Transport
for NSW

Ousedale Creek Koala Underpass (formerly Brian Road Intersection Upgrade)

REF submissions report

June 2025

NSW GOVERNMENT

Transport.nsw.gov.au

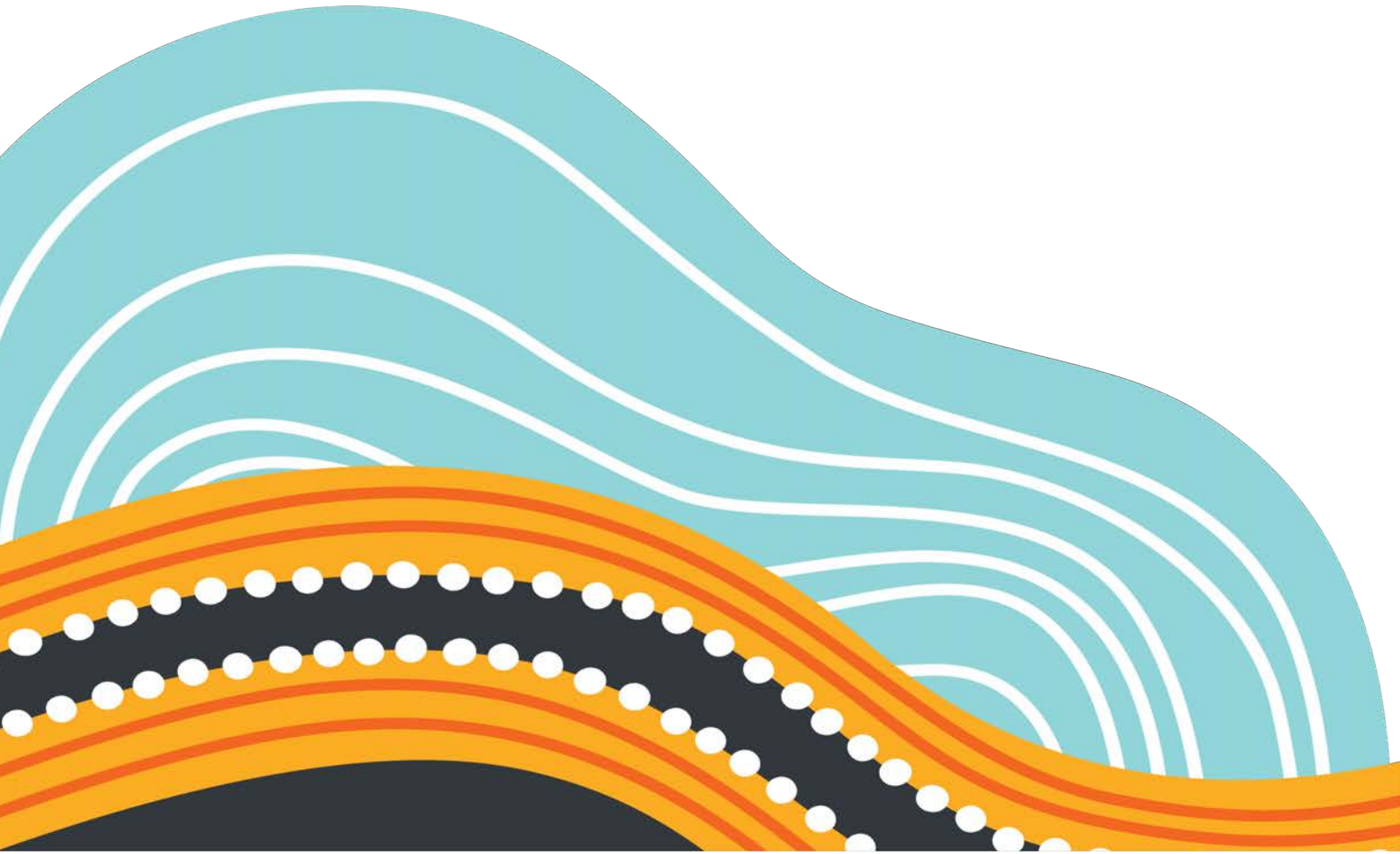
Acknowledgement of Country

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 WSP and Transport for NSW.

