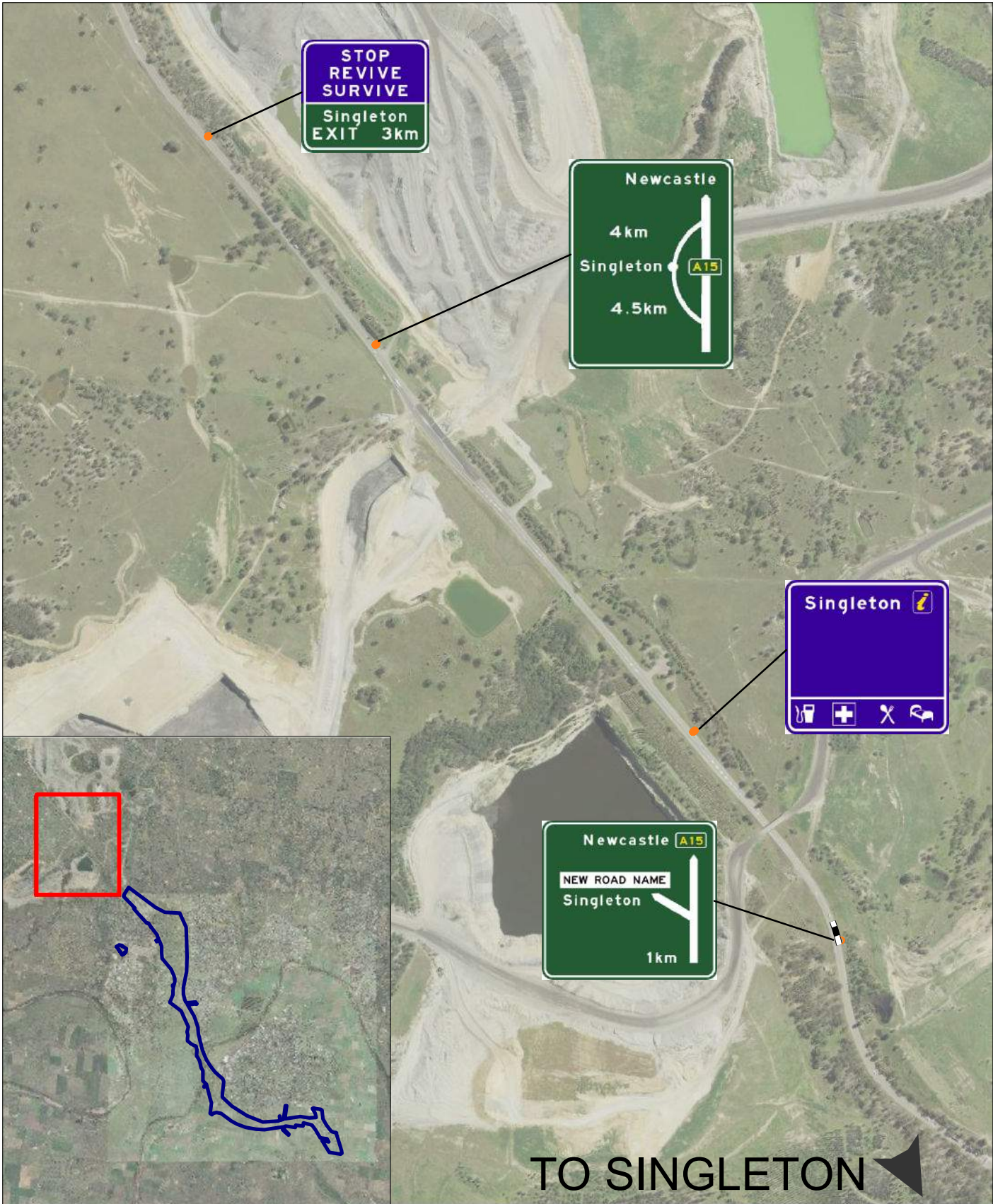


FIG. 3-3 Northern approach signage

**Legend**

- Signage
- Protective barrier



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## 3.3 Construction activities

### 3.3.1 Work methodology

The work methodology outlined in Section 3.3.1 of the project REF remains generally consistent with the approach that would be used for the proposed modification. Detailed work methodologies would be determined during detailed design and construction planning. Indicative work methodologies for the proposed modifications are described below.

#### **Bridge construction**

The construction of the new bridge structure at the southern connection and the extended length of the bridge over the floodplain would be consistent with the methodology for construction of the bridge over the floodplain described in Section 3.3.1 of the project REF. An indicative construction methodology is as follows:

- Construction of a temporary access road adjacent 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 scaffold
- Bridge girders and barriers would be lifted into place using cranes.

Alternate methodologies for pile foundations may be considered in construction planning with one possible option being pre-cast driven piles. The consistency of the impacts of alternative methods with the project REF and this addendum would be considered throughout the construction planning process and subject to an additional environment assessment, where required.

#### **Construction of the full interchange at Putty Road connection**

Construction of the full interchange at the Putty Road connection would involve:

- Site establishment works including clearing, grubbing, demolition, fencing and signage
- Earthworks activities to establish the design levels of the connection at Putty Road
- 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.

#### **Relocation of the Singleton water pump station and standpipe**

Relocation of the Singleton Council water pump station and standpipe would involve:

- Site establishment works including clearing, grubbing, demolition, fencing and signage
- Earthworks activities to establish the design levels of the water pump station
- Water main works including the installation of new mains, temporary connections, and new standpipe
- Provision of power and communications

- Road base and pavement construction
- Construction of the water pump station building
- Sequenced shut down, relocation, and commissioning of the existing water pumps to the new pump station
- Demolition of the existing water pump station and standpipe
- Landscaping and finishing work.

### 3.3.2 Construction hours and duration

Construction for the proposed modification would not require work outside of the hours proposed in Section 3.3.2 of the project REF. 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 (Roads and Maritime, 2016):

- 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, such as precast bridge structures
- Intersection and tie-in activities of the bypass to existing roads, such as Putty Road and the southern connection
- Installation and adjustment of barriers and signage for construction zones during each construction stage
- Operation of construction compounds to support the above work.

### 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 project REF. Plant and equipment required for construction would be determined by the construction contractor.

### 3.3.4 Earthworks

Earthworks activities for the proposed modifications include excavation where the design of the road is lower than the existing ground level, construction of fill embankments where the design of the road 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 3-1. Precise quantities would be identified during detailed design.

Table 3-1: Indicative earthworks quantities

Area	Approved project		Proposed modification	
	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )
Southern connection to Putty Road	5250	122,350	7,300	164,900
Putty Road connection to Gowrie Gates	65,200	87,650	66,750	177,350
Gowrie Gates to northern connection	486,800	198,600	546,900	201,900
Total	557,250	408,600	555,800	540,100
Balance (approved project)	Surplus 148,650		Surplus 15,700	

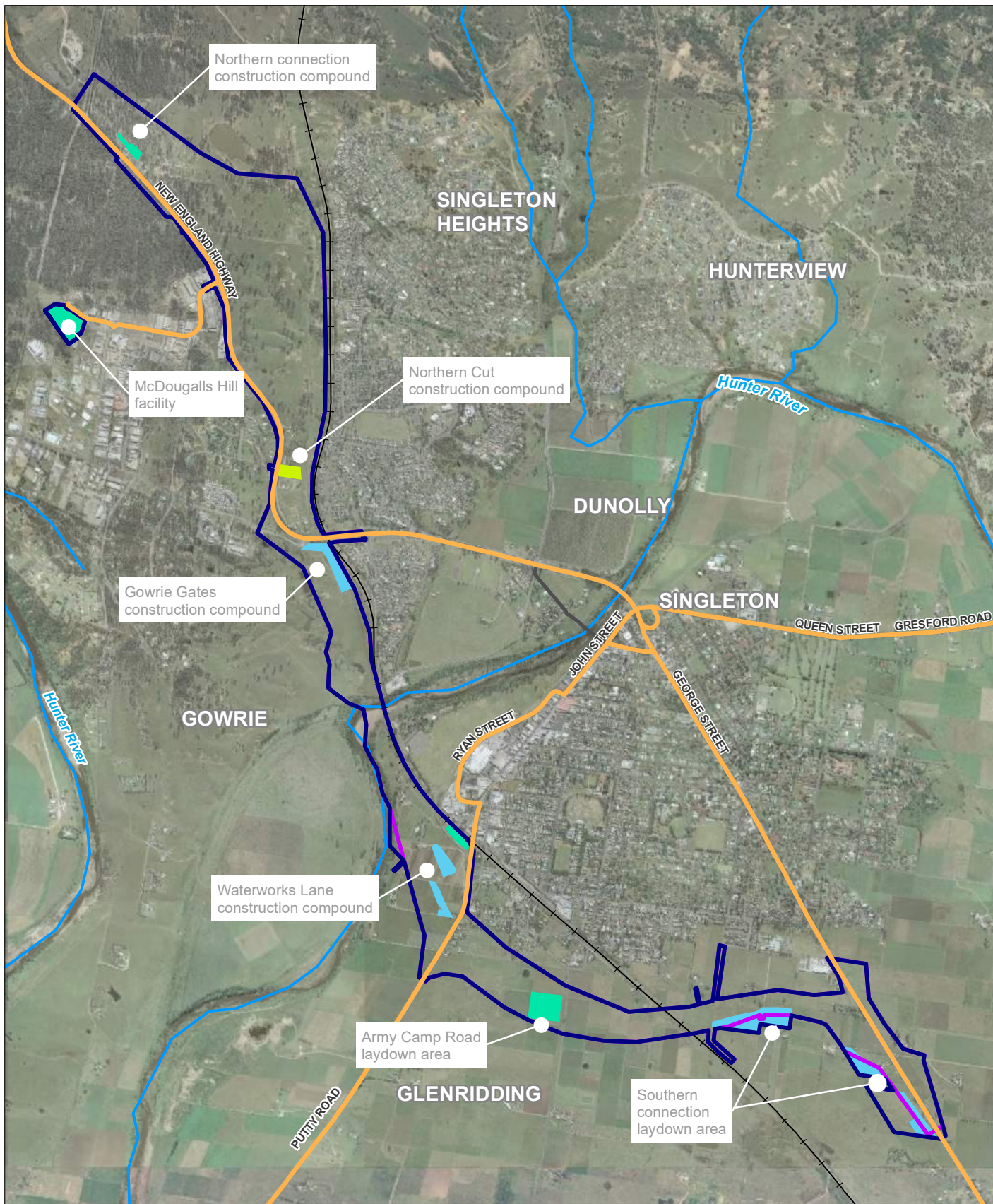
### 3.3.5 Source and quantity of materials

The construction of the proposed modifications would not require any materials in addition to those listed in Section 3.3.5 of the project REF. However, it is likely that the proposed modifications 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 modifications, would be confirmed during detailed design.

Material excavated to the north of Gowrie Gates would be used as a source of fill material across the project. Excess fill left over from other local road projects may be used for this project where suitable.

### 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 project REF. Haulage routes remain unchanged and are shown on Figure 3-4. The use of local roads including Ryan Avenue as shown in Figure 3-4 would be subject to continued consultation with Singleton Council.



**FIGURE 3-4 Construction ancillary facilities and haulage routes**

**Legend**

**Proposal features**

- Project REF area
- Proposal area
- Haulage routes
- Construction ancillary facility (new)
- Construction ancillary facility (unchanged)

Construction ancillary facility (modified)

- Other features**
- State roads
  - Main North railway line
  - Watercourse

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### 3.4 Ancillary facilities

As part of the proposed modification, changes to construction ancillary facilities are proposed to avoid conflicts with the construction of the modified design. Specifically, the construction ancillary facilities at the southern connection, Waterworks Lane and Gowrie Gates have been adjusted and/or moved. A new construction compound, namely the Northern Cut construction ancillary facility, is also proposed. A summary of the modified and new construction ancillary facilities and associated activities at each is provided in Table 3-2. The potential activities and anticipated impacts at each modified site remain consistent with that assessed in the project REF.

No other changes to the number and placement of construction ancillary facilities are required for the proposed modification. The details of the construction ancillary facilities that have not changed are provided in Section 3.4 of the project REF.

The location of all ancillary facilities for the project is shown on Figure 3-4.

#### 3.4.1 Southern connection laydown area

The southern connection laydown area has been modified to include two different laydown areas near the southern connection. The laydown areas would be located on land currently used for agricultural purposes, previously acquired as part of the project. The site would be accessed from the New England Highway.

Construction activities at this location would primarily include the laydown of construction materials and equipment required to support the construction of the southern connection and the proposed bridge structure, as well as the bridge over the floodplain.

#### 3.4.2 Waterworks Lane construction compound

The Waterworks Lane construction compound has been adjusted to accommodate the new design. The eastern section of the compound, located on ARTC-owned land, would be unchanged. The western section of the compound would be split into two separate sections on privately owned land currently used for agricultural purposes, but within the area to be acquired for the project. This allows the compound areas to continue to be utilised throughout construction of the proposed modification. The construction compound would be accessible from Waterworks Lane via an existing access point and the Putty Road connection once constructed would then be used as the primary access.

This construction compound would support the construction of the Putty Road connection, road surface through the Doughboy Hollow and Hunter River floodplains and the bridge over the Hunter River.

#### 3.4.3 Gowrie Gates construction compound

The Gowrie Gates construction compound has been extended further to the north towards New England Highway and west towards Maison Dieu Road.

The compound is located within land owned by Australian Rail Track Corporation (ARTC) and would be subject to ARTC approval and a temporary lease during construction. The construction compound would be located in an area of cleared land.

This construction compound would support the construction of the bridge over the New England Highway and connection with the New England Highway at the Gowrie Gates.

#### 3.4.4 Northern Cut construction compound

The Northern Cut construction compound is a new ancillary facility proposed to be located to the east of the New England Highway at the intersection of Park View Crescent and New England Highway. The proposed construction compound is located on land owned by Transport.

This construction compound would support the construction of the bridge over the New England Highway and connection with the New England Highway at the Gowrie Gates.

Table 3-2: Summary of new or modified construction activities at proposed construction ancillary facilities

Construction activities	Southern connection laydown area	Waterworks Lane construction compound	Gowrie Gates construction compound	Northern Cut construction compound
Vegetation clearing	Yes	No	No	Yes
Utility works including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities	No	Yes	Yes	Yes
Establishment of site offices, amenities, and temporary infrastructure including fencing	No	Yes	Yes	Yes
Laydown and storage of materials	Yes	Yes	Yes	Yes
Chemical storage	Yes	Yes	Yes	Yes
Crushing	Yes	Yes	Yes	Yes
Delivery of materials, plant, and equipment	No	Yes	Yes	Yes
Stockpiling	Yes	Yes	Yes	Yes
Demobilisation	Yes	Yes	Yes	Yes

### 3.5 Public utility adjustment

Public utility adjustments were modified as part of the previous addendum REF (April 2023). No further public utility adjustments are required as part of this modification. The proposed modification would require minor modifications to drainage. The drainage changes are within the proposal area and considered in this addendum REF. Modifications would predominantly include drainage channels. The nature of the modifications would be consistent with those described in section 3.5 of the project REF.

### 3.6 Property acquisition

No properties in addition to those identified in section 3.6 of the project REF and previous addendum REF (April 2023) are proposed to be acquired as are 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 SEPP (Transport and Infrastructure) aims to facilitate the effective delivery of infrastructure across the State.

Section 2.108 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 for NSW, 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)
- State Environmental Planning Policy (Precincts – Eastern Harbour City)
- State Environmental Planning Policy (Precincts – Regional) 2021
- State Environmental Planning Policy (Precincts – Western Parkland City) 2021.

Section 2.10 to 2.15 of SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

Consultation, including consultation as required by ISEPP (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 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 previous addendum REF (April 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 the Koala 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 area. No further assessment was required as part of this modification.

#### 4.1.2 Local Environmental Plans

The proposed modification is located within the Singleton LGA. There are two local environmental planning instruments that apply to the Singleton LGA. These are the:

- Singleton Local Environmental Plan 1996 (Singleton LEP 1996)
- Singleton Local Environmental Plan 2013 (Singleton LEP 2013).

The Singleton LEP 1996 remains in force for portions of the Singleton LGA which are identified as deferred matters on the Singleton LEP 2013 land zoning maps. No elements of the proposed modification would be on land that is identified as a deferred matter in the Singleton LEP 2013, therefore no further consideration of the Singleton LEP 1996 is required.

Clause 5.10 of the Singleton LEP 2013 provides for the protection of heritage items within the Singleton LGA. The project REF identified four heritage items within the project area that are listed on the Singleton LEP 2013. The proposed modification is located within three of these items being the “Former Pumping Station”, “Bebeah” and the “Woolpack Inn”. An assessment of the potential impacts of the proposed modification on these heritage items is provided in Section 6.7.

As outlined in Section 4.1.1, Section 2.108(1) of SEPP (Transport and Infrastructure) overrides the requirement for development consent from Singleton Council. 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 would involve some adjustments to property acquisitions presented in the project REF, however, this is not expected to increase land fragmentation. Property acquisitions required for the proposed modification are detailed in Section 3.6. As described in the socio-economic impact of the proposed modification in Section 6.6, the impact to agricultural productivity within the Singleton LGA as a result of the proposed modification is considered to be minor.

#### **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 6.7. 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.

### **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, a number of weed species have been identified in the proposed modification area. Consistent with the project REF, management measures have been recommended 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 habitat, 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).

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).

#### 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 Planning and Environment - Water as per the NSW Water Management (General) Regulation 2018.

#### 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 previous addendum REF (April 2023). No further adjustment AHIP area are required for the proposed modification. An assessment of the potential impacts to Aboriginal heritage and measures to manage potential impacts are discussed in Section 6.7.

##### **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. An assessment of potential impacts on non-Aboriginal heritage items is provided in Section 6.7 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 given the potential for archaeological relics at this location.

##### **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 and is summarised in Section 6.5 of the project REF. The proposed modification does not alter the likelihood of encountering contaminated soil or groundwater from that described in the project REF.

##### **Protection of the Environment and 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.

#### **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.

#### **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 *Environment Protection and Biodiversity Conservation Act 1999* (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 6.7 of the addendum REF.

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 6.7 of the addendum REF and Appendix A. The proposed modifications are not expected to change impacts identified in the project REF and previous Addendum AREF (April 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 Department of Climate Change, Energy, the Environment and Water is not required.

The assessment undertaken for the project REF 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 peoples and Torres Strait Islanders.