Executive summary

The proposal

Transport for NSW (Transport) proposes to improve the safety features of Appin Road and install an underpass at the Ousedale Creek Corridor. Transport is undertaking this project on behalf of the Department of Planning, Housing and Infrastructure (DPHI) as part of the implementation of the Cumberland Plain Conservation Plan (CPCP).

The revised key features of the proposal include:

- a fauna underpass under Appin Road approximately 35m south of the intersection of Appin Road and Brian Road, comprising a reinforced concrete box culvert (3m wide, 2.4m high and about 36m long)
- refuge poles and tree logs at the fauna underpass entrances
- koala escape poles and koala escape hatches along Appin Road and Brian Road
- koala grids at property driveways and across Brian Road around 260m west of the intersection in line with the end of the koala exclusion fencing
- a new vegetated fauna path that will connect to the new fauna underpass leading to existing mature vegetation within the proposal boundary
- safety barriers and koala exclusion fencing on roadside locations
- fauna fence drop downs at either side of the underpass to allow trapped fauna inside the road reserve to escape
- installation of relocated utilities including drainage, roadside furniture, pavement markings, street lighting and signage
- reinstatement of vegetation through the restoration of koala habitat
- establishment of a temporary road for diversion of Appin Road, ancillary facilities and lay down locations to support the work
- pedestrian access gates adjacent to the koala grids at residential driveways.

In response to community feedback during the exhibition of the Brian Road Intersection Upgrade Review of Environment Factors (REF), the proposed single-lane roundabout at the intersection of Brian Road and Appin Road is no longer included in the scope. The road and embankment widening has been removed from the proposal scope. The extent of the proposed safety barriers is subject to detailed design.

Display of the REF

The REF was publically displayed for 31 days between 25 January 2023 and 24 February 2023 on the Transport project website http://www.transport.nsw.gov.au/ouesdale-creek and was available for download. The REF was advertised via the project email distribution list.

Transport distributed a community notification to affected property owners and the broader community.

The project team held two community information sessions at the Bradbury Markets on The Parkway, Saturday 4 February from 9 am to 12 pm and at the IGA Appin and Saturday 11 February from 10 am to 2 pm.

Summary of issues and responses

A total of 104 submissions were received during the display of the REF. Of these 104 submissions, 96 were individual submissions from the general community, seven were from community and stakeholder groups and one was from a government agency.

Of the 104 submissions, 5.8 per cent were in support of the proposal, 10.6 per cent were supportive but raised some concerns, 59.6 per cent objected to a certain aspect of the proposal, 16.3 per cent objected to the proposal and 7.7 per cent only raised matters out of scope. Out of the 104 submissions, 97 submissions raised matters within the scope of the

proposal and this submissions report. Of these 97 submissions, 25 submissions raised matters not directly related to the proposal as well as explicitly raising matters within the scope of the proposal.

Submissions that were not supportive of the proposed modification related to the needs and options considered, content within the REF, biodiversity impacts, traffic impacts, planning and land use concerns, consultation concerns, noise impacts, and hazards and risk impacts. A summary of these issues and how they have been responded to are summarised below.

Some submissions expressed support for the project either generally or regarding a specific feature of the proposal including the underpass, koala exclusion fencing and roundabout. Transport acknowledges support for the proposal.

Needs and options considered

Submissions questioned the need and justification of the single-lane roundabout, and many requested it be removed from the proposal scope. Submissions requested Transport clarify who the four underpass options were assessed by. Submissions stated that Lendlease should not be influencing the underpass design.

In response to these concerns, the roundabout is no longer included in the proposal scope. The current traffic configurations would remain, including the right-hand turn intersection with a speed along Appin Road of 80km/h. As a result, the proposal is now called the Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade).

Section 1.2 of the REF details that the assessment has been conducted by WSP on behalf of Transport. The REF detailed the options assessment that took place prior to the environmental assessment. Lendlease is not involved in the design or delivery of the Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade).

Brian Road Intersection Upgrade REF content

Accuracy of the REF

A submission questioned the accuracy of the inferred proximity to Dharawal National Park and the presence of Lysaght Road on several maps in the REF.

The project site is adjacent to CPCP 'avoided land' on the eastern side which extends into bushland within Dharawal National Park. While it is noted that Dharawal National Park is not directly adjacent to the proposal site, it was mentioned in the REF to provide context.

The relevant figures have been amended to exclude Lysaght Road.

Impact assessment

One submission requested the environmental assessment consider the National Parks and Wildlife Service's (NPWS) Developments adjacent to NPWS lands: Guidelines for consent planning authorities (NPWS 2020).

Currently there is no land reserved or held under the Nation*al Parks and Wildlive Act 1974* (NPW Act) adjacent to the proposal. Transport acknowledges that this may change in the future. Although the mitigation measures were developed without specific reference to the NPWS developments adjacent to NPWS lands: Guidelines for consent planning authorities (NPWS 2020), they are in general accordance with the requirements.

Biodiversity

Concern for koalas

Submissions expressed general concern for koalas due to the construction and operation of the proposal including koala displacement and noise, light and pollution impacts. Submissions requested the impacts on koalas be assessed with an Environmental Impact Statement, a Species Impact Statement or a Biodiversity Development Assessment Report (BDAR).

Transport has considered the impacts on koalas through the design of the proposal. Further, the proposal aims to reduce koala injury and mortality rates by limiting their access to the road and providing connectivity under Appin Road.

The REF was prepared to fulfil the requirements of Section 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) including that Transport examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity. Section 7.3 of the *Biodiversity Conservation Act 2016* (BC Act) requires that the significance of the impact on threatened species and endangered ecological communities is assessed using a five part test to determine if a Species Impact Statement or BDAR is required. This assessment concluded that the impacts on Threatened Ecological Communities (TECs) and threatened species are unlikely to be significant. As such, neither a Species Impact Statement nor a BDAR is required to support the proposal.

Proposed Ousedale Creek Underpass

Submissions opposed or questioned the need for the underpass. Submissions stated that the underpass is not suitable for koalas or other species. These submissions expressed concern over the design of the underpass, including its dimensions, lack of suitable koala habitat on either side of the underpass and other design characteristics.

The proposed underpass is crucial in providing safe koala passage between koala habitats on the eastern and western sides of Appin Road. DPHI are progressing with land acquisitions including on either side of the proposed underpass, to connect to the proposed national park along the Georges River and the Ousedale Creek habitat corridors. While these activities are anticipated to enhance the effectiveness of the proposed underpass, they are outside the scope of this proposal.

In response to submissions, the underpass design as exhibited has been changed. The underpass would now be a reinforced concrete box culvert 3m wide, 2.4m high and about 36m long. The revised box culvert design is sufficient for koalas, macropods, and other terrestrial native wildlife. Monitoring of other similar-sized underpasses has consistently demonstrated use by a range of native species. For more information refer to the fauna connectivity tab at Biodiversity | Transport for NSW. The previously narrow channelised drainage swale on the western side of the culvert has also been widened and opened to better funnel koalas into the underpass.

Consistency with expert advice – underpass design

Submissions requested the underpass be designed in accordance with expert advice and best practice. Requests included an increase in the underpass diameters and features to reduce the impact of threats, light and noise on koalas.

The location of the crossing was identified in the CPCP along the corridor and is consistent with the recommendations of the Office of the Chief Scientist and Engineer (OCSE). The underpass has been redesigned in response to community feedback and would be a reinforced concrete box culvert 3m wide, 2.4m high and about 36m long. Culverts such as these have been installed on many roads in Australia with studies showing they are readily used by the intended species. The larger size of the culvert compared to the pipe is expected to benefit koala connectivity. The previously narrow channelised drainage swale on the western side of the culvert has also been widened and opened to better funnel koalas into the underpass.