Searches of the National Native Title Register, Register of Native Title Claims and Register of Indigenous Land Use Agreements were undertaken on 28 July 2023 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 continues that undertaken for the project at large. Consultation has followed Heritage NSW's Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010) and 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 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 2.108 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 endeavoured to keep the community and stakeholders informed and proactively consulted throughout the development of the project and proposed modification. 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 proposal
- 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 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 submissions regarding the project. A Submissions Report was prepared documenting the outcomes of this process and published 7 August 2020.

Community submissions received during the display has resulted in design changes to the project. As part of this, a full interchange at the Putty Road connection has been included into the design. The full interchange with additional ramps to provide greater access to Singleton town centre would address concerns raised through consultation for the approved project.

#### 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 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.

Consultation has included meetings (online and face to face), phone calls, general project updates, as well as direct communications between Transport and Registered Aboriginal Parties regarding the proposed modification.

#### 5.1.3 Landowners

Affected landowners have been consulted with throughout each phase of the project. 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 in accordance with the Community and Stakeholder Engagement Plan.

No new properties to those identified in the project REF were identified for acquisition as a result of the proposed modifications. Transport will continue to consult with all directly affected landholders.

#### 5.1.4 SEPP (Transport and Infrastructure) consultation

Singleton Council and NSW State Emergency Services (NSW SES) have been consulted about the proposed modification 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.

Formal SEPP (Transport and Infrastructure) letters were issued to Singleton Council and NSW SES on 26 October 2022.

Singleton Council was consulted as per the 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. A response was received from Council on 16 November 2022. Council was in general agreeance with most aspects of the proposed modification. Issues raised by Singleton Council are summarised in Table 5-1.

NSW SES was consulted as per the requirement of section 2.13 for development on flood liable land. No response was received from the SES for inclusion in the addendum REF.

Table 5-1: Summary of issues raised through SEPP Transport and Infrastructure consultation

Agency	Issue raised	Response / where addressed in addendum REF
Singleton Council	Modifications to the location of/new construction compounds	The location of construction compounds are provided in Section 3 of the project REF and Section 3 of this report. Transport will continue to liaise with council during construction phase.
Singleton Council	Flooding	The main carriageway of the bypass has been 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 flood water flow paths of Doughboy Hollow to minimise obstructions where practical. Further detail regarding flooding is provided in Section 6.1 and Appendix C.
	July 2022 flooding conditions at Doughboy Hollow	Noted
	Closure of New England Highway at Doughboy Hollow (due to flooding) affecting emergency services and evacuation routes	Noted
	Request for further investigation and design refinement to provide flood immunity to the section of New England Highway at Doughboy Hollow during major flood events.	Transport notes flooding impacts and will continue to investigate opportunities to minimise flooding impacts where practical in detailed design.
	During the July 2022 flood, transport routes were affected by the closure of Doughboy Hollow and Golden Highway (Mudies Creek)	Noted
	Request for further investigation and design refinement to provide flood immunity to the Putty Road interchange during major flood events.	Impacts to flooding were considered throughout the redesign for the Putty Road Interchange. Further information regarding the flooding impacts is provided in Section 6.1.
	Maintaining operation of both the Putty Rd interchange and at Doughboy Hollow during flood events would provide continued transport routes, emergency services access and evacuation routes that are important to the Singleton township and broader region	Noted
State Emergency Services	No response received to date	Transport will continue to consult with SES

## 5.2 Ongoing or future consultation

The community and stakeholders will be informed about the addendum REF and the proposed modifications. This addendum REF will be made available on the Transport project website.

Transport will 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 New England Highway bypass of Singleton. 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 ameliorate the identified potential impacts.

### 6.1 Surface water, hydrology, and flooding

#### 6.1.1 Methodology

A surface water, hydrology and flooding assessment was undertaken for the project REF 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 undertaken.

The flood impact assessment prepared by BMT in 2022 for the proposed modification is in Appendix C. The flood impact assessment considered mainstream flooding of the Hunter River and local catchment runoff from Doughboy Hollow Creek. The flood impact assessment adopted the following methodology.

- Review of available flooding data and previous flood assessments.
- Inclusion of updated detailed levee survey data from Singleton Council.
- Information from the flood model developed as part of the Singleton Floodplain Risk Management Study and Plan (FRMSP) currently being prepared for Singleton Council was adopted as a base case.
- Assessment of the impact of operational activities of the concept design and proposed modification on flooding.

#### 6.1.2 Existing environment

The existing surface water, hydrology and flooding environment relevant to the proposed modifications is consistent with the description in Section 6.2.2 of the project REF. Additional existing flooding conditions determined through the flood impact assessment for the proposed modification are described below.

The catchment area to Singleton is approximately 16,000 square kilometres. The original settlement of Singleton is on the floodplain of the Hunter River, with newer development located on flood-free land north of the Hunter River floodplain.

Both the Main North railway line and New England Highway bisect the natural path of major flood flows conveyed through Glenridding and Doughboy Hollow floodplains. The Singleton flood levee located along the riverbank to the northwest of the Singleton Central Business District (CBD) was constructed in 1963 and extended during 1982-1983 and in 1987. The levee has been designed to reduce flood risk to Singleton township from flood events up to and including the one per cent Annual Exceedance Probability (AEP) event, similar to a large flood event experienced in the town in 1955.

The flood impact assessment indicates that under existing conditions flooding by the one per cent AEP event would overtop the Main North railway line in the vicinity of John Street (south) and the railway station, resulting in extensive inundation of residential properties. There is also a significant damming effect by the railway embankment and a small ridge near the Singleton sewage treatment plant. This results in deep flooding in the Doughboy Hollow floodplain and increases the likelihood of overtopping of the railway line which would lead to flooding of the township.

In the Whittingham area south of Singleton, the New England Highway currently experiences a level of flood immunity somewhere between the ten per cent AEP and five per cent AEP events.

A figure of the one per cent AEP flood distribution is provided in [Figure 6-1](#). It indicates the two main flow paths being:



- The Hunter River channel and floodplain flowing around the northern side of Singleton.
- The Doughboy Hollow floodplain, which breaks away from the Hunter River at Glenridding and flows around the southern side of Singleton, before combining with the Hunter River floodplain again at Whittingham.

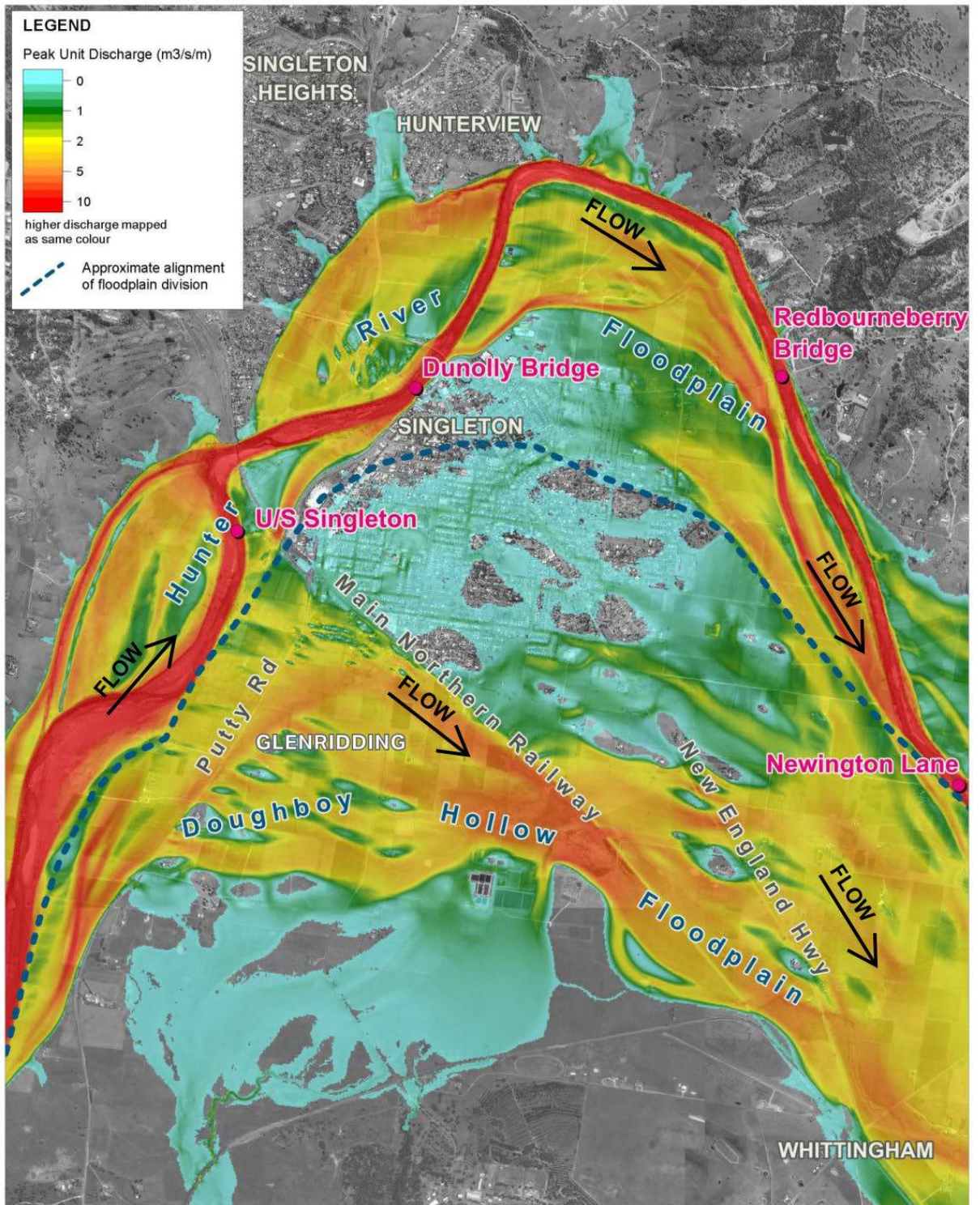


Figure 6-1: Singleton flood flow distribution 1% AEP event under existing conditions (source: BMT, 2022)  
(Red text indicates monitoring gauges)

### 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 project REF.

The modified and new construction ancillary facilities are not located near any waterways.

##### **Flooding**

Construction of the proposed modification is not expected to alter the potential impacts to flooding identified in Section 6.2 of the project REF.

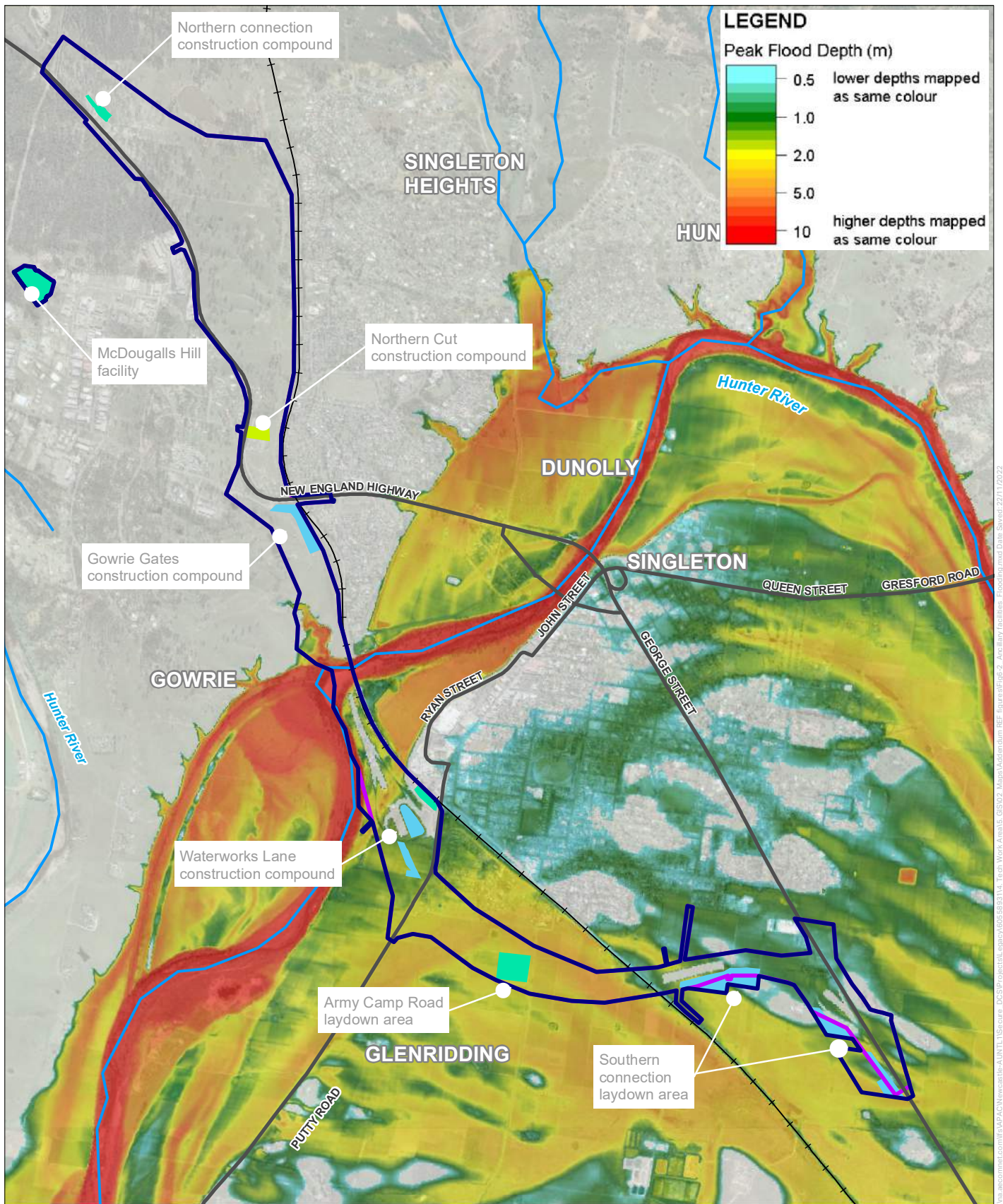
The new Northern Cut construction compound is located outside of a high flood risk area (refer to Figure 6-2).

##### **Water extraction and use – Hunter River**

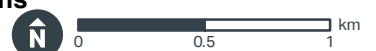
The proposed modification may require the extraction and use of water from the Hunter River for dust suppression and other construction activities. Water extraction and use will require applicable approvals from the NSW Department of Planning and Environment - Water as per the NSW Water Management Act 2000 and NSW Water Management (General) Regulation 2018.

Water extraction must not impact basic landholder rights (stock and domestic) and 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.





**FIGURE 6-2 Construction ancillary facilities - 1% AEP modelled peak flood conditions**



**Legend**

**Proposal features**

- Project REF area
- Proposal area
- Construction ancillary facility (new)
- Construction ancillary facility (unchanged)

Construction ancillary facility (modified)

**Other features**

- State roads
- Main North railway line
- Watercourse

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## **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 project REF. 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 would generally remain consistent with that of the existing drainage arrangements and are not considered likely to impact on surface water quality.

### **Flooding**

The bypass design has considered flood risk throughout its development and has been modified to minimise flooding impacts during operation. The proposed modification would increase the length of the bridge over the floodplain. The southern connection would be reconfigured to include a bridge structure on the main bypass alignment reducing the amount of road fill embankment at the southern connection than included in the REF.

Together, these modifications would reduce obstruction to floodplain flows during flood events and minimise flooding impacts. The flood impact assessment of the proposed modification is summarised below.

### **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 modifications.

Changes to peak flood level between the approved project 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 modification compared to the approved project
20% AEP	No change
10% AEP	<p>The modification results in some increases in peak flood levels within low-lying parts of Doughboy Hollow. These increases are associated with the proposed Putty Road connection, since it forms a partial obstruction, resulting in a slight redistribution of flows. The impacts occur to existing flowpaths and the increases in peak flood level are generally in the range of 0.01 m to 0.02 m with increases of up to 0.05 m in a localised area immediately adjacent to the railway embankment.</p> <p>Other highly localised differences in peak flood levels are apparent within the immediate vicinity of the Putty Road connection with increases of up to 0.12 m and decreases of up to 0.20 m resulting from the modification.</p>
5% AEP	<p>The modification results in increases in peak flood level of around 0.02 m within the Hunter River upstream (west) of the proposed bypass. Peak flood level increases of up 0.02 m also occur within the Doughboy Hollow floodplain.</p> <p>Localised increases of a higher magnitude occur immediately adjacent to the Putty Road connection as a result of the modification. However, consistent with the approved project, no dwellings appear to be significantly impacted.</p>
2% AEP	<p>Peak flood level increases within the Hunter River extend further upstream as a result of the modification, but the overall impact remains within 0.02 m to 0.05 m. There is a reduction in peak flood level to multiple properties south and southeast of the Putty Road connection. These decreases are up to 0.08 m and are associated with the redistribution of flow due to the Putty Road Connection.</p> <p>Consistent with the approved project, there are some minor increases and decreases in peak flood levels near the southern connection. The impacts are localised and limited to rural properties, with no impacts on existing residential dwellings.</p>
1% AEP	<p>This event shows the largest change resulting from the modification when compared to the approved project. This is illustrated in Figure 6-3 and Figure 6-4.</p> <p>At the 1% 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 is being acquired by Transport for the construction and operation of the Singleton bypass. Therefore, depending on the extent of land acquisition, much of the localised impact may not result in any adverse effects to property.</p> <p>On the Hunter River upstream of bypass, the increase in peak water level is typically between 0.03 m and 0.06 m. This compares to 0.02 m to 0.04 m under the approved design.</p> <p>There is an overall reduction in peak flood level to urban areas of Singleton. The magnitude of the reduction has reduced due to the proposed modification but remains an overall reduction of approximately 0.03 m.</p>