The design includes fauna rails located inside to be installed within the culvert which would allow koalas to avoid predators. Refuge poles would also be installed at the entrances of the underpass. Noise and light impacts are not expected to influence koalas' use of the underpass given they already possess some tolerance to anthropogenic disturbances.

Consistency with expert advice – connectivity measures and underpass location

Submissions requested the underpass be relocated to Mallaty Creek or Mount Gilead. Submissions also requested the installation of multiple underpasses and the extension of the koala habitat.

The OCSE considered each of the east-west corridors and provided advice to the then Minister for Energy and Environment and Minister for Planning and Public Spaces. The CPCP relies on this advice in determining the most effective corridors for koala movement. The Ousedale Creek corridor was identified as the most suitable east-west corridor. The CPCP outlines that the vegetation along Mallaty Creek does not meet the requirements of an effective koala corridor with average widths ranging between 200-300m. The Appin Road Upgrade project to the north of the proposal includes the installation of two underpasses to support the movement of koalas throughout the locality.

Following the construction of the underpass, revegetation work would take place to establish a vegetated fauna connection between the underpass and the surrounding habitat. DPHI are progressing with land acquisitions, including on either side of the proposed underpass, to connect to the Koala National Park along the Georges River and the Ousedale Creek habitat corridors.

Requests for other wildlife connectivity measures

Submissions requested other wildlife crossing structures including overpasses, raised bridges and glider poles.

Connectivity measures for arboreal fauna, such as rope bridges and glide poles, have not been provided at this location given the current lack of continuous tree canopy near the road. The planned revegetation work as part of this proposal and the broader CPCP revegetation efforts for the Ousedale Creek Corridor could, over time indicate that providing arboreal connectivity may be worthwhile. However, it is not a consideration at this stage.

Koala exclusion fencing

Submissions expressed concern for the koala exclusion fencing, stating that it is either not designed appropriately or would restrict the movement of the local koala population.

The proposed permanent koala exclusion fencing and temporary construction koala exclusion fencing is considered best practice and has been designed in consultation with koala experts and DPHI. The temporary construction fencing has been designed to minimise risk of falling over. The permanent koala exclusion fencing would redirect koalas away from Appin Road to the underpass, which would provide safe access under Appin Road. The koala exclusion fencing would extend for approximately 250m south of the Brian Road intersection, 250m north to connect to the Appin Road Safety Improvements project and west 260m along Brian Road. Transport also notes that DPHI are investigating solutions to address concerns over fence end effects raised during the public display of the REF.

Koala Grids

Submissions requested extra koala grids be added to either end of the fence along the road and across the road at the southern end to limit fence end effects.

As per the updated scope, koala grids have been proposed at existing driveways and across Brian Road at the fence limits. Grids across Appin Road would not be feasible as it would create a safety risk for road users.

Offsetting

Submissions requested that an offset strategy be prepared and implemented by Transport and suggested that the Transport Conservation Fund would not be appropriate.

Transport would prepare and implement a biodiversity offset strategy to address these requirements. Offsetting would be required in accordance with the Transport's Biodiversity Policy, the Tree and Hollow Replacement Guidelines and No Net Loss Policy. This would ideally take place within the subject land. Contribution to the Transport Conservation Fund would only occur if it is not possible to meet the replacement requirments within the proposal boundary or land in proximity to the proposal.

Traffic

Impact assessment approach

Submissions expressed concern that the traffic and transport assessment had not considered the expected population growth in the area.

Concerns regarding the traffic impact assessment have been noted. However, given the proposed intersection upgrade at Brian Road is no longer included in the scope of work, the traffic impact assessment of the intersection no longer applies.

Operational traffic impacts

Submissions expressed concern that the proposed Brian Road roundabout would have significant traffic impacts, often attributed to the decreased speed at the proposed roundabout.

Section 6.3.3 of the REF outlined that while there would be some delay associated with the construction and operation of the proposal, impacts would be limited. Traffic impacts due to the Brian Road roundabout would not occur as it is no longer included in the project scope.

Safety

Some submissions raised concern for the safety of drivers due to the Brian Road roundabout and the reduced speed limit. Some submissions requested the detailed design of the roundabout to include additional safety features.

Given the proposal no longer includes the single-lane Brian Road roundabout, any safety concerns in relation to it are no longer relevant. Further, additional safety measures at the Brian Road intersection are no longer considered relevant.

Active/ public transport

Submissions expressed concern for the safety of pedestrians and cyclists and requested a dedicated shared path be added to the proposal scope along Appin Road. Widening the road to accommodate a shared path would require considerable removal of vegetation and would encroach into private property. These impacts would not be in keeping with the proposal's objective to minimise social and environmental impacts. Further, the installation of a shared path within the project area would have minimal benefits as it would not connect to a shared path beyond the project extent along Appin Road.

Planning and land use

Property acquisition and lease

A submission requested that the proposed partial acquisition and temporary lease for the construction of their property be reviewed.

Acquisition would be required for properties on either side of the underpass. Properties would be both temporarily leased and permanently acquired. DPHI is leading these land acquisitions pursuant to the *Land Acquisition (Just Terms) Act 1991*. DPHI is working with affected owners and tenants to assist them in understanding their rights and obligations, as well as the process for acquiring land in New South Wales.

Surrounding development

A submission requested that the proposal be consistent with future urban development in the area, particularly the rezoning of 345 Appin Road, also known as the Appin (Part) Precinct. The submission expressed concern that the proposed upgrades to the intersection as presented in the REF would waste both time and money as future development would require further upgrades to the intersection to accommodate for population growth and traffic increases.

The proposal no longer includes upgrades to the intersection. It is unlikely that the revised scope would impact any future development within the vicinity of 345 Appin Road. Transport would continue to consult with directly impacted stakeholders throughout the construction and operation of the proposal.

Future land reservation under the National Parks and Wildlife Act 1974

NPWS questioned if any key features of the proposal would be located in the proposed national park along the Georges River. They also stated that access to or work within land reserved under the NPW Act cannot occur as part of this proposal unless authorisation is granted by NPWS under the NPW Act or the *National Parks and Wildlife Regulation 2019.*

Currently the land required to construct the proposal is not located within land reserved under the NPW Act. Transport acknowledges that the Office of Strategic Lands is currently looking to acquire land for the future national park along the Georges River. It is unlikley that the road infrastructure, including the koala underpass, would form part of the land to be reserved under the NPW Act. If that changes in the future Transport would seek authorisation from NPWS under the NPW Act or the *National Parks and Wildlife Regulation 2019.*

Consultation

A submission requested further consultation with Transport to discuss the proposed Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade) and the content of their planning proposal. A submission stated that the construction of the proposal triggers consultation under Section 2.15 of the Transport and Infrastructure State Environmental Planning Policy (SEPP).

A consultation strategy for the proposal was developed to encourage stakeholder and community involvement and connections. The need for consultation with NPWS in accordance with the Transport and Infrastructure SEPP is not required as the land for the proposed national park along the Georges River has not been acquired by NPWS and would not be

acquired prior to the determination of this proposal. Nevertheless, Transport has consulted with NPWS on the proposal. Transport would continue to consult with impacted stakeholders throughout the construction and operation of the proposal.

Noise impacts

A submission requested that construction take place between 9 am and 4 pm to limit noise impacts for residents.

Construction activities would typically occur between 7 am and 6 pm on Monday to Friday and 8 am to 1 pm on Saturday in accordance with the Transport Construction Noise and Vibration Guidelines. Any potential noise impacts during these hours or during out-of-hours would be mitigated with a range of noise and vibration safeguards and management measures.

Hazards and risks

A submission raised concern regarding the location of the proposal in relation to mine subsidence land.

Risks associated with construction on mine subsidence land were considered in the REF. The advice received from Subsidence Advisory NSW during the consultation was adopted in the proposal design.

Other

Requests to widen Appin Road

Submissions requested the proposal include the widening of Appin Road to accommodate for increased traffic. Another submission stated that the shoulder widening and safety barriers are only a temporary measure and should not be pursued.