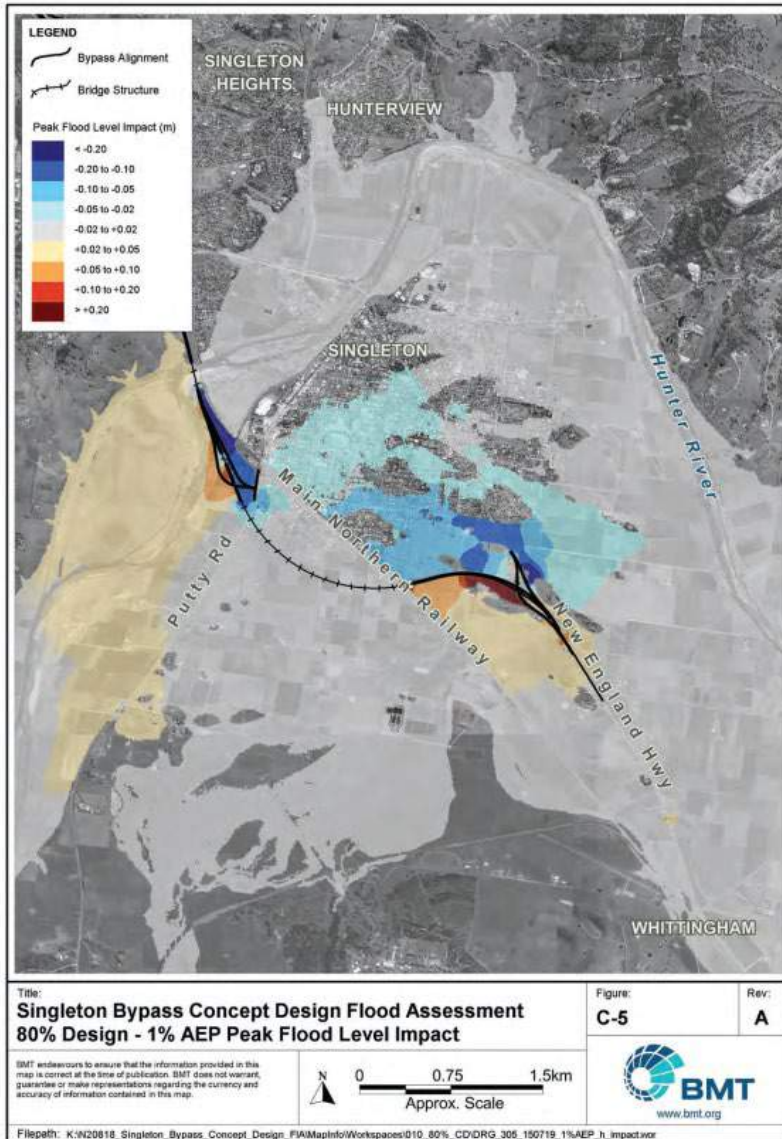


Figure 6-3: Approved project design – 1% AEP peak flood level impact (source: BMT 2020)

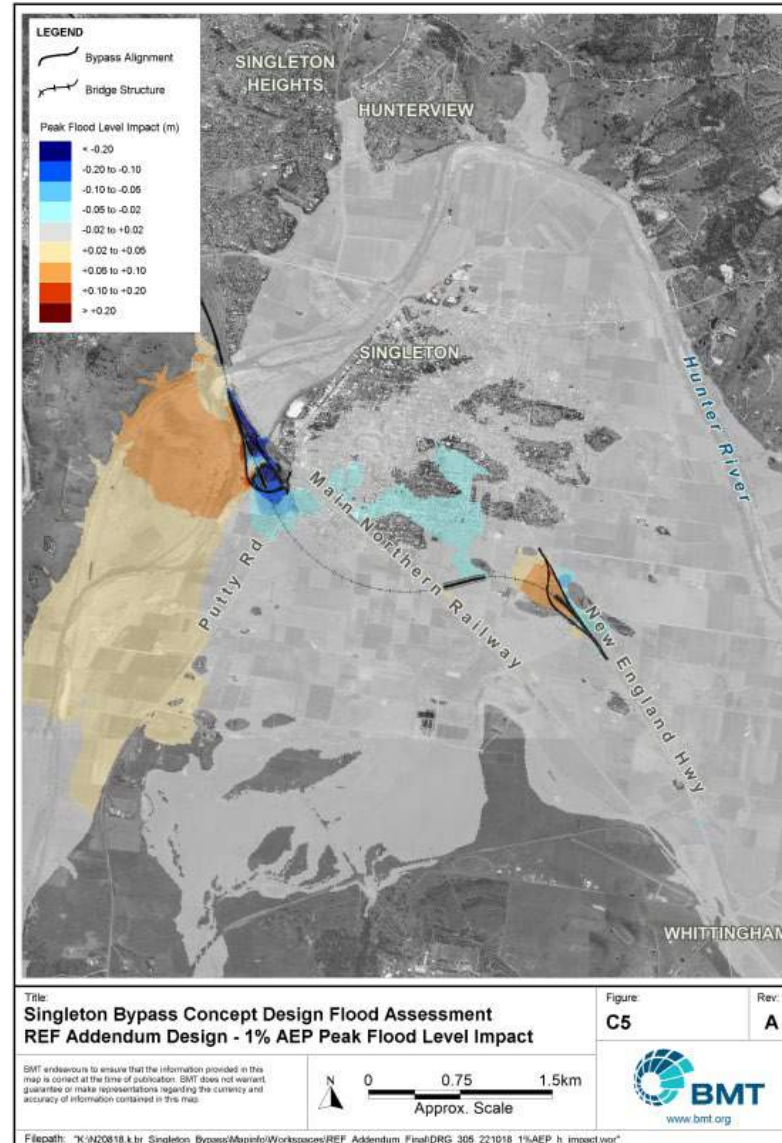


Figure 6-4: REF addendum design – 1% AEP peak flood level impact (source: BMT 2022)

**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, the change in floodplain velocity distribution is relatively localised for all design events considered.

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

Table 6-2: Changes in peak flood velocity

Flood Event	Summary of changes resulting from the modification compared to the approved project
20% AEP	No change
10% AEP	Minimal change limited to areas immediately adjacent to the Putty Road connection.
5% AEP	The change in velocity resulting from the modification is generally the same as what is assessed in the project REF. However, there would no longer be a change in velocity around the northern abutment of the bridge over the floodplain and a channel at the southern connection exit ramp is no longer created.
2% AEP	<p>There would be no change in velocity around the northern abutment of the bridge over the floodplain and a channel at the southern connection exit ramp is no longer created.</p> <p>The peak velocity in the floodway downstream of the railway would decrease by approximately 0.7 m/s from that for the approved project extending for around 800 m downstream of the bypass.</p> <p>There are some minor changes to peak velocity adjacent to the Putty Road connection but these are highly localised and do not impact on any dwellings.</p>
1% AEP	<p>Within the Rose Point floodway upstream of the railway, peak velocities still increase, but range from around 0.5 m/s to 1.2 m/s rather than 0.8 m/s to 1.3 m/s.</p> <p>The reduction in peak velocity in the floodway downstream of the railway also changes from around 0.4 m/s as assessed in the approved REF to 0.5 m/s resulting from the modification.</p> <p>Peak flood velocities adjacent to the northbound connection from Putty Road increase by up to 0.6 m/s where the Putty Road connection redistributes floodwater within the floodplain. There are some minor peak velocity increases of up to 0.2 m/s adjacent to the southern abutment of the Hunter River railway bridge.</p> <p>The embankment between the two large floodplain bridges creates minor localised increases in peak flood velocity due to a slight concentration in flow as water passes alongside and around the embankment. The maximum increase is 0.7 m/s which is the same as for the approved design. There are also reduced peak velocities in areas that become partially sheltered by the bypass embankment.</p> <p>Changes to velocity around the southern connection would be reduced by the proposed modification but the reduction is less than that for the approved design.</p> <p>These changes are shown on Figure 6-5 and Figure 6-6.</p>



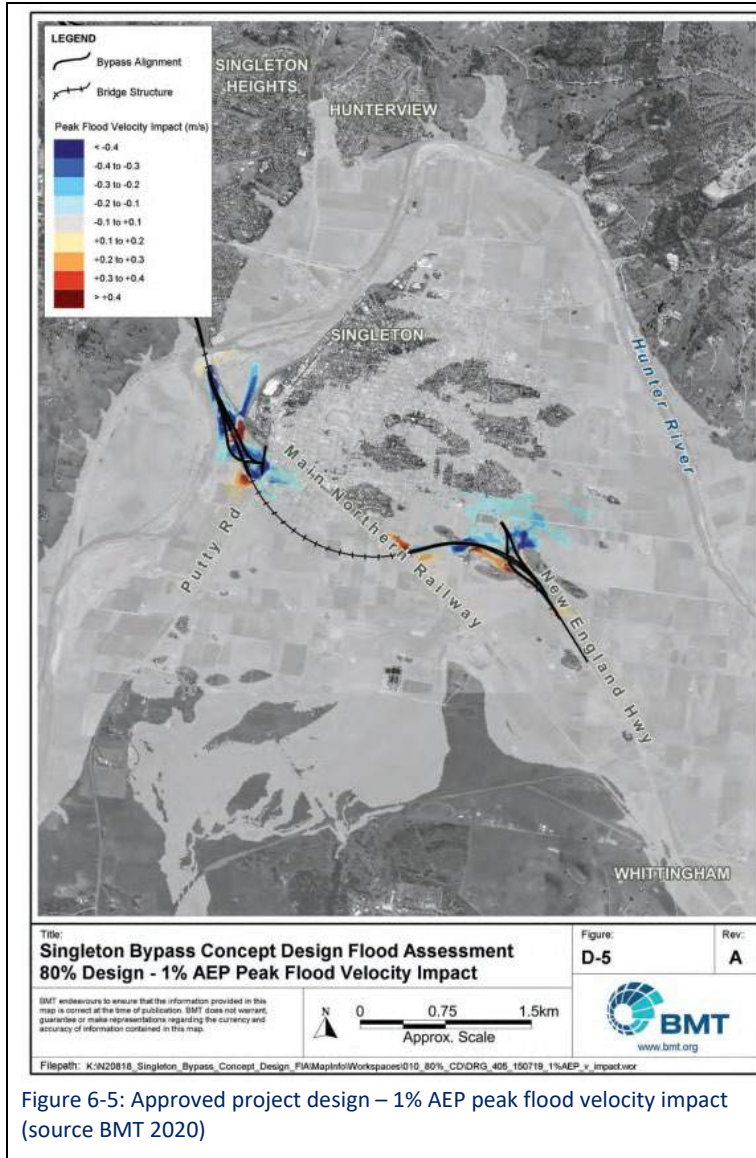


Figure 6-5: Approved project design – 1% AEP peak flood velocity impact (source BMT 2020)

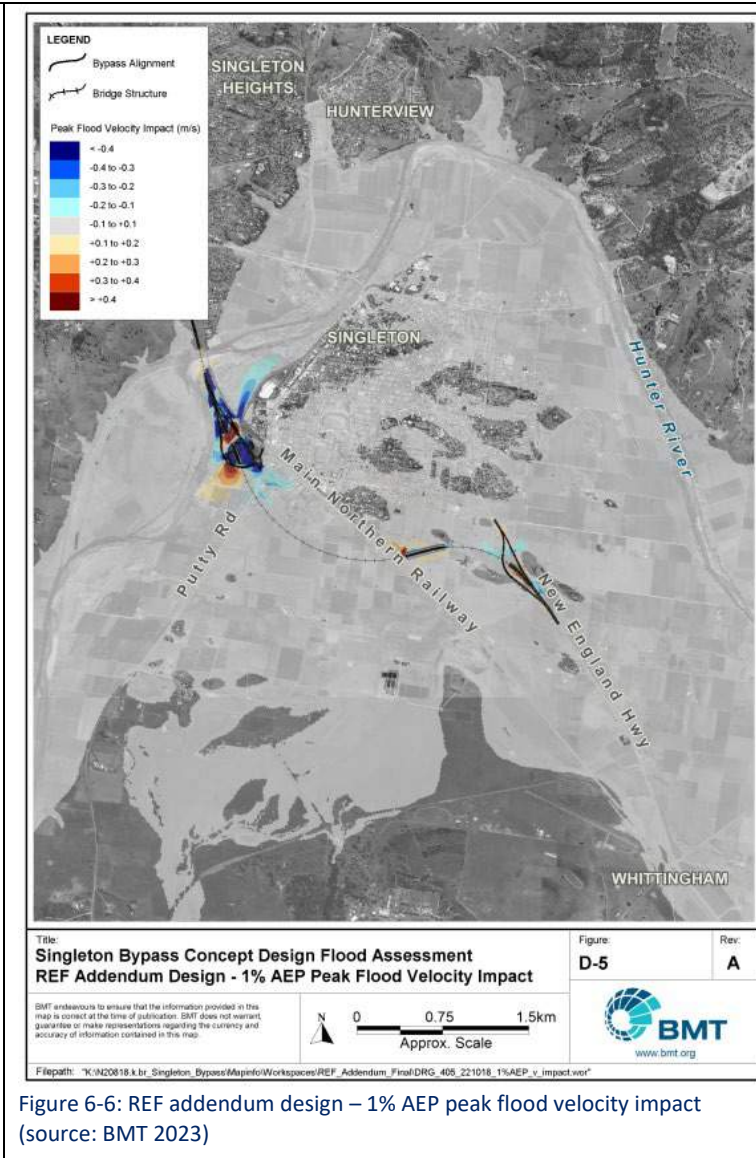


Figure 6-6: REF addendum design – 1% AEP peak flood velocity impact (source: BMT 2023)

### Other impacts

The approved project REF identified that the bypass design would not impact the overall duration of flood inundation. However, it would benefit the community by improving accessibility and evacuation routes during flood events. This remains consistent for the proposed modification.

### Summary

Overall, the flood impacts associated with the operation of the project are typically minor for all modelled events. The proposed modification would ensure that the obstruction to floodplain flow is minimal and would result in minimal floodplain impacts. The exception to this would be within the immediate vicinity of the bypass at locations where structures locally redistribute flow, resulting in both increases and decreases in peak flood level and velocity.

Based on the one percent AEP flood event, the proposed modification would have a localised minor increase in afflux to the west of the Putty Road connection and east of the new bridge alignment at the southern connection, based on the existing condition. There would be a decrease in afflux to the west of the project alignment at the southern connection. These changes are shown on Figure 6-3 and Figure 6-4.

Further to the above, there is a minor increase in the peak flood velocity associated with the proposed modification for the one per cent AEP event in the vicinity of Putty Road. At the southern connection, the localised minor changes (both increase and decrease) in peak flood levels associated with the proposed modification can be attributed to the removal of infrastructure creating an obstruction to flow across the floodplain. These changes are shown on Figure 6-5 and Figure 6-6.

### 6.1.4 Safeguards and management measures

No further safeguards and management measures are proposed. The measures provided in the project REF 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 undertaken following the methodology outlined in Appendix L of the project REF. No further traffic counts were carried out for the addendum REF.

The traffic assessment modelled six scenarios for the additional ramps at the Putty Road connection. The assessment did not model scenarios for the southern connection as this involved a reconfiguration to the design rather than the addition of new structures.

### 6.2.2 Existing environment

Section 6.5 of the project REF describes the existing traffic and transport environment.

#### Existing traffic volumes

Transport has a permanent classifier station located on the New England Highway just north of Singleton, about 200 metres north of Rixs Creek Lane. This station provides historical annual average daily traffic (AADT) data.

The data for this station between 2015 and 2018 was presented in the project REF and has since reported four more years of data, shown in Table 6-3.

The AADT data for the New England Highway nearest to Singleton shows traffic volumes have steadily increased until 2020 where a substantial decline is observed. This is most likely attributable to the COVID-19 pandemic which disrupted day-to-day life. However, given the trend of past years, it is expected that now COVID-19 restrictions have been lifted, there would continue to be traffic growth on the New England Highway.

Table 6-3: Transport AADT data for New England Highway

Station	Two way traffic volumes (vehicles)							
	2015	2016*	2017	2018	2019	2020	2021	2022
200 m north of Rixs Creek Lane, Rixs Creek ID: 6153	13,245	-	13,796	14,284	14,671	13,888	13,747	13,915

\* 2016 data has been excluded from the table as southbound traffic only was recorded

### 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 project REF. The proposed modification consists of alterations to existing elements of the 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 modifications is anticipated to be similar to that assessed in the project REF, being up to 80 light 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 southern connection laydown area, Waterworks Lane construction compound and the Gowrie Gates construction compound, would be modified as described in Section 3.4. There would also be a new compound located opposite Park View Crescent referred to as the Northern Cut construction compound.

The southern connection laydown area would be accessed via the New England Highway and the Waterworks Lane construction compound would initially be accessed via Waterworks Lane and then from the new Putty Road connection roundabout once constructed. These modifications would not increase impacts to traffic and transport.

Given the proximity of the southern connection to the 60 km/h speed zone through Singleton, the change in speed zone would be temporarily relocated around 1.2 kilometres south. This change would add around 29 seconds of travel time compared to existing conditions and would improve safety for road users during construction. The new speed would be adequately signposted to ensure road users are aware of the change.

The Gowrie Gates construction compound modification is a slight increase in area and would not increase impacts to traffic and transport.

The Northern Cut construction compound would be accessed via the New England Highway. Access arrangements would be confirmed during construction planning to manage impacts to traffic and transport.

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 bypass impacts these roads predominately when lifting bridge girders, widening existing pavement and tie-in works. The proposed modifications would not extend the duration of the project and traffic impacts would be consistent with those assessed in the project REF. 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 project REF.

## **Operation**

### **Traffic impacts**

Due to the substantial change to the Putty Road connection as part of the proposed modification, an operational assessment of traffic performance was undertaken for the new configuration. Modelling adopted a bypass opening year of 2026 and examined future years of 2036, and 2046 and compared these against the modelling results of the previous bypass layouts examined in the project REF. The modelling indicated the inclusion of the roundabout interchange at Putty Road in the bypass scenario 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 following future scenarios previously modelled:

- Scenario 1 – Bypass with no south facing ramps
- Scenario 2 – Bypass with south facing ramps

The modelling outcomes for 2036, 10 years after the proposed opening, are summarised in this chapter. The complete traffic assessment report is included at Appendix D.

Traffic impacts at the southern connection are considered negligible as a result of the proposed modification, when compared to the approved project, as new structures were not included 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 level of service the proposed modification at Putty Road would have when compared to the previously considered scenarios. Table 6-4 summarises the performance of key intersections in each scenario during the peak morning period of 5:30 to 6:30am.

The performance and level of service of the proposed modification is generally consistent with the other scenarios modelled.

Table 6-4: Intersection performance 5:30 – 6:30 AM

Intersection	Scenario 1 Bypass no ramps		Scenario 2 Bypass with ramps		Proposed modification	
	Avg. delay (s)	LoS	Avg. delay (s)	LoS	Avg. delay (s)	LoS
New England Highway / Bridgman Road	151	F	104	F	146	F
New England Highway / Howe Street	13	A	13	A	12	A
New England Highway / York Street	20	B	20	B	24	B
Putty Road / Ryan Avenue	14	B	14	B	15	B
John Street / Hunter Street	9	A	10	A	9	A
John Street / Newton Street	1	A	1	A	1	A
Queen Street / New England Highway Ramp	5	A	7	A	4	A
Putty Road Northern Ramp / Roundabout	6	A	7	A	2	A
New England Highway / Maison Dieu Road / Bypass Off Ramp	14	A	14	B	14	A

The performance of the proposed modification during the evening peak period (4 to 5pm) would experience minor increases of delays at two intersections. The intersection of Putty Road and Ryan Avenue would experience a small increase in delay of six seconds as a result of increased traffic on the western approach with additional traffic heading towards the bypass interchange resulting in a minor change from level of service A to B. Similarly, the intersection of John Street and Hunter Street would experience an increase in delay of three seconds with additional traffic on the southern approach resulting in a minor change of level of service from A to B. A summary of intersection performance of the proposed modification during each peak period is included in Table 6-5.

Table 6-5: Summary of intersection performance of the proposed modification scenario during peak hours

Intersection	AM peak (5:30 6:30am)		AM peak (8:30 9:30am)		PM peak (4 5pm)	
	Avg. delay (s)	LoS	Avg. delay (s)	LoS	Avg. delay (s)	LoS
New England Highway / Bridgman Road	146	F	35	C	53	D
New England Highway / Howe Street	12	A	9	A	14	A
New England Highway / York Street	24	B	22	B	22	B
Putty Road / Ryan Avenue	15	B	16	B	19	B
John Street / Hunter Street	9	A	14	B	16	B
John Street / Newton Street	1	A	2	A	3	A
Queen Street / New England Highway Ramp	4	A	9	A	12	A
Putty Road Northern Ramp / Roundabout	2	A	5	A	6	A
New England Highway / Maison Dieu Road / Bypass Off Ramp	14	A	10	A	9	A

**Traffic flows**

The inclusion of a new roundabout interchange at Putty Road has minimal impacts on overall traffic flows. The modelling results indicate that locating the interchange closer to the Singleton CBD would result in a small increase of traffic on the south facing ramps when compared to the other scenarios.

Traffic flows on the bypass, modelled at the bridge over the floodplain south of the Putty Road connection, would also be higher than the other scenarios. Traffic volumes during the peak morning and evening periods would increase in both directions. Traffic volumes at other modelled locations along the bypass remain similar to the other bypass scenarios.

The increase in traffic flows of the proposed modification are generally minor and the level of service of each key intersection would remain consistent with the other scenarios, and in some cases decrease the average delay experienced at intersections.

**Travel times**

The proposed modification at Putty Road has limited impact on travel times when compared to the other bypass scenarios. An exception is the route along John Street and Queen Street, which experiences a small increase in travel time of less than 25 seconds in 2036 as a result of the new roundabout interchange when compared to the other bypass options.

**On-street parking**

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 provision of a bypass is anticipated to improve road user safety, particularly for those in Singleton as through traffic would utilise 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 updated interchange layout results in some additional traffic utilising the south facing ramps via the roundabout when compared to the other configurations, particularly the south facing ramps scenario. The modelling results show that locating the interchange in closer proximity to Singleton CBD would result in a small increase of traffic on the south facing ramps when compared to the other scenarios.

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 project REF and previous addendum REF (April 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 noise and vibration technical report addendum for the proposed modification provided in Appendix E.

### 6.3.1 Methodology

The construction noise and vibration impact assessment methodology and assumptions were presented in Chapter 3 of the noise and vibration technical report prepared for the project REF.

### 6.3.2 Existing environment

A description of the existing acoustic environment around the Singleton bypass was presented in Chapter 2 of the noise and vibration technical report prepared for the project REF.

#### Criteria

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

Table 6-6: 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 activities with the potential to generate noise would be carried out within the construction ancillary facilities described in Section 3.4 and along the bypass alignment. Noise generating activities associated with the proposed modification would include:

- Earthworks
- Drainage
- Bridge construction
- Pavement works
- Finishing works including asphaltting, line marking and signage and street furniture installation
- Installation of approach signage.

Works associated with the approach signage and safety barriers would generally be minor in nature consisting of the installation of a cast concrete support foundation with the use of a small to medium drill rig. The foundation would then be left for a setting period (typically around 28 days) after which the sign and post would be attached with a crane. As construction works would occur over a period of less than three weeks and noise impacts are expected to be minor, the quantitative assessment does not include these areas.

Within the construction ancillary facilities, the following works would generate noise:



- Vegetation clearing
- Establishment of site offices, amenities and temporary infrastructure including fencing
- Construction worker parking
- Construction vehicle facilities such as washdown areas and refuelling stations
- Laydown and storage of materials
- Delivery of materials, plant and equipment
- Stockpiling
- Demobilisation.

For each ancillary facility and the bypass alignment, predicted noise levels for each construction scenario including the proposed modifications have been reassessed against the existing relevant noise criteria. A summary of the results of the assessment in each NCA is provided in Table 6-7 for works during standard hours. Detailed noise predictions are provided in Section 4 of Appendix E.

Table 6-7: Standard hours construction noise impacts by noise catchment areas

NCA	Impact of bypass alignment modifications	Impact of construction ancillary facilities modifications
NCA 1	<ul style="list-style-type: none"> <li>• A greater number of receivers exceed the noise management level</li> <li>• There are a total of four highly affected noise receivers across all alignment construction activities, down from 13 receivers</li> </ul>	<ul style="list-style-type: none"> <li>• Noise levels from the works associated with the Southern connection laydown area would exceed the noise management levels at nearby receivers during vegetation removal, stockpiling and demobilisation works</li> <li>• Most exceedances are less than 10 dB(A). Four additional exceedances of greater than 20 dB(A) are predicted, however these works would be very limited in duration. Two residences are predicted to be highly affected during the vegetation removal works</li> </ul>
NCA 2	<ul style="list-style-type: none"> <li>• A greater number of receivers exceed the noise management level</li> <li>• There are a total of 10 highly noise affected receivers across all alignment construction activities, down from 18 receivers</li> </ul>	<ul style="list-style-type: none"> <li>• Noise levels from the works associated with the Waterworks Lane construction compound would exceed the noise management levels at nearby receivers during site establishment, stockpiling and demobilisation activities</li> <li>• The majority of exceedances are less than 10 dB(A), however a number of exceedances of greater than 20 dB(A) are predicted. These exceedances are during short term activities.</li> </ul>
NCA 3	<ul style="list-style-type: none"> <li>• A greater number of receivers exceed the noise management level</li> <li>• No receivers are identified as highly noise affected, consistent with the project REF</li> </ul>	<ul style="list-style-type: none"> <li>• Noise levels from the works associated with the new Northern Cut construction compound would exceed the noise management levels at nearby receivers during vegetation removal works, site establishment, stockpiling and demobilisation activities</li> <li>• The majority of exceedances are less than 10 dB(A), however a number of exceedances of greater than 20 dB(A) are predicted. These exceedances are during short term activities.</li> <li>• There are also some increases in the number of residences impacted by works associated with the Gowrie Gates construction compound during stockpiling</li> </ul>

NCA	Impact of bypass alignment modifications	Impact of construction ancillary facilities modifications
NCA 4	<ul style="list-style-type: none"> <li>A greater number of receivers exceed the noise management level, however the severity of exceedances are generally lower than those predicted in the project REF</li> <li>There is one highly noise affected receiver across all alignment construction activities, consistent with the project REF</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels from the works associated with the new Northern Cut construction compound would exceed the noise management levels at nearby receivers during vegetation removal works, site establishment, stockpiling and demobilisation activities</li> <li>The majority of exceedances are less than 10 dB(A), however a number of exceedances of greater than 20 dB(A) are predicted. One residence is predicted to be highly affected during the vegetation removal and site establishment works</li> <li>There are also some increases in the number of residences impacted by works associated with the Gowrie Gates construction compound during site establishment, stockpiling and demobilisation activities</li> </ul>
NCA 5	<ul style="list-style-type: none"> <li>Noise impacts remain similar to the project REF</li> <li>There is a total of four highly noise affected receivers across all alignment construction activities, up from three receivers</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>

No changes to noise impacts are predicted for non-residential receivers as a result of the proposed modification during standard hours. No non-residential noise sensitive receivers are predicted to be affected by the new Northern Cut construction compound.

The majority of works along the alignment would be undertaken during standard hours. However, works may be carried out outside these hours to minimise traffic and rail disruptions during peak times and to offset wet weather delays. A summary of the results of the assessment for out-of-hours works is included in Table 6-8.

Table 6-8: Out of standard hours construction noise impacts by noise catchment areas

NCA	Impact of bypass alignment modifications	Impact of construction ancillary facilities modifications
NCA 1	<ul style="list-style-type: none"> <li>A greater number of receivers exceed the noise management level than those predicted in the project REF, except for exceedances greater than 25 dB(A)</li> <li>A total of five receivers are predicted to experience an exceedance of greater than 25 dB(A) across all alignment construction, down from 10 receivers</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels from the works associated with the Southern connection laydown area would exceed the noise management levels at nearby receivers during laydown activities</li> <li>Most exceedances are less than 5 dB(A), however noise levels at two residences are predicted to exceed by more than 25 dB(A)</li> </ul>
NCA 2	<ul style="list-style-type: none"> <li>A greater number of receivers exceed the noise management level than those predicted in the project REF</li> <li>The number of receivers that are predicted to experience an exceedance of greater than 25 dB(A) across all alignment construction activities totals 49, up from 25 receivers</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels from the works associated with the Waterworks Lane construction compound would exceed the noise management levels at nearby receivers during laydown activities</li> <li>The majority of exceedances are less than 15 dB(A), and the number of exceedances between 6 dB(A) and greater than 25 dB(A) are less than predicted in the project REF</li> </ul>
NCA 3	<ul style="list-style-type: none"> <li>A greater number of receivers exceed the noise management level than those predicted in the project REF</li> <li>The number of receivers that are predicted to experience an exceedance of greater than 25 dB(A) across all alignment construction activities totals 91<sup>3</sup>, up from two receivers</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels from the works associated with the new Northern cut construction compound would exceed the noise management levels at nearby receivers during laydown activities</li> <li>Most exceedances are less than 15 dB(A)</li> <li>No changes to noise impacts associated with the Gowrie Gates construction compound</li> </ul>

NCA	Impact of bypass alignment modifications	Impact of construction ancillary facilities modifications
NCA 4	<ul style="list-style-type: none"> <li>• A greater number of receivers exceed the noise management level than those predicted in the project REF with the exception of exceedances greater than 25 dB (A)</li> <li>• There are no receivers predicted to experience an exceedance of greater than 25 dB (A) across all alignment construction activities, in comparison to three receivers</li> </ul>	<ul style="list-style-type: none"> <li>• Noise levels from the works associated with the new Northern cut construction compound would exceed the noise management levels at nearby receivers during laydown activities</li> <li>• Most exceedances are less than 15 dB(A), however noise levels at two residences are predicted to exceed by more than 25 dB(A)</li> <li>• Noise impacts associated with the Gowrie Gates construction compound remain similar to the project REF</li> </ul>
NCA 5	<ul style="list-style-type: none"> <li>• The number of receivers to exceed the noise management level increases slightly to those predicted in the project REF</li> <li>• The number of receivers that are predicted to experience an exceedance of greater than 25 dB(A) across all alignment construction activities totals three, up from two receivers</li> </ul>	<ul style="list-style-type: none"> <li>• Not applicable</li> </ul>

It is important to consider that the predicted noise levels are representative of the worst case 15 minute period of construction activity, while the construction equipment is at the nearest location to each sensitive receiver location. The nature of the noise generating works for the proposed modification would not be substantially different to those assessed and mitigated in the project REF.

No changes to noise impacts are predicted for non-residential receivers as a result of the proposed modification during out of hours. No non-residential noise sensitive receivers are predicted to be affected by the new Northern Cut construction compound.

#### **Construction sleep disturbance**

Exceedances of the sleep disturbance and awakening reaction criteria are predicted at a number of properties in each NCA. The largest numbers of exceedances are associated with bridge construction, pavement and finishing works in the vicinity of NCA 1, NCA 2 and NCA 3. As a result of the proposed modification potential sleep disturbance exceedances are predicted to increase from 1231 to 1286 receivers in total during these activities and predicted awakening reactions reduced from about 184 to 146 receivers.

Construction associated with the proposed modification would largely be carried out during standard construction working hours.

#### **Construction road traffic noise**

Construction vehicle movements would not alter from that described and assessed in the project REF. As such, safeguards outlined in the project REF would be appropriate to manage risks associated with construction road traffic noise arising from the proposed modification.

#### **Construction vibration**

Construction vibration would not alter from that described and assessed in the project REF. As such, safeguards outlined in the project REF would 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. This assessment was undertaken for operation of the project and updated to incorporate the proposed modification.

Traffic volumes were modelled as part of the proposed modification and determined that the level of traffic travelling on the bypass would generally be slightly higher than was modelled for the project REF. The existing road traffic noise was modelled as part of the project REF and has been adopted for the assessment of the proposed modification. This was considered the most representative of 'typical' conditions, given updated traffic counts may be influenced by travel restrictions associated with the COVID-19 pandemic.

An assessment was carried out in accordance with the Road Noise Policy to determine whether the proposed modification would alter the noise barrier recommendations presented in the project REF. The assessment considered incremental increases of 0.5 metres in barrier height from 0 to 8 metres.

In general, the higher the barrier, the greater the level of noise reduction. However, as identified in Transport's Noise Wall Design Guideline (2021), noise barriers that are excessively high can bring about the potential for visual intrusion, reduction of sunlight, loss of character and view and social alienation, compromising urban design and resulting in undesirable visual features.

The noise barrier assessment for the proposed modification determined that increasing the barrier height would not achieve noise level reductions commensurate with other impact considerations and would not substantially reduce the number of properties eligible for mitigations. Rather than increasing the height of the proposed noise barriers, it is recommended to offer at-property mitigation measures to those receivers that would now be eligible for consideration as a result of the modification.

A summary of the recommended noise barriers for the project is presented in Table 6-9. As indicated above, the proposed noise barrier heights are consistent with those presented in the project REF.



Table 6-9: Design noise barrier heights

Location	Height (m)	Length (m)
Bridge over the floodplain (east)	3	700
Bridge over the floodplain (central)	3	880
Bridge over the floodplain (west)	3.5	950

The Year 2026 and Year 2036 design scenarios were reassessed including the design noise barriers discussed in Table 6-9 (refer to Appendix E for further detail).

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 above constructed, include:

- Road traffic noise levels are predicted to exceed the LAeq noise criterion at an additional 90 sensitive receivers totalling 183 receivers
- Of these 183 noise sensitive receivers:
  - Noise levels are predicted to increase by more than 2 dB(A) at an additional six sensitive receivers totalling 67
  - Noise levels are predicted to exceed the cumulative limit at one additional sensitive receivers totalling seven (i.e.  $\geq$  LAeq(15 hr) or LAeq(9 hr) noise criterion + 5 dB(A))
  - Noise levels are predicted to exceed the relative increase criterion at an additional 34 sensitive receivers totalling 56 (the difference between 'no build' and 'build' noise levels is  $\geq$  12 dB)
  - No receivers are identified as being acute (i.e. the project contributes less than 2.0 dB(A) to the overall level and noise levels are equal to or greater than LAeq(15 hr) 65 dB(A) or LAeq(9 hr) 60 dB(A))
- Sensitive receivers considered to be eligible for the consideration of feasible and reasonable noise mitigation measures increased by 14, totalling 103 sensitive receivers.

A list of the receivers eligible for noise mitigation measures is provided in Table 4-2 of Appendix E.

### 6.3.4 Safeguards and management measures

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

## 6.4 Air quality

This chapter presents the methodology and results of the construction and operational air quality impact assessment for the proposed modification. Further detail regarding the methodology and the results for the assessment is provided in Appendix F.

### 6.4.1 Methodology

#### Construction

Potential air quality impacts from construction have been assessed for the project in its entirety inclusive of changes to construction activities as part of the proposed modification. Changes to construction activities for the proposed modification are discussed in Section 3.3 and summarised in Section 0.

Potential impacts from dust generation during construction were assessed using the UK Institute of Air Quality Management (IAQM), 2014 Guidance on the assessment of dust from demolition and construction. The IAQM methodology assesses the risk of impacts associated with demolition and construction without the application of any mitigation measures. The assessment provides a classification of the risk of dust impacts which then allows the identification of appropriate mitigation measures commensurate with the level of risk.

The IAQM guidance process is a four-step risk-based assessment of dust emissions associated with demolition, land clearing and earth moving, and construction activities. The IAQM assessment process is described in detail in Appendix F and a summary of the process is described in the following sections.

#### Step 1 – Screening assessment

A screening assessment is undertaken to identify both ‘human’ and ‘ecological receptors’ within close proximity to the proposal area and the routes used by construction vehicles on public roads.

#### Step 2 – Dust risk assessment

Step 2 in the IAQM methodology is a risk assessment tool designed to appraise the potential for dust impacts due to unmitigated dust emissions during construction. The key components of the risk assessment are defining the dust emission magnitudes (Step 2A) and the surrounding area sensitivity (Step 2B) which are combined in a risk matrix (Step 2C), to determine an overall unmitigated risk of dust impacts.

##### *Step 2A – Dust emission magnitude*

Dust emission magnitudes are estimated according to the scale of works being undertaken and are classified as either small, medium or large.

##### *Step 2B – Sensitivity of surrounding area*

The “sensitivity” component of the risk assessment is determined by defining the surrounding area’s sensitivity to dust soiling, human health effects and ecological impacts. Here the sensitivity of the surrounding area is rated high, medium, or low.

##### *Step 2C – Unmitigated risks of impacts*

The dust emission magnitudes determined in Step 2A are combined with the sensitivities determined in Step 2B to determine the risk of impacts with no mitigation applied. Table 6-10, reproduced from the IAQM guidance, provides the risk of dust impacts from demolition, earthworks, construction and track-out for each scale of activity listed.

Table 6-10: Risk of dust impacts

Activity	Surrounding area sensitivity	Dust emission magnitude		
		Large	Medium	Small
Demolition	High	High	Medium	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Negligible
Earthworks	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Construction	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Track-out	High	High	Medium	Low
	Medium	Medium	Low	Negligible
	Low	Low	Low	Negligible

**Step 3 – Management strategies**

The outcome of Step 2C is used to determine the level of management that is required to ensure that dust impacts on surrounding sensitive receptors are maintained at an acceptable level. A high or medium-level risk rating means that suitable management measures must be implemented during construction.

**Step 4 – Reassessment**

The final step of the IAQM methodology is to determine whether there are significant residual impacts, post mitigation, arising from the project inclusive of the proposed modification.

**Operational**

To assess operational air quality impacts, a Level 1 Screening Assessment was undertaken in accordance with the NSW Approved Methods (EPA 2017) using the Tool for Roadside Air Quality (TRAQ) (Version 1.3) developed by Roads and Maritime (now Transport).

Traffic forecast data from the traffic modelling for the approved project was used to estimate vehicle emissions to enable the quantification of potential air quality impacts attributed to operation of the proposed modification. The project REF AADT volumes forecasted for the design opening year (2026) and 10 years after opening (2036) were used as the basis for the estimate of vehicle emissions for daily average traffic (taking into account the traffic volume, traffic mix, speed, number of lanes and road grade).

AADT volumes for the bypass between New England Highway and Putty Road (hereafter referred to as ‘Main Alignment 1’) have changed as a result of the proposed modification as more vehicles would use this section of the bypass to access the additional southbound on-ramp and northbound off ramps. The additional on and off ramps at Putty Road have also been assessed.

Air pollutants modelled in TRAQ; included Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>) and particulate matter less than or equal to 10 microns in diameter (PM<sub>10</sub>). With regard to particulate matter, TRAQ is limited to the assessment of the PM<sub>10</sub> fraction only. As PM<sub>10</sub> emissions from vehicles are predominantly made up of the finer PM<sub>2.5</sub> particle fraction (about 95 percent), an estimate of potential PM<sub>2.5</sub> ground level concentrations have also been provided, which was estimated by scaling predicted PM<sub>10</sub> concentrations (refer Appendix F).

## 6.4.2 Existing environment

### Climate and weather

The climate and weather at Singleton are affected by several factors such as terrain and land use. Wind speed and direction are largely affected by topography on a small scale, while factors such as regional scale winds affect wind speed and direction on a larger scale. Wind speed and direction are important variables in assessing potential air quality impacts, as they dictate the direction and distance air pollutants travel.

The DPE operates three ambient air quality monitoring stations in proximity to the project that collect wind speed and wind directional data. The monitoring stations include:

- Singleton north-west station located approximately 900 metres north-east of the northern end of the project
- Singleton station is approximately 1.9 kilometres east of the centre of the project
- Singleton south station approximately 1.5 kilometres east of the southern end of the project.

Five years of wind speed and wind direction data was examined at each of the stations between 2016 and 2020; including the analysis year 2018 analysed for the project REF. Wind roses for each air quality monitoring station are provided in Figure 6-7. The five-year average wind patterns shown in Figure 6-7 are relatively similar between the three locations, with predominant wind directions from both the north-west and south-east (which follows the axis of the Hunter Valley). Annual average wind speeds are relatively low at all three stations ranging from 2.1 metres per second at Singleton and 2.9 metres per second at Singleton south.

Given the relatively low wind speeds observed at the monitoring stations, there would be the potential for periods during the year when low wind speeds and calm conditions may result in higher pollution levels (as these conditions commonly correspond to poor dispersion conditions). The screening assessment in Section 0 adopts a conservative approach through the use of unfavourable weather conditions typically not conducive to rapid dispersion of air pollutants. Weather conditions are based on a wind speed of one metre per second, temperature of 15 degrees Celsius and pascal stability class F (typical of stable night-time conditions).

A description of the existing acoustic environment around the Singleton bypass was presented in Chapter 2 of the noise and vibration technical report prepared for the project REF.

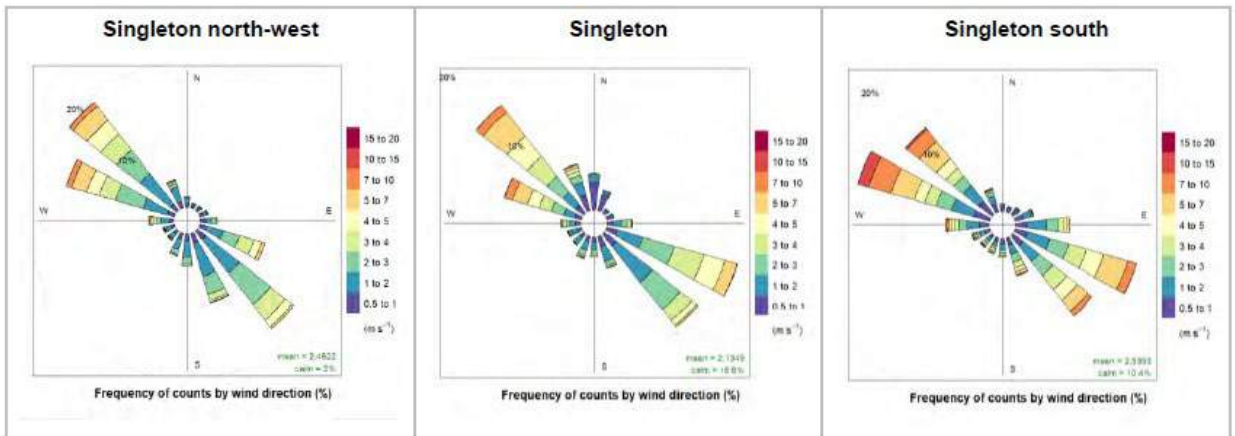


Figure 6-7: 2016 to 2020 wind roses for ambient air quality monitoring stations (DPE 2021)

### Ambient air quality

Ambient air refers to atmospheric air in its natural state. For ambient air quality within and around the project, pollutants of concern include carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>) and particulate matter equal to or less than 10 microns in diameter (PM<sub>10</sub>) and less than 2.5 microns in diameter (PM<sub>2.5</sub>)

The Singleton north-west, Singleton and Singleton south DPE ambient air quality monitoring stations all monitor for PM<sub>10</sub>. Nitrogen dioxide (NO<sub>2</sub>) and PM<sub>2.5</sub> are also monitored at the Singleton station.

Monitoring data for 2018 at each monitoring station is shown in Table 6-22 against the appropriate ambient air quality criteria as stated under the EPAs NSW Approved Methods for Modelling and Assessment of Air Pollutants (EPA 2017) (the Approved Methods) for the appropriate averaging periods. The year 2018 has been chosen for consistency with the original air quality



assessment for the project. The year 2018 is also the most recent complete data set that is representative of typical background air quality concentrations. The years 2019 and 2020 data are not considered representative of existing background concentrations. This is due to extreme particulate concentrations recorded over the 2019-2020 'Black Summer' period characterised by an unprecedented and catastrophic bushfire season, followed by potentially lower than average levels of NO<sub>2</sub>; PM<sub>10</sub> and PM<sub>2.5</sub> concentrations due to reduced activity (including vehicle movements) and as a consequence of COVID-19.

Ambient air quality criterion set by NSW EPA were recently updated in September 2022 for NO<sub>2</sub> to align with the ambient air quality standards set by National Environmental Protection Council under the National Environmental Protection (Ambient Air Quality) Measure (Ambient Air Quality NEPM). The Ambient Air Quality NEPM standards have also been provided in Table 6-11.

TRAQ utilises 90th percentile background data to calculate potential cumulative impacts from vehicle emissions (as discussed in Section 0). Table 6-11 shows the 90th percentile concentration for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> as in the absence of local CO data at Singleton, default CO background concentrations from the TRAQ database have been used in this assessment.

Table 6-11 shows that both the 1-hour maximum and annual average NO<sub>2</sub> concentrations recorded at the Singleton station for 2018 were under the relevant EPA criteria and the NEPM standard.

The PM<sub>10</sub> 24 hour maximum concentrations reported in Table 6-11 were well above the EPA criterion at all stations in the Singleton area. These concentrations are attributed to dust storms occurring in November 2018, however, the 90th percentile concentrations used in TRAQ are below the maximum 24 hour EPA criterion at all stations. Annual average PM<sub>10</sub> concentrations for the area were above the criterion at Singleton north-west. This is likely to be attributed to mining activities occurring to the north-west of the monitoring station. Annual average PM<sub>10</sub> concentrations recorded at Singleton and Singleton south monitoring stations were just below the criterion.

The maximum 24-hour and 90th percentile PM<sub>2.5</sub> concentration at Singleton was below the criterion at 19.2 and 13.4µg/m<sup>3</sup> respectively. The record annual average PM<sub>2.5</sub> concentration was also elevated, slightly exceeding the ambient air quality criterion.

Table 6-11: Ambient air quality data at DPE monitoring stations at Singleton, NSW

Pollutant	Average period	Concentration (µg/m <sup>3</sup> )			EPA criteria (µg/m <sup>3</sup> )	NEPM standard (µg/m <sup>3</sup> )
		Singleton	Singleton northwest	Singleton south		
NO <sub>2</sub>	1-hour (maximum)	71.8	No data	No data	164	164
	1-hour (90 <sup>th</sup> percentile)	34.9	No data	No data	Not applicable	Not applicable
	Annual average	15.9	No data	No data	31	31
PM <sub>10</sub>	24-hour (maximum)	192.8	195.5	183.3	50	50
	24-hour (90 <sup>th</sup> percentile)	37.5	46.3	37.0	Not applicable	Not applicable
	Annual average	24.0	26.8	23.0	25	25
PM <sub>2.5</sub>	24-hour (maximum)	19.2	No data	No data	25	25
	24-hour (90 <sup>th</sup> percentile)	13.4	No data	No data	Not applicable	Not applicable
	Annual average	8.1	No data	No data	8	8

µg/m<sup>3</sup> = Micrograms per metre cubic metre

**Sensitive receptors and land use**

The land use surrounding the proposed modifications is mainly rural and residential. Areas of higher density residential include Singleton Heights, Darlington and Singleton, with the majority of sensitive receptors lying to the east of the project and divided by the Main North railway line. The residential area contains a mix of sensitive land uses including houses, schools, retirement homes and sporting fields. There is also an industrial development located to the west of the project at McDougalls Hill, as well as low density residential areas and a caravan park.

The TRAQ model calculates pollutant concentrations directly downwind of vehicle emissions from the road at pre-specified distances. Typically, the nearest sensitive or commercial receptor is located at least 10 metres or more from the kerb of the road. For this assessment the modelled concentrations directly downwind of the proposed modifications have been modelled at discrete receptor locations at the kerb as well as 10 metres, 20 meters, 30 metres and 50 metres from the kerb.

The proximity of sensitive receptors to both the updated proposal area and alignment remains much the same as discussed in the project REF.

Table 6-12 provides a summary of changes to the proximity of sensitive receptors from the updated proposal area and alignment based on the proposed modification.

Table 6-12: Changes to sensitive receptor proximity to updated proposal area and alignment

Proposed modification	Updated proposal area	Alignment
Southern Connection (Bridge over floodplain) (refer to Figure 1-2)	<ul style="list-style-type: none"> <li>Proposal area south of the alignment has been extended.</li> <li>Proposal area is now adjacent to the boundary of a single rural residential receptor off Waddles Lane south of the proposed bridge over the floodplain at the southern connection.</li> </ul>	<ul style="list-style-type: none"> <li>No significant changes to setback distances from the kerb</li> </ul>
Putty Road Connection (Bridge extension over floodplain, southbound entry ramp and northbound exit ramp) (refer to Figure 1-3 )	<ul style="list-style-type: none"> <li>Proposal area west of bridge over Rose Point floodway extended.</li> <li>No significant changes to setback distances from the updated proposal area.</li> </ul>	<ul style="list-style-type: none"> <li>No significant changes to setback distances from the kerb</li> <li>Closest receptors to alignment located off Glenridding Road adjacent to round about</li> </ul>
Bridge over the floodplain (west)	<ul style="list-style-type: none"> <li>Southern connection laydown area modification area sits within the changes to the proposal area as described above for the southern connection</li> <li>No other changes to the proposal area as a result of construction compound changes</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

### 6.4.3 Potential impacts

#### Construction

##### Step 1 Screening assessment

An initial screening assessment in accordance with the IAQM method was undertaken and is summarised in Table 6-13. The initial screening assessment identified several sensitive ‘human’ receptors located within 350 metres of the updated proposal area and within 50 metres of construction vehicle routes. Vegetation surrounding the project primarily includes roadside vegetation and pasture within 100 metres from the bulk of dust-emitting activities likely to take place. Riparian vegetation is also present in the vicinity of the Putty Road connection along the banks of the Hunter River.

Based on the proximity of additional ‘human’ receptors located within the proposed modification area a Stage 2 assessment was triggered. No additional significant ecological receptors were observed within 50 metres of the proposed modification and as such assessment of ecological impacts remains unchanged from the air quality assessment undertaken for the project REF.

Table 6-13: Changes to sensitive receptor proximity to updated proposal area and alignment

Receptor type	Triggers	Comment
Human receptor	<ul style="list-style-type: none"> <li>Located within 350 metres of updated proposal area</li> <li>Located within 50 metres of construction vehicle routes on public roads up to 500 metres from the site entrance</li> </ul>	<ul style="list-style-type: none"> <li>Many receptors are located within 350 metres of the updated proposal area and construction vehicle routes including areas relating to the proposed modification</li> <li>Stage 2 assessment triggered; further assessment of dust impacts is required.</li> </ul>
Ecological receptor	<ul style="list-style-type: none"> <li>Located 50 metres of updated proposal area</li> <li>Located within 50 metres of construction vehicle routes on public roads up to 500 metres from the site entrance</li> </ul>	<ul style="list-style-type: none"> <li>Surrounding vegetation primarily roadside vegetation and pasture within 100 metres of bulk dust emitting activities</li> <li>Northern portion of the proposal area as assessed in the project REF is adjacent to an EEC (see Section 6.1.2 of the project REF)</li> <li>Some riparian vegetation is present in the vicinity of the Putty Road Connection along the banks of the Hunter River</li> </ul>

##### Step 2 Risk assessment of unmitigated impacts

Construction of the project is anticipated to take approximately three years to complete. The proposed modification would form part of the overall project construction program and is not anticipated to substantially modify the duration of construction. Potential dust impacts during the construction period have been determined based on the IAQM construction dust assessment guidance documentation and the expected scale of the construction activities outlined in Section 3.3.

##### Step 2A

Potential dust emission magnitudes as per Step 2A were estimated based on the indicative construction work methodology for the project, inclusive of the proposed modification described in Section 3.3. Potential dust generating activities and associated magnitudes are included in Table 6-14. The magnitude of the unmitigated emissions from the construction activities are rated as large for demolition, earthworks, construction and track-out activities due to the expected extent of construction activities. The magnitude of unmitigated emissions from construction activities from the proposed modification are consistent with the project REF.

Table 6-14: Dust emissions magnitude

Activity	REF magnitude	Potential dust generating activities for proposed modification	Proposed modification magnitude
Demolition	Large	<ul style="list-style-type: none"> <li>Some adjustments to partial property acquisition boundaries to occur. Existing buildings on acquired properties within the updated proposal area would require removal. Proposed modifications to property acquisition are described in Section 3.6</li> <li>No additional properties are proposed to be acquired as part of the proposed modification</li> </ul>	Large
Earthworks	Large	<ul style="list-style-type: none"> <li>Large scale earthworks required including excavation where the design of the road is lower than the existing ground level, construction of fill embankments where the design of the road is above the existing ground level and boring into the ground for bridge structural supports.</li> <li>Approximately 8,900m<sup>3</sup> of cut material and 338,200 m<sup>3</sup> of fill would be required for the proposed modification. A breakdown of indicative earthworks quantities for individual areas is provided in Section 3.3.4</li> <li>The range of plant and equipment used during earthworks is not expected to be substantially different for the proposed modification</li> </ul>	Large
Construction	Large	<ul style="list-style-type: none"> <li>Construction activities are described in detail in Section 3.3 and would include:                             <ul style="list-style-type: none"> <li>A bridge structure over the floodplain at the southern connection</li> <li>Extension of proposed bridge over floodplain by 140 m at northbound on and off ramps at Putty Road connection.</li> <li>Connection at Putty Road consisting of a southbound entry ramp and northbound exit ramp (the Putty Road connection)</li> </ul> </li> <li>The proposed modification would also require some additional public utility adjustments (refer to Section 3.5).</li> <li>Concrete would be sourced from local suppliers where possible and concrete batching activities is not proposed at any of the construction compounds*.</li> <li>Crushing to occur at all construction compound and laydown areas with exception to the McDougalls Hill facility.</li> <li>The number of dust generating materials required for construction are not expected to change; however, quantities are likely to change as a result of the proposed modification.</li> <li>Changes to construction ancillary facilities to avoid conflicts with the construction of the modified design as detailed in Section 3.4, including to the southern connection laydown, Gowrie Gates construction compound and Waterworks Lane construction compound.</li> <li>Addition of a new construction compound near the intersection of Park View Crescent and New England Highway (Northern Cut construction compound).</li> <li>Construction plant and mobile equipment used during earthworks is not expected to be substantially different for the proposed modification.</li> </ul>	Large
Track-out	Large	<ul style="list-style-type: none"> <li>The proposed modification is not anticipated to substantially change the number of light and heavy vehicle movements during construction.</li> <li>Haulage routes are consistent with the project REF</li> </ul>	Large

\* For this assessment it is assumed concrete would be sourced from local suppliers and no onsite concrete batching plant at construction compound sites would be required.

Step 2B

Sensitivity of the area surrounding the project was estimated according to the IAQM guidance. The overall sensitivity of the potential receivers to both dust and human health impacts is classified as high, based on the following factors in Table 6-15. Surrounding vegetation primarily includes roadside vegetation and pasture within 100 metres from the bulk of dust-emitting activities likely to take place. Ecological sensitivity for the proposed modification was considered low. Sensitivity of the area is consistent with the project REF as shown in Table 6-15.

Table 6-15: Sensitivity of the area with accordance with the IAQM

Potential impact	Sensitivity of the area		Justification
	REF	Proposed modification	
Dust soiling	High	High	<ul style="list-style-type: none"> <li>Greater than 100 high sensitivity receptors (residential) within 50 metres of construction activities.</li> </ul>
Human health	High	High	<ul style="list-style-type: none"> <li>Greater than 100 high sensitivity receptors (residential) within 50 metres of construction activities.</li> <li>Annual average PM<sub>10</sub> concentration in the Singleton area between 23 µg/m<sup>3</sup> and 26.8 µg/m<sup>3</sup> which is either just below or above the EPA criterion of 25 µg/m<sup>3</sup></li> </ul>
Ecological	Low	Low	<ul style="list-style-type: none"> <li>Study is located within a disturbed landscape with only fragmented, modified vegetation remnants and riparian vegetation along the Hunter River.</li> <li>Proposed modification does not affect northern portion of the project REF area adjacent to ecologically endangered community (EEC)<sup>5</sup>.</li> </ul>

<sup>5</sup> Potential impacts from dust deposition from construction on adjacent EEC was assumed to be negligible. Refer Section 6.9.3 of the project REF for more information.

Step 2C

The potential risks for the overall updated proposal area were found to be “high” for construction activities as shown in Table 6-16 in relation to potential unmitigated impacts relating to dust soiling and human health within 50 metres of the proposal. The majority of residential receptors are, however, situated over 50 metres from the project and would have a medium to low risk given their offset distance from the project. The potential unmitigated ecological risks from the project were found to range from “low” to “medium”. These results are consistent with those assessed in the project REF, therefore, the proposed modification is not considered to increase the risk of potential air quality impacts.

Table 6-16: Summary of risk assessment for construction footprint

Activity	Step 2A potential for dust emissions	Step 2B: Sensitivity of area			Step 2C: Risk of dust impacts		
		Dust soiling	Human health	Ecological	Dust soiling	Human health	Ecological
Demolition	Large	High	High	Low	High	High	Medium
Earthworks	Large	High	High	Low	High	High	Low
Construction	Large	High	High	Low	High	High	Low
Track-out	Large	High	High	Low	High	High	Low



### Step 3 Mitigation strategies

The outcome of Step 2C was used to determine the level of management that is required to ensure that dust impacts on surrounding sensitive receptors are maintained at an acceptable level. A high or medium-level risk rating suggests that suitable management measures must be implemented during construction. A range of mitigation strategies aimed at reducing the likelihood of air quality impacts to offsite sensitive receptors are included in Section 6.9.4 of the project REF and are considered appropriate for the proposed modification.

### Step 4 Reassessment

The final step of the IAQM methodology is to determine whether there are significant residual impacts, post mitigation, arising from the proposal. The guidance states:

“For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect would normally be ‘not significant’.”

It is anticipated that, with the implementation of the recommended mitigation strategies provided in Section 6.9.4 of the project REF which are consistent with the standard dust mitigation measures used on large road construction projects, the residual effect (impacts) of the project would be ‘not significant’ at all locations for dust soiling, human health and ecological impacts. The proposed modification would not change this outcome.

## Operational

### Traffic forecast data

Traffic movements along the proposed road corridor have the potential to result in motor vehicle emissions from fuel combustion, fluid evaporation, brake and tyre wear, and re-suspended road dust.

Emissions from motor vehicles would comprise mainly hydrocarbons, CO, NO<sub>x</sub> and PM<sub>10</sub>. Traffic activity including the number of vehicles, the vehicle type mix and vehicle speeds can directly influence the near roadside air pollutant concentrations. Vehicle emissions would vary based on the vehicle type mix or ratio of light to heavy vehicles, fuel type mix (for example, petrol and diesel), and the distribution of vehicles by age of manufacture. Traffic forecast data as detailed in Section 6.5 of the project REF have been used to estimate vehicle emissions and to quantify air quality impacts attributed to operation of the proposal.

AADT volumes including vehicle type mix, were forecast for the design opening year (2026) and 10 years after opening (2036). The traffic data was then used to estimate vehicle emissions for daily average traffic considering the traffic volume, vehicle mix, speed, number of lanes and road grade. Traffic data input parameters were largely consistent with those outlined in Section 6.9 of the project REF. Revised traffic AADT forecasts including, traffic mix and speeds for Main Alignment 1 and the additional northbound off ramp and southbound on ramp at the Putty Road Connection have been provided in Appendix D.

Potential reductions in traffic numbers along local roads within the Singleton area as a result of the project, including the proposed modification have not been quantified as part of this assessment. Operation of the proposed bypass would reduce traffic numbers, including heavy freight through the Singleton town centre, and would improve both traffic flow and travel times. The reduction in both vehicle numbers and congestion would potentially result in a reduction in vehicle emissions and associated ground level concentrations.

### Dispersion calculations

For the purpose of this assessment, a Level 1 Screening Assessment has been carried out in accordance with the Approved Methods using the TRAQ (Version 1.3) developed by Roads and Maritime (now Transport). Air emissions from key sections along the proposed road corridor that would experience changes in traffic have been generated using the total traffic volume with percentages of vehicles in each age bracket and type category. Road grade and speed information was also included in the calculations.

Vehicle emission factors from the World Road Association, referred to as PIARC (formerly the Permanent International Association of Road Congress) are used by TRAQ to estimate emissions from relevant roads in the vicinity of Singleton bypass. In 2004, PIARC (2004) published a document with comprehensive vehicle emissions factors for different road gradients, vehicle speeds and for vehicles conforming to different European emission standards. The emission data in TRAQ have been modified to take into account the age, vehicle mix and emission control technology of the Australian vehicle fleet using DPE data.

To assess air quality impacts, it is necessary to have information on existing pollutant levels in the area in which the proposed modification would be likely to contribute to these levels. TRAQ provides 90<sup>th</sup> percentile background data for CO (one hour and eight hour average), NO<sub>2</sub> (one hour average) and PM<sub>10</sub> (24 hour average) in the Lower Hunter as well as annual averages. In the absence of local data at Singleton for CO (one and eight hour average) 90<sup>th</sup> percentile, background concentrations for the Lower Hunter have been adopted for CO for this assessment. Local air quality data for NO<sub>2</sub> and PM<sub>10</sub> has been identified and discussed in Section 6.4.2. This data has been added to the TRAQ background air quality database and incorporated into the dispersion model.

#### *Carbon monoxide*

Predicted 2026 and 2036 incremental and cumulative maximum one hour and eight hour CO concentrations are presented in Appendix F and show that predicted CO concentrations from the proposed modification comply with EPA criteria both incrementally and cumulatively for the design opening year (2026) and ten years after opening (2036).

#### *Nitrogen dioxide*

Predicted 2026 and 2036 incremental and cumulative maximum one hour and annual average NO<sub>2</sub> concentrations are presented in Appendix F. The results show that predicted NO<sub>2</sub> concentrations comply with both the EPA criteria and NEPM standards both incrementally and cumulatively for 2026 and 2036 for the proposed modification.

#### *Particulate matter*

Predicted 2026 and 2036 incremental and cumulative maximum 24-hour and annual average PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are shown in Appendix F. Similar to the project REF, predicted annual average PM<sub>10</sub> and PM<sub>2.5</sub> cumulative concentrations are in exceedance with the EPA criteria. This is largely attributed to the elevated background concentrations in the Singleton area; with only small contributions at Main Alignment 1 and additional Putty Road connections.

For 2026 the maximum 24-hour cumulative concentrations for PM<sub>10</sub> and PM<sub>2.5</sub> were compliant with the EPA criterion for the proposed modification. For 2026 the proposed maximum 24-hour concentration at Main Alignment 1 was found to exceed the Maximum 24-hour PM<sub>10</sub> concentration within 10 m of the alignment. Compliance was achieved within 20 m of the kerb. Given the setback distance of sensitive receptors along the Main Alignment is greater than 10 m the proposed modification is not predicted to result in any additional exceedances of the PM<sub>10</sub> 24-hour maximum criterion. No exceedances of the PM<sub>2.5</sub> criteria for the proposed modification were predicted.

### 6.4.4 Safeguards and management measures

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

## 6.5 Landscape character and visual impacts

### 6.5.1 Methodology

A detailed landscape character and visual impact assessment (LCVIA) was carried out for the project REF. The LCVIA was undertaken in accordance with the Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment (Roads and Maritime 2018).

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

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 G. Sensitivity and magnitude are combined to give an impact rating of high, moderate, low or negligible.

### 6.5.2 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 6.10.2 of the project REF and are described in Table 6-17.

Table 6-17: 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 a number of 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 in the sections to follow.

### 6.5.3 Potential impacts

#### Construction

##### Landscape character impact

The impacts on landscape character from the construction of the proposed modifications 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 modifications would be consistent with the approved project. These are assessed in Section 6.10 of the project REF.

#### Operation

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

While the location of the Singleton Council water pump station and standpipe structure would change from that previously identified in the project REF, the nature of the structure would not. The final design of the structure would include building, hardstand areas and fencing. The final design would be determined in consultation with Singleton Council.

##### 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 proposed modification predominantly consists of alterations to infrastructure elements already approved. There would be no additional substantial elements that would detract from the landscape character of the area. The change in location of the water pump station would not result in additional impacts to landscape character.

A summary of the landscape character impact of the approved project and the proposed modifications for the LCZs the proposed modification directly impacts is provided in Table 6-18.

The significance of impact on landscape character remains consistent with the findings of the project REF.



Table 6-18: Summary of impacts on landscape character

Landscape character zone	Sensitivity	Magnitude	Approved project significance of impact rating (2019)	Proposed modification significance of impact rating (2022)
1 – Enclosed rural landscape	Low	Moderate	Moderate to Low	Moderate to Low
2 – Open rural landscape	Moderate	High	High to Moderate	High to Moderate
6 – Agricultural Floodplains	High	Moderate	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 G.

**Visual impacts**

A visual impact assessment was completed for eight viewpoints surrounding the project, including an additional viewpoint to those assessed by the project REF. Viewpoint 8 (Waterworks Lane) was included for assessment of the proposed changes at the Putty Road connection. Only two of the viewpoints show changes resulting from the proposed modification.

A summary of the visual impact of the approved project and the proposed modifications of the two viewpoints impacted is provided in Table 6-19.

The significance of impact on the viewpoints remains consistent with the findings of the project REF (excluding Viewpoint 8 as it was not assessed in the project REF).

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

Table 6-19: Summary of visual impacts across the proposal area

Viewpoint	Sensitivity	Magnitude	Approved project significance of impact rating (2019)	Proposed modification significance of impact rating (2022)
2 – Ellen Avenue	High	Moderate	High to Moderate	High to Moderate
8 – Waterworks Lane	Moderate	High	Not assessed	High to Moderate

Changes associated with the proposed modification would mostly be at viewpoints 2 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 2 has been rated as having a high-moderate impact, which is consistent with the rating assessed in the project REF. The main change to this viewpoint is the increase in height of the embankment.

Viewpoint 8 has been rated as having a high-moderate impact. This rating is based on comparing the current view of this area against the proposed modification. However, the Putty Road connection formed part of the approved project, and when compared to the approved project i.e., a full interchange, compared to an interchange with a northbound entry ramp and southbound exit ramp, the change in visual impacts from the approved project to the proposed modification would be reduced.

The Singleton Council water pump station and standpipe would also be located within Viewpoint 8 (situated to the left off-frame, adjacent to the central roadway, of Figure 6-11). The proposed structure would be about four metres tall and would include associated driveways and hardstand. This structure would mostly be seen by road users travelling along Putty Road. Views from commercial receivers beyond the Main North railway line (along Thomas Street) and residential receivers beyond

Putty Road (along Glenridding Road) would be limited given the distance to receivers and obstructions of existing infrastructure. Given the changes to this area as a result of the Putty Road connection and the transient nature of impact to road users, the visual impact of the structure at this location is considered low to moderate.

To assist with the visual impact assessment, visualisations of the project, including the proposed modifications, at each of the assessed viewpoints were developed and are provided in full in Appendix G. Viewpoints 2 and 8, are shown on Figure 6-8 to Figure 6-11. Viewpoint 8 is shown against the current view as opposed to the approved project view, given that this viewpoint was not included in the LCVIA for the project REF.



Figure 6-8: Approved project view of Ellen Avenue (viewpoint 2)



Figure 6-9: Indicative view of Ellen Avenue as a result of the proposed modification (viewpoint 2)



Figure 6-10: Current view of Waterworks Lane (viewpoint 8)



Figure 6-11: Indicative view of Waterworks Lane as a result of the proposed modification (viewpoint 8)  
(hatched rectangle shows indicative location of the Singleton Council water pump station and standpipe)

#### 6.5.4 Safeguards and management measures

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

## 6.6 Socio-economic

### 6.6.1 Methodology

The methodology for the socio-economic impact assessment of the proposed modification is consistent with the assessment prepared for the project REF.

An addendum socio-economic impact assessment (addendum SEIA) was prepared to identify and assess the changed or additional socio-economic impacts of the proposed modification to the project and recommend, where necessary, management and mitigation measures to address the identified impacts (refer Appendix H).

Much of the data and findings of the previous assessment remain relevant for the proposed modification. However, the Australian Bureau of Statistics undertakes a survey of the entire Australian population every five years, known as the Census. The Census most recently occurred in 2021. Most of the data from this Census was available and used in preparing the addendum SEIA and formed part of the assessment.

### 6.6.2 Existing environment

#### Demographics

Singleton is located in the centre of the Hunter Region of New South Wales. The population of the Singleton LGA in 2021 was 24,577 of which 17,018 lived in the township of Singleton. The wider LGA and Singleton have relatively low cultural diversity with only 6.0 per cent of Singleton speaking another language at home in 2021 (consistent with 5.1 per cent in the Singleton LGA). Over 60 per cent (61.1) of the population was employed full time in 2021, with an unemployment rate of 4.2 per cent, both of which are consistent with the LGA average (59.9 per cent and 3.7 per cent).

#### Economy

The main economic drivers in the Singleton region are mining, tourism, agriculture and the defence industry. Coal mining industries have played a significant role in the Hunter and Singleton's history since the late 1800s and accounts for around one fifth of the resident labour force of Singleton today, directly employing about 2,800 workers. Around 20 coal mines operate in the Singleton LGA and produce approximately 57 million tonnes of coal annually. In total, the mining industry has contributed to 36 per cent of local employment and created \$5.1 billion in regional output annually.

There are around 112 businesses located along John Street and George Street in Singleton, with an additional 49 businesses located in Singleton Square. The range of businesses indicates that Singleton serves a variety of industries such as the mining, tourism and agriculture and provides administrative, retail, commercial, education and health services for local residents of Singleton and the region.

#### Social infrastructure

Singleton has a wide range of community facilities and assets ranging from places of worship to sporting grounds, recreation, education and essential facilities and services. Social infrastructure in the vicinity of the proposed modification includes:

- Rose Point Park - contains an array of BBQ facilities, seating and paths. It is located close to the Hunter River and the CBD. The park also provides for baseball, cricket, netball, rugby, soccer and AFL facilities
- Singleton Off-leash Dog Park
- Australian Christian College – Singleton
- Rainbows Early Learning Centre
- Singleton Neighbourhood Centre.

Further details on the existing socio-economic environment of Singleton are provided in the project REF.

### 6.6.3 Potential impacts

The socio-economic impacts discussed in the project REF and the Submissions Report would apply to the proposed modification. Additional specific impacts for the construction and operation of the proposed modification are provided in the following sections.



**Construction**

**Property**

Property impacts, including additional adjustments to property acquisitions and temporary occupation of land for ancillary facilities are described further in Appendix H. This section assesses the socio-economic implications of the proposed modification. Long term impacts are discussed in the section below as operational impacts.

Land for the construction ancillary facilities would be leased by Transport for the construction of the project, including the proposed modification, or located on land that has been acquired by Transport for the project. Lease arrangements would be negotiated with the property owner.

For the proposed modification, the construction ancillary facilities at the southern connection, Gowrie Gates and Waterworks Lane have been adjusted and/or shifted and a new construction compound, namely the Northern Cut construction compound, is also proposed to be located to the east of the New England Highway at the intersection of Park View Crescent and New England Highway (refer to Section 3.4).

The changes to the Gowrie Gates construction compound sit partially outside of the acquisition area for the project. The modified area is partially located on land owned by ARTC. Use of this land would be subject to ARTC approval and a lease agreement would be negotiated with ARTC. This would temporarily impact the existing use of land for rail activities. There is capacity in the surrounding land owned by ARTC that would ensure the ongoing operation of the Main North railway line.

The changes to the southern connection laydown area sit within the acquisition area for the project.

The new construction compound, Northern Cut construction compound, is proposed to be located on a property which has previously been acquired by Transport.

**Amenity**

Amenity refers to the quality of a place, its appearance, feel and sound, and the way its community experiences the place. Construction of the proposed modification may impact the local amenity of the area temporarily. This would be associated with increases in noise and air emissions, changed traffic conditions and access arrangements, additional traffic on roads and changes to views. These potential impacts have been addressed in other sections of this addendum REF as follows:

- Traffic and transport (refer to Section 6.2)
- Noise and vibration (refer to Section 6.3)
- Air quality (refer to Section 6.4)
- Landscape character and visual amenity (refer to Section 6.5).

The significance assessment for these impacts is summarised in Table 6-20. The significance of each potential impact of the proposed modifications remains consistent with the findings of the project REF.

Table 6-20: Summary of significance assessment for amenity impacts during construction

Impacts	Magnitude of impact	Sensitivity of receivers	Significance
Traffic and transport	Low	Low	Low
Noise and vibration	Moderate	Moderate	Moderate
Air quality	Moderate	Moderate	Moderate
Visual amenity	Low	Low-moderate	Moderate-low

**Access and connectivity**

Some existing accesses to residential properties may be temporarily impacted during the construction of the proposed modification. Residents of these properties may be inconvenienced through changes in pedestrian and vehicle access to their properties. Most of these impacts would be limited to short term closures and alternate access arrangements would be provided.

Construction activities may also cause temporary partial closure of roads and changes to speed limits on the New England Highway and Putty Road.



The magnitude of impacts to access associated with the proposed modification is considered to be low given the number of properties that would be impacted, that temporary access arrangements would be implemented to ensure access is maintained during construction, new permanent access arrangements would be provided where necessary and impacts to travels times would be minor. Rural-residential properties may have a degree of flexibility for alternate property access arrangements given lot size and land availability. Nevertheless, property access can be an important factor for agricultural activities, therefore the sensitivity of receptors is considered to be moderate. The socio-economic significance of the impact to access would be moderate-low.

#### **Impacts to community values, business and economy**

The project REF identified various potential impacts to community values, business, and the economy as a consequence of construction. The potential impacts to these aspects are not anticipated to be materially different as a result of the proposed modification.

#### **Operation**

##### **Property and land use**

Impacts to agricultural land have been minimised during the design of the proposed modification and as a result, no further properties would be impacted than those presented in the project REF and previous addendum REF (April 2023).

Transport would continue ongoing consultation with affected landowners regarding the potential impacts to their property, including acquisitions and would provide alternate access arrangements where appropriate.

##### **Amenity**

Impacts to amenity arising from the operation of the proposed modification are anticipated to be consistent with the project REF. The function of the bypass reducing traffic in Singleton, particularly heavy vehicles, and improving noise levels, air quality and pedestrian safety in the town centre, would not be affected by the proposed modification.

##### **Access and connectivity**

All properties affected by changed access arrangements 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.

The magnitude of this impact is considered to be low given that although access would still be modified, the access point would be returned closer to the existing access condition. Other access impacts identified in the project REF and SEIA would be unaffected by the proposed modification. The sensitivity of receptors is therefore still considered to be moderate.

Following community feedback and the recent announcement made by the Deputy Premier, a full interchange at the Putty Road connection forms part of the proposed modification. This would provide better access to Singleton town centre from the bypass, also increasing connectivity of the town with the wider community and passing motorists.

##### **Social infrastructure, business and economy**

No further impacts to social infrastructure, business and the local economy are anticipated to occur as a result of the operation of the proposed modification.

#### **6.6.4 Safeguards and management measures**

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

## 6.7 Other impacts

### 6.7.1 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 was undertaken for each, and the results summarised in Table 6-21. These remaining environmental aspects include:

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

Safeguards and management measures identified in the project REF, Submissions Report, and previous addendum REF (April 2023) as well as any additional measures identified to mitigate the potential impacts of the proposed modification are detailed in Chapter 7.

Table 6-21: Remaining environmental impacts

Environmental factor	Existing environment	Potential impacts
<b>Biodiversity</b>	<p>The proposed modification is located within the existing approved project boundary and impact area identified in the previous addendum REF (April 2023).</p> <p>The existing environment is consistent with that described in Section 6.1 of the project REF and the previous addendum REF (April 2023).</p>	<p><b>Construction</b></p> <p>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 and addendum REF.</p> <p><b>Operation</b></p> <p>Operational biodiversity impacts of the proposed modification would be consistent with those identified in the project REF.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<b>Aboriginal heritage</b>	<p>The proposed modification is located within the existing approved project boundary and AHIP area identified in the previous addendum REF (April 2023) and AHIP 4895.</p> <p>The existing environment is consistent with that described in Section 6.7 of the project REF and Section 6.2 of the previous addendum REF (April 2023).</p>	<p><b>Construction</b></p> <p>The proposed modification is unlikely to increase or cause additional impact to Aboriginal heritage items during construction and would be consistent with the impacts outlined identified in the project REF and addendum REF.</p> <p><b>Operation</b></p> <p>Operational Aboriginal impacts of the proposed modification would be consistent with those identified in the project REF and addendum REF.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<b>Groundwater</b>	<p>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.</p> <p>The existing environment is consistent with that described in Section 6.3 of the project REF.</p>	<p><b>Construction</b></p> <p>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.</p> <p>No further impacts to groundwater users are likely to occur as a result of the proposed modification.</p> <p>The proposed modification would not increase the likelihood or risk of groundwater contamination during construction.</p>

Environmental factor	Existing environment	Potential impacts
		<p><b>Operation</b></p> <p>There are no expected impacts to groundwater during operation.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Soils and contamination</b></p>	<p>The existing environment including geology, soils and potential sources of contamination described in Section 6.4 of the project REF applies to the proposed modification.</p>	<p><b>Construction</b></p> <p><b>Erosion and sedimentation</b></p> <p>The addition of the bridge structure at the southern connection would reduce the area of exposed surface and earthworks required for the project. Potential erosion and sedimentation impacts of the proposed modification are consistent with those identified in the project REF.</p> <p><b>Contamination</b></p> <p>The proposed modification does not alter the likelihood of encountering contaminated soil or groundwater from that described in the project REF.</p> <p><b>Operation</b></p> <p><b>Erosion and sedimentation</b></p> <p>During operation of the proposed modification, the risk of soil erosion would be minor as all areas disturbed would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring.</p> <p><b>Contamination</b></p> <p>Contamination risks associated with the operation of the proposed modification would be consistent with those identified in the project REF, being spill incidents arising from motor vehicle accidents.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Non-Aboriginal heritage</b></p>	<p>The non-Aboriginal heritage located within and in the area surrounding the project is described in section 6.8 of the project REF.</p> <p>Specifically, the proposed modification is located within the “Former Pumping Station”, “Bebeah” and the “Woolpack Inn” heritage curtilages. The approach signage to the north of the project is located within the vicinity of the heritage item “Coke Ovens”.</p>	<p><b>Construction</b></p> <p>Construction of the proposed modification would not increase the impact to the heritage items identified in the project REF.</p> <p><b>Bebeah and Woolpack Inn</b></p> <p>The changes to the design as a result of the proposed modification would not involve direct impacts to the features cited as contributing to the heritage significance of the “Bebeah” or “Woolpack Inn”</p>

Environmental factor	Existing environment	Potential impacts
		<p>items, consistent with the project REF. Works are proposed within the curtilages of these items, with the changes to the design in these areas being only minor.</p> <p><b>Former pumping station</b></p> <p>The “Former pumping station” heritage item would be removed by the project and the proposed modification does not change this impact.</p> <p><b>Coke Ovens</b></p> <p>The northern approach signage would be located within the road corridor. The “Coke Ovens” item is located about 75 metres east of the nearest sign, and therefore would not be impacted by this feature of the proposed modification.</p> <p><b>Singleton Hunter River Underbridge</b></p> <p>The two adjacent items associated with the Singleton Hunter River Underbridge would be directly impacted by the proposed modification. The associated items include:</p> <ul style="list-style-type: none"> <li>• concrete base, located 15 metres west of the underbridge; and</li> <li>• timber, brick and metal items located 175 metres south-west of the underbridge.</li> </ul> <p>The two adjacent items were noted in association to the Singleton Hunter River Underbridge in the project REF due to their geographical proximity, but as elements of its fabric they were graded as being in poor condition and having little contribution to the heritage significance of the underbridge. Rather than being considered as individual sites themselves, they are assessed as contributory elements of the underbridge, and ones which if removed will not alter the heritage significance of the underbridge itself.</p> <p><b>Operation</b></p> <p>The operation of the proposed modification is not expected to introduce or increase impacts to non-Aboriginal heritage identified in the project REF.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Property and land use</b></p>	<p>The existing property and land use environment was described in Section 6.11 of the project REF. The existing environment of the proposed modification is consistent of that described in the project REF.</p>	<p><b>Construction</b></p> <p>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.</p>



Environmental factor	Existing environment	Potential impacts
	<p>Land use zones that occur within the proposed modification area include:</p> <ul style="list-style-type: none"> <li>• RU1 (Primary production)</li> <li>• SP2 (infrastructure)</li> </ul> <p>The majority of the land within the proposed modification is zoned RU1 (Primary production).</p>	<p><b>Operation</b></p> <p>No additional properties to those presented in the project REF would be acquired in the proposed modification.</p> <p>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.</p> <p>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.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Resource use and waste management</b></p>		<p><b>Construction</b></p> <p>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.</p> <p>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 detailed design and it is not anticipated that this difference would be substantial.</p> <p><b>Operation</b></p> <p>No further impacts to resource use and waste management would occur from the operation of the proposed modification.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Climate change</b></p>	<p>The existing environment in the context of climate change is included in Section 6.14 of the project REF.</p>	<p><b>Construction</b></p> <p>The emission of greenhouse gases during construction of the proposed modification would be negligible in addition to that described in the project REF.</p> <p><b>Operation</b></p> <p>No further impacts are anticipated during operation of the proposed modification.</p>

Environmental factor	Existing environment	Potential impacts
		<p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Hazard and risk</b></p>	<p>Existing hazards and risks in the vicinity of the proposed modification are consistent with those described in Section 6.15 of the project REF, including the existing road network, the Main North railway line and flooding hazards associated with the Hunter River.</p>	<p><b>Construction</b></p> <p>The hazards and risks for the construction of the proposed modification would be consistent with those identified in the project REF.</p> <p><b>Operation</b></p> <p>Operational hazards and risks of the proposed modification would generally be consistent with those identified in the project REF. Flooding hazards in the vicinity of the southern connection would be reduced as a result of the proposed modification.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>
<p><b>Cumulative impacts</b></p>	<p>N/A</p>	<p><b>Construction</b></p> <p>Cumulative impacts were assessed in Section 6.16 of the project REF. The key cumulative impacts identified for construction included:</p> <ul style="list-style-type: none"> <li>• Increased construction vehicle traffic on local roads</li> <li>• Cumulative air and noise impacts associated with multiple construction activities</li> <li>• Temporary changes to visual amenity.</li> </ul> <p>The proposed modification would not materially alter cumulative impacts for traffic, air, noise and visual amenity.</p> <p><b>Operation</b></p> <p>The cumulative impacts associated with the operation of the proposed modification would be consistent with those identified in the project REF.</p> <p><b>Safeguards and management measures</b></p> <p>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.</p>

## 7. Environmental management

### 7.1 Environmental management plans (or system)

A number of 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 New England Highway bypass of Singleton are summarised in Table 7-1. Safeguards and management measures are presented as per the project REF. No additional safeguards and management measures have been identified in 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	<p>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:</p> <ul style="list-style-type: none"> <li>(a) A Surface Water Management Plan (SWMP)</li> <li>(b) Any requirements associated with statutory approvals</li> <li>(c) Details of how the proposal will implement the safeguards outlined in the project REF</li> <li>(d) Issue-specific environmental management plans</li> <li>(e) Roles and responsibilities</li> <li>(f) Communication requirements</li> <li>(g) Induction and training requirements</li> <li>(h) Procedures for monitoring and evaluating environmental performance, and for corrective action</li> <li>(i) Reporting requirements and record-keeping</li> <li>(j) Procedures for emergency and incident management</li> <li>(k) Procedures for audit and review.</li> </ul>	Construction contractor	Pre-construction / construction
B1	Biodiversity	<p>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:</p> <ul style="list-style-type: none"> <li>(a) plans for the construction site and adjoining area showing native vegetation, flora and fauna habitat, threatened species and threatened ecological communities;</li> <li>(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;</li> <li>(c) requirements set out in the Landscape Design Guideline (RMS 2018);</li> </ul>	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<p>(d) procedures addressing relevant matters specified in the Biodiversity Guidelines - Protecting and managing biodiversity on RTA projects (RTA 2011) including but not limited to:</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• vegetation clearing and bushrock removal, including staged habitat removal and any specified seasonal limits on clearing activities</li> <li>• fauna handling and unexpected threatened species finds</li> <li>• rehabilitation, revegetation, re-use of soils, woody debris and bushrock, and other habitat management actions</li> <li>• weed, pathogen and pest management</li> </ul> <p>(e) procedures addressing relevant matters specified in the NSW DPI (Fisheries) Policy and guidelines for fish habitat conservation and management</p> <p>(f) monitoring during construction</p> <p>(g) adaptive management measures to be applied if monitoring indicates unexpected adverse impacts.</p> <p>The Flora and Fauna Management Plan will also include the following measures to reduce potential for fauna entrapment within the pipeline trenches:</p> <ul style="list-style-type: none"> <li>• Minimising to the period of time the trench is open</li> <li>• Provide opportunities for fauna to exit the trench such as trench plugs or other appropriate measures, at a minimum of every 500 m</li> <li>• Installation of fauna shelter devices, such as sawdust filled bags, at 250 m intervals along the trench</li> <li>• Daily pre-start inspections of the open trench, and removal of trapped fauna by suitably qualified personnel as required</li> <li>• Welded pipe strings will be end capped to prevent fauna entry.</li> </ul>		
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:	Construction contractor	Pre-construction / construction



No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>• critical habitat</li> <li>• threatened species, endangered ecological communities, groundwater dependent ecosystems or their habitat</li> <li>• 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</li> <li>• native vegetation of higher quality condition</li> <li>• other native vegetation.</li> </ul>		
B3	Biodiversity	<p>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:</p> <ul style="list-style-type: none"> <li>• no vegetation clearing or bushrock removal beyond limits identified in this proposal</li> <li>• avoiding identified exclusion zones and protected habitat features.</li> <li>• avoiding mixing of topsoil with woody debris materials</li> <li>• separation of woody vegetation suitable for re-use during construction and rehabilitation or revegetation works</li> <li>• implementation of staged clearing</li> <li>• trimming and pruning to be undertaken in accordance with relevant Australian Standards</li> <li>• 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.</li> </ul>	Construction contractor	Pre-construction / construction
B4	Biodiversity	<p>Prior to the commencement of construction, carry out:</p> <ul style="list-style-type: none"> <li>• 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 <ul style="list-style-type: none"> <li>– River red gum (<i>Eucalyptus camaldulensis</i>) (endangered population - BC Act)</li> </ul> </li> </ul>	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>- Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions (EEC – BC Act)</li> <li>• 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</li> <li>• Ground truthing surveys of the regional vegetation mapping within the McDougalls Hill ancillary facility to confirm presence of:               <ul style="list-style-type: none"> <li>- Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions EEC (BC Act)</li> <li>- Central Hunter Valley Eucalypt Forest and Woodland CEEC (EPBC Act)</li> </ul> </li> </ul> <p>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.</p>		
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 include consider, where suitable, the use of: <ul style="list-style-type: none"> <li>(a) artificial hollow creations.</li> <li>(b) reinstallation of suitable hollows removed by the proposal.</li> <li>(c) installation of nest boxes</li> </ul>	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: <ul style="list-style-type: none"> <li>(a) Species present.</li> <li>(b) Total number of individuals and groups per occupied roost site.</li> </ul>	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<p>(c) Description of occupied roost sites.</p> <p>(d) Breeding status of the colony, including approximate adult to juvenile ratios.</p>		
B8	Biodiversity	<p>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:</p> <p>(a) A monitoring program for both during and outside of breeding periods.</p> <p>(b) Details of construction activities to be monitored that may affect microbat habitat, particularly light, noise, vibration, alteration of drainage into culverts.</p> <p>(c) Mitigation measures to be implemented during construction, including regular inspections of impacts from 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.</p> <p>(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.</p> <p>(e) A process for evaluating the effectiveness of management measures.</p>	Construction contractor	Pre-construction / construction / post-construction
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	Construction contractor	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<p>Guidelines (RMS 2011). The strategy is to focus on maintaining connectivity in the northern extent of the proposal and is to include, but not be limited to:</p> <ul style="list-style-type: none"> <li>(a) provision for a rope crossing with an indicative location between chainages 8450 and 8725</li> <li>(b) identification of trees suitable for retention in the northern connection and tie in to facilitate glider crossings</li> <li>(c) consideration of additional gliding crossing structures where the width of disturbance is greater than 50 metres</li> <li>(d) type and extent of any associated landscaping or structures such as fencing or fauna infrastructure.</li> </ul>		
B14	Biodiversity	<p>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:</p> <ul style="list-style-type: none"> <li>• Geotechnical investigations</li> <li>• Construction compound sites including stockpiling and material laydown areas</li> <li>• Temporary infrastructure including security and exclusion fencing, erosion and sediment controls</li> <li>• Utility relocations.</li> </ul> <p>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.</p>	Transport / Construction contractor	Pre-construction / construction
B15	Biodiversity	<p>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.</p>	Construction contractor	Construction
W1	Surface water and flooding	<p>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.</p>	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
W2	Surface water and flooding	<p>A flood response management plan will be prepared as part of the CEMP. The Flood Risk Response Management Plan will address, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>Processes for monitoring and mitigation flood risk</li> </ul> <p>Steps to be taken in the event of a flood warning including removal or securing of loose material, equipment, fuels and chemicals.</p>	Construction contractor	Construction
W3	Surface water and flooding	<p>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.</p> <p>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.</p>	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	<p>The rehabilitation of disturbed areas will be undertaken progressively as construction stages are completed, and in accordance with:</p> <ul style="list-style-type: none"> <li>Landcom's Managing Urban Stormwater: Soils and Construction series</li> <li>RTA Landscape Guideline</li> <li>RMS Guideline for Batter Stabilisation using Vegetation (2015).</li> </ul>	Construction contractor	Construction
W6	Surface water and flooding	<p>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:</p> <ul style="list-style-type: none"> <li>Sediment management devices, such as fencing, hay bales or sandbags</li> <li>Measures to divert or capture and filter water prior to discharge, such as drainage channels and first flush and sediment basins</li> <li>Scour protection and energy dissipaters at locations of high erosion risk</li> <li>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</li> </ul>	Construction contractor	Construction



No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>Appropriate location and storage of construction materials, fuels and chemicals, including bunding where appropriate.</li> </ul>		
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	<p>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:</p> <ul style="list-style-type: none"> <li>Management of chemicals and potentially polluting materials</li> <li>Any bunding requirements</li> <li>Maintenance of plant and equipment</li> <li>Emergency management, including notification, response and clean-up procedures.</li> </ul>	Construction contractor	Pre-construction / construction
W10	Surface water and flooding	<p>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:</p> <ul style="list-style-type: none"> <li>Visual monitoring of local water quality</li> <li>Up and down stream water quality monitoring of the Hunter River prior to the start of construction</li> <li>Monthly up and down stream water quality monitoring for the duration of working within and over the Hunter River.</li> </ul>	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

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
E2	Contamination	<p>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:</p> <ul style="list-style-type: none"> <li>• Diversion of surface runoff</li> <li>• Capture of any contaminated runoff</li> <li>• Temporary capping.</li> </ul> <p>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.</p>	Construction contractor	Construction
E3	Contamination	<p>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:</p> <ul style="list-style-type: none"> <li>• Identification of potential asbestos on site</li> <li>• Procedures to manage and handle any asbestos</li> <li>• Mitigation measures if asbestos is encountered during construction</li> <li>• Procedures for disposal of asbestos in accordance with NSW EPA guidelines, Australian Standards and relevant industry codes of practice.</li> </ul>	Construction contractor	Construction
E4	Soils	<p>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.</p>	Construction contractor	Construction
T1	Traffic and transport	<p>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.</p>	Transport	Detailed design
T2	Traffic and transport	<p>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.</p>	Construction contractor / Transport	Detailed design
T3	Traffic and transport	<p>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.</p>	Construction contractor / Transport	Construction
T4	Traffic and transport	<p>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</p>	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<p>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:</p> <ul style="list-style-type: none"> <li>• Access and haulage routes</li> <li>• Measures to maintain access to local roads and properties</li> <li>• Site specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to maintain pedestrian and cyclist access</li> <li>• 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</li> <li>• Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads.</li> <li>• A response plan for any construction traffic incident</li> <li>• 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</li> <li>• Monitoring, review and amendment mechanisms.</li> </ul>		
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 arrangements are made with the relevant road authority. Copies of road condition reports will be provided to the local roads authority.	Construction contractor	Pre-construction / post- construction
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

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
N1	Noise and vibration	<p>A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the Construction Environmental Management Plan. The CNVMP would identify:</p> <ul style="list-style-type: none"> <li>• all potential significant noise and vibration generating activities associated with the activity</li> <li>• noise and vibration sensitive receptors</li> <li>• 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</li> <li>• feasible and reasonable mitigation measures to be implemented, taking into account the Transport’s Beyond the Pavement urban design policy, process and principles.</li> <li>• a monitoring program to assess performance against relevant noise and vibration criteria</li> <li>• arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures</li> <li>• an out of hours works procedure, including approval process and proposed mitigation measures.</li> </ul>	Contractor	Pre-construction / post-construction
N2	Noise and vibration	<p>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:</p> <ul style="list-style-type: none"> <li>• the project</li> <li>• construction period and construction hours</li> <li>• contact information for project management staff</li> <li>• complaint and incident reporting and how to obtain further information.</li> </ul>	Contractor	Construction
N3	Noise and vibration	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include:</p> <ul style="list-style-type: none"> <li>• All relevant project specific and standard noise and vibration mitigation measures</li> <li>• Relevant licence and approval conditions</li> </ul>	Contractor	Construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>• Permissible hours of work</li> <li>• any limitations on high noise generating activities</li> <li>• Location of nearest sensitive receivers</li> <li>• Construction employee parking areas</li> <li>• Designated loading/unloading areas and procedures</li> <li>• Site opening/closing times (including deliveries)</li> <li>• Environmental incident procedures.</li> </ul>		
N4	Noise and vibration	<p>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.</p> <p>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.</p>	Contractor	Construction
N5	Noise and vibration	<p>Where reasonable and feasible, high noise generating activities (75dB(A)<math>L_{eq}</math> 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.</p>	Contractor	Construction
N6	Noise and vibration	<p>Where high noise generating activities (75 dB(A) <math>L_{eq}</math> at receiver) are required out of hours the following will be implemented:</p> <ul style="list-style-type: none"> <li>• The equipment will be used prior to 10pm where reasonable and feasible</li> <li>• Where the above cannot be achieved the equipment will be used prior to midnight where reasonable and feasible.</li> </ul> <p>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.</p>	Contractor	Construction
N7	Noise and vibration	<p>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.</p>	Transport	Pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
N8	Noise and vibration	<p>The following will be implemented for deliveries to and from the proposal:</p> <ul style="list-style-type: none"> <li>• Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers.</li> <li>• Dedicated loading/unloading areas to be shielded if close to sensitive receivers.</li> <li>• Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.</li> </ul> <p>Construction sites would be arranged to limit the need for reversing associated with regular/repeatable movements</p>	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	<p>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.</p> <p>These measures include the following:</p> <ul style="list-style-type: none"> <li>• Monitoring</li> <li>• Notification (letterbox drop or equivalent)</li> <li>• Specific notifications</li> <li>• Phone calls</li> <li>• Individual briefings</li> <li>• Respite Offers</li> <li>• Respite Periods</li> </ul>	Contractor	Construction



No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>Duration Respite.</li> <li>Alternative Accommodation</li> </ul>		
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 (Roads and Maritime 2014d).	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 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	Transport	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		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.		
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	<p>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:</p> <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul> <p>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.</p>	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

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
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
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: <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>	Transport	Detailed design / pre-construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
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 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.	Transport	Detailed design

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
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: <ul style="list-style-type: none"> <li>Heritage protection measures.</li> <li>An induction program for construction personnel on the management of non-Aboriginal heritage values.</li> <li>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.</li> </ul>	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: <ul style="list-style-type: none"> <li>Notification of the works to the affected residents and community</li> <li>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.</li> </ul> <p>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.</p>	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

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
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
A1	Air quality	<p>An Air Quality Management Plan will be prepared and implemented as part of the CEMP. The Plan will identify:</p> <ul style="list-style-type: none"> <li>• Potential sources of air pollution (such as dust, vehicles transporting waste, plant and equipment) during construction</li> <li>• Air quality management objectives consistent with any relevant published EPA and/or DPIE guidelines</li> <li>• 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</li> <li>• Methods to manage works during strong winds or other adverse weather conditions</li> <li>• A progressive rehabilitation strategy for exposed surfaces</li> <li>• When the air quality, suppression and management measures need to be applied, who is responsible, and how effectiveness will be assessed</li> <li>• Community notification and complaint handling procedures.</li> </ul>	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



No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
LV2	Landscape and visual	An Urban Design Plan will be prepared as part of the CEMP. The Plan will include: <ul style="list-style-type: none"> <li>• Location and identification of vegetation in the proposal area to be retained and proposed landscaped areas</li> <li>• Details of the staging of built elements including retaining walls, bridges and noise walls</li> <li>• Details of the staging of landscape works</li> <li>• Maintenance measures for landscaped or rehabilitated areas, including timings</li> <li>• A landscape monitoring program including an inspection program with frequency.</li> </ul>	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.	Roads and Maritime 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.	Roads and Maritime 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: <ul style="list-style-type: none"> <li>• Gather information about the current use and activities carried out on their property</li> <li>• Identify how the proposal would affect ongoing land use and activities on their property</li> <li>• Inform the development of appropriate mitigation measures.</li> </ul>	Transport	Detailed design
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): <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions</li> <li>• Contact name and number for complaints</li> <li>• How the project webpage will be maintained for the duration of the proposal.</li> </ul>	Transport / construction contractor	Detailed design / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
		<ul style="list-style-type: none"> <li>Minimum consultation activities to be carried out</li> <li>A complaints handling procedure.</li> </ul>		
SE3	Social and economic	<p>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:</p> <ul style="list-style-type: none"> <li>The travel distances and estimated times for travelling routes via the bypass compared to travelling via the Singleton town centre</li> <li>Services and facilities available within the Singleton township</li> <li>Any visitor attractions within the Singleton township.</li> </ul>	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	<p>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.</p> <p>The WMP will include, but not necessarily be limited to:</p> <ul style="list-style-type: none"> <li>Measures to avoid and minimise waste associated with the project.</li> <li>Classification of wastes generated by the project and management options (re-use, recycle, stockpile, disposal).</li> <li>Classification of wastes received from off-site for use in the project and management options.</li> <li>Identifying any statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions.</li> <li>Procedures for storage, transport and disposal.</li> <li>Monitoring, record keeping and reporting, including any documentation management obligations arising from resource recovery exemptions.</li> </ul> <p>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.</p>	Construction contractor	Pre-construction / construction

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing
M3	Construction waste	<p>The following resource management hierarchy principles will be followed:</p> <ul style="list-style-type: none"> <li>• Avoid unnecessary resource consumption as a priority.</li> <li>• Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery).</li> <li>• Disposal will be a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</li> </ul>	Construction contractor	Pre-construction / construction
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	<ul style="list-style-type: none"> <li>• Emergency response plans will be incorporated into the construction environmental management plan.</li> </ul>	Construction contractor	Pre-construction / construction
R2	Hazard and risk	<p>A Hazard and Risk Management Plan will be prepared and implemented as part of the CEMP. The Plan will identify:</p> <ul style="list-style-type: none"> <li>• Details of hazards and risks associated with the activity</li> <li>• Measures to be implemented during construction to minimise these risks</li> <li>• 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</li> <li>• 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".</li> </ul>	Construction contractor	Pre-construction / construction

### 7.3 Licensing and approvals

All relevant licenses, permits, notifications and approvals needed for the New England Highway bypass of Singleton 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
<i>Protection of the Environment Operations Act 1997 (s43)</i>	Environment protection licence (EPL) for scheduled activities from the EPA.	Prior to start of the activity.
<i>Fisheries Management Act 1994 (s199)</i>	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.
<i>Fisheries Management Act 1994 (s219)</i>	Permit to obstruct the free passage of fish (temporary or permanent) from the Minister for Primary Industries.	Prior to start of the activity.
<i>National Parks and Wildlife Act 1974 (s90)</i>	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.
<i>Crown Lands Act 1989 (s6)</i>	Licence to occupy areas of Crown land.	Prior to start of the activity

## 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 enhance connectivity of the bypass to Singleton town centre whilst 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 listed in Section 2.1 of the project REF.

The proposed modification is also consistent with the objectives stated in Section 2.3 of the project REF and Section 2.2 of this addendum REF.

The proposed modification would potentially result in some increases to environmental impacts including impacts to noise and vibration and amenity. However, the safeguards and management measures provided in Section 7.2 would avoid, minimise or mitigate these potential impacts arising from the proposed modification.

The proposed modification would have long-term benefits including better access to Singleton town centre and improved flood performance of the bypass.

#### 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 new properties would be needed to be acquired to those presented in the project REF.

Long-term benefits of the proposed modification include improving access to Singleton town centre and business district 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 any additional direct removal of native vegetation than the amount identified in the project REF and previous addendum REF (April 2023). 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 and previous addendum REF (April 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 the flood performance of the bypass. Whilst 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 Section 7.

## 8.2 Objects of the EP&A Act

Object	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 New England Highway bypass of Singleton. It would involve minimal additional use and development of land to that in the project REF.
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.	<p>The proposed modification would not result in the removal of additional native vegetation</p> <p>The proposed modification is consistent with the outcomes of the project BAR and project addendum BAR.</p> <p>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.</p> <p>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 and previous addendum REF (April 2023).</p>
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	<p>The proposed modification is not expected to increase impacts to non-Aboriginal heritage.</p> <p>Impacts to Aboriginal heritage would be managed in accordance with an Aboriginal Heritage Impact Permit (AHIP) issued by Heritage NSW.</p> <p>Safeguards and management measures would also be employed to appropriately mitigate any further potential impacts arising from the proposed modification.</p>
1.3(g) To promote good design and amenity of the built environment.	Two of the principal drivers of the design of the proposed modification are to improve amenity in the form of better access to Singleton town centre and minimising environmental impacts by improving the flood performance of the bypass.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the project.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the project.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	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 its construction or operation. 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 access to Singleton town centre from 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 project REF 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'.

This addendum REF as well as the project REF and submissions report has examined the environmental impacts and benefits of the project and identified mitigation measures to manage the potential for adverse impacts. 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 activity.

This has included consideration where relevant, of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species, 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.

A number of 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 the addendum REF best meets the project objectives but would still result in some impacts to sensitive receivers from noise and vibration, reduced amenity and land acquisitions. Safeguards and management measures as detailed in this addendum REF would ameliorate or minimise these expected impacts. The proposed modification would also provide better access to Singleton town centre and improve the flood performance of the bypass. On balance the proposed modification is considered justified and the following conclusions are made.

#### 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, submissions report, and previous addendum REF (April 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. The proposed modification is subject to assessment under Division 5.1 of the EP&A Act. Consent from Singleton 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 is noted that the project REF 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.



Neil Standen  
Team Lead, Impact Assessment  
AECOM Australia Pty Ltd

Date: 21/09/2023

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



Mark Cure  
A/Senior Project Manager  
Transport for NSW

Date: 21/09/2023

## 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
AADT	annual average daily traffic
AEP	Annual Exceedance Probability
AHIP	Aboriginal Heritage Impact Permit
AHMP	Aboriginal Heritage Management Plan
ALR Act	<i>Aboriginal Land Rights Act 1983</i>
ARTC	Australian Rail Track Corporation
BAR	Biodiversity Assessment Report
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BDAR	Biodiversity Development Assessment Report
CBD	Central Business District
CEMP	Construction / Contractor's environmental management plan
CLM Act	<i>Contaminated Lands Management Act 1997</i>
CNVMP	Construction Noise and Vibration Management Plan
CP	Communication Plan
DPI	Department of Primary Industries
EEC	endangered ecological communities
EIA	Environmental Impact Assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i> . Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i> . Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
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	<i>Fisheries Management Act 1994 (NSW)</i>
FRMSP	Floodplain Risk Management Study and Plan
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
LALC	Local Aboriginal Land Council
LCVIA	landscape character and visual impact assessment
LCZ	Landscape Character Zones
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
NCA	noise catchment area
NES	Matters of national environmental significance under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
POEO Act	<i>NSW Protection of the Environment Operations Act 1997</i>
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Transport for NSW.
RAP	Registered Aboriginal Parties
REF	Review of Environmental Factors
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all function are now managed by Transport for NSW
SEIA	socio-economic impact assessment

Term /acronym	Description
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP (Biodiversity and Conservation)	<i>State Environmental Planning Policy (Biodiversity and Conservation) 2021</i>
SEPP (Planning Systems)	<i>State Environmental Planning Policy (Planning Systems) 2021</i>
SEPP (Precincts – Central River City)	<i>State Environmental Planning Policy (Precincts – Central River City) 2021</i>
SEPP (Precincts – Eastern Harbour City)	<i>State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021</i>
SEPP (Precincts – Regional) 2021	<i>State Environmental Planning Policy (Precincts – Regional) 2021</i>
SEPP (Resilience and Hazards)	<i>State Environmental Planning Policy (Resilience and Hazards) 2021</i>
SEPP (Transport and Infrastructure)	<i>State Environmental Planning Policy (Transport and Infrastructure) 2021</i>
SIS	Species Impact Statement
SWMP	<i>Surface Water Management Plan</i>
TEC	Threatened Ecological Community
TRAQ	Tool for Roadside Air Quality
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
WM Act	<i>Water Management Act 2000</i>



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- Whitelaw, E 1971, A History of Singleton. Singleton: Singleton Historical Society & Museum Inc.

# 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? Guideline (1995/1996)* 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
<p>Any environmental impact on a community?</p> <p>The proposed modification would be consistent with the project REF and require total and partial acquisition of land. 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.</p>	Short-term negative
<p>Construction of the proposed modification would be consistent with the environmental impacts outlined in the project REF, including altered visual amenity and access for some residents, noise and air quality impacts. These impacts would be temporary and managed with the implementation of the mitigation measures outlined in Section 7.2 of the addendum REF.</p>	Short-term negative
<p>Aboriginal heritage sites would be impacted by the proposed modification and have previously been salvaged to mitigate these impacts. The proposed modification has been designed to reduce impacts to these aspects as far as practical.</p>	Long-term negative
<p>Operation of the proposed modification would be consistent with the project REF and improve traffic flow, travel times and safety through Singleton by reduced traffic volumes and improve the movement of heavy freight vehicles.</p>	Long-term positive
<p>Any transformation of a locality?</p> <p>During construction of the proposed modification would be consistent with the project REF with amenity impacts expected including noise and air quality impacts which would temporarily transform the locality. These impacts would be managed through the implementation of the mitigation measures identified in Section 7.2 of the addendum REF.</p>	Short-term negative
<p>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.</p> <p>The proposed modification would also result in low to moderate visual impacts for residents on the western side of Singleton and to road users, due to the raised embankments and bridges included in the design. Landscaping and urban design elements have been incorporated into the design to minimise these impacts.</p>	Long-term negative
<p>Any environmental impact on the ecosystems of the locality?</p> <p>The proposed modification would not involve any further impacts to ecosystems than those assessed in the project REF.</p>	Nil
<p>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</p> <p>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 the addendum REF.</p>	Short-term negative
<p>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?</p>	Long-term negative



Factor	Impact
<p>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.</p>	
<p>Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)?</p> <p>The proposed modification would not result in any additional clearing of native vegetation requiring removal than outlined in the project REF and addendum REF.</p>	Nil
<p>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</p> <p>The proposed modification would not endanger any species of animal, plant or other form of life.</p>	Nil
<p>Any long-term effects on the environment?</p> <p>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. The proposed modification would also improve the flood performance of the bypass.</p>	Long-term positive
<p>Any degradation of the quality of the environment?</p> <p>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 the addendum REF.</p>	Short-term negative
<p>Operation of the proposed modification is unlikely to result in the ongoing degradation of the environment.</p>	Long-term neutral
<p>Any risk to the safety of the environment?</p> <p>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. Furthermore, the flood performance of the bypass would be improved by the proposed modification.</p> <p>The proposed modification has been designed to achieve a one in 100-year (one per cent Annual Exceedance Probability) flood immunity on the bypass whilst minimising flooding impacts on surrounding land. The proposed modification would reduce peak flood levels around the southern connection and the Putty Road connection compared to the design presented in the project REF.</p>	Long-term positive
<p>Any reduction in the range of beneficial uses of the environment?</p> <p>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.</p>	Long-term negative
<p>Any pollution of the environment?</p> <p>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 the addendum REF.</p>	Short-term negative

Factor	Impact
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 to be generated, consistent with that of the project REF. Mitigation measures for the disposal of waste streams likely to be produced during construction are detailed in the 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.  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.	Long-term positive
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
<p>Any impact on a World Heritage property?</p> <p>The proposed modification would not impact on a World Heritage property.</p>	Nil
<p>Any impact on a National Heritage place?</p> <p>The proposed modification would not impact on a National Heritage place.</p>	Nil
<p>Any impact on a wetland of international importance?</p> <p>One wetland of international importance was identified being the Hunter estuary wetlands. This occurs 45 to 50 kilometres downstream of the proposed modification.</p>	Nil
<p>Any impact on a listed threatened species or communities?</p> <p>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.</p> <p>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 REF, submission report, and previous addendum REF.</p>	Nil
<p>Any impacts on listed migratory species?</p> <p>An assessment of significance under the EPBC Act was undertaken as part of the project REF for one migratory species, being the White-throated Needletail (<i>Hirundapus caudacutus</i>). The assessment concluded that the project is unlikely to substantially impact this species.</p> <p>The proposed modification is unlikely to impact any migratory species, including the White-throated Needletail, given that no adjustments to the proposal area 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 proposal area.</p>	Nil
<p>Any impact on a Commonwealth marine area?</p> <p>The proposed modification would not impact on a Commonwealth marine area.</p>	Nil
<p>Does the proposed modification involve a nuclear action (including uranium mining)?</p> <p>The modification does not involve a nuclear action.</p>	Nil
<p>Additionally, any impact (direct or indirect) on Commonwealth land?</p> <p>The proposed modification would not impact (either directly or indirectly) on Commonwealth land.</p>	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

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



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? (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 <i>National Parks and Wildlife Act 1974</i> , 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 <i>Marine Estate Management Act 2014</i> ?	No	Department of Industry	Section 2.15
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	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 <i>Mine Subsidence Compensation Act 1961</i> ?	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 <i>Threatened Species Conservation Act 1995</i> )?	No	Department of Planning and Environment	Section 3.24

# Appendix C

## Flood assessment report

# Appendix D

## Traffic and transport assessment report

# Appendix E

## Noise and vibration assessment report

# Appendix F

Air quality methodology and impact assessment data



# Appendix G

## Landscape character and visual impact assessment report

# Appendix H

## Addendum socio-economic impact assessment report



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