Duplicating Appin Road to accommodate a multilane carriageway would not be in keeping with the proposal objectives. The approved Appin Road Upgrade includes road duplication from a single to dual carriageway between Fitzgibbon Lane to around 2.5km south of Copperfield Drive and would help facilitate traffic flow along Appin Road.

Given the construction of a roundabout is no longer included in the scope, the existing traffic configurations remain as per the revised scope and would not require road widening. The safety barriers are essential to ensure the safety of all road users and property owners is maintained. The extent of these barriers is subject to the detailed design.

Other infrastructure upgrade requests

Submissions suggested other infrastructure upgrades in the region including further upgrades to Appin Road and surrounding roads as well as construction of the Outer Sydney Orbital.

Transport notes the other infrastructure upgrade suggestions; however, they are not within the scope of the proposal.

Soil and erosion

A submission requested that sedimentation and erosion controls be utilised where necessary to not increase the risk of erosion or movement of sediment onto NPWS land.

Currently there is no land reserved under the NPW Act adjacent to the proposal. Transport acknolweldges that this may change in the future. Relevent soil and erosion safeguards were outlined in Section 6.8 of the REF. These safeguards include the preparation of Erosion and Sediment Control Plan/s to be implemented as part of the Soil and Water Management Plan. The Soil and Water Management Plan will then be included in the CEMP during the detailed design and pre-construction phase. The Erosion and Sediment Control Plan/s will address any foreseeable risks in relation to soil erosion and water pollution, including those relating to NPWS lands and protected waterways.

Other

A submission expressed concern about furniture under Kings Falls Bridge that was displaced during a flood.

While concerns over the impacts of recent flooding events in the area are noted, they do not relate to and are outside the scope of the proposal. The original crossing platforms were removed and replaced with horizontal logs in Feburay 2025. These changes aim to encourage koalas to use the crossing and resolve the damage caused to the original koala structures. The works were funded by DPHI and delivered by Transport. Transport has also installed vertical supports at either end of the underpasses within metres of vegetation.

Changes to the proposal

Several changes were made to the proposed scope. These changes were made in response to community feedback, concerns raised in submissions and in response to changes in the project boundary of the Appin Road Safety Improvements proposal.

These changes include:

- removal of the single-lane roundabout at the intersection of Appin Road and Brian Road from the proposed scope
- a box culvert underpass underneath Appin Road approximately 35m south of the Brian Road intersection, instead of the exhibited reinforced concrete pipe underpass in the same location
- widening of the previously channelised drainage swale on the western side to improve koala access
- reduction in the proposal footprint at the northern extent of the proposal by around 250m
- an additional koala grid across Brian Road around 260m west of the intersection in line with the end of the koala exclusion fencing
- new koala escape poles and koala escape hatches on either side of Appin Road at the southern extent of the proposal and just north of the intersection of Brian Road and Appin Road as well as on either side of Brian Road at the western extent
- additional refuge poles and fauna furniture at the fauna underpass entrances and within the structure.

Additional assessment and consistency review

Biodiversity

An additional biodiversity assessment was required to assess the impacts of the proposal to account for changes in the proposal boundary, changes to the underpass design, and additional koala escape poles and fauna furniture. The methodology has not changed and included a desktop review as well as field surveys including plot-based vegetation surveys and targeted flora and fauna surveys.

The updated proposal would include the removal of 2.59ha of native vegetation in total which is 0.06ha less than originally proposed which reflects the reduction to the northern extent of the proposal. Table 4-2 presents a summary of the direct impacts on native vegetation. During construction, all other potential impacts would remain the same as presented in the REF. During operation, the additional wildlife measures would further enhance the connectivity of the Ousedale Creek Corridor and reduce the likelihood of koala injury and mortality. In accordance with Transport's Biodiversity Policy and Tree and Hollow Replacement Guidelines, the replacement requirement would include planting 278 trees and installing 21 artificial hollows. Additional biodiversity safeguards and management measures were provided in Section 4.1.5.

Noise and vibration

A consistency review of the noise and vibration assessment, as presented in the REF, was conducted to determine if the anticipated impacts would change due to the revised proposal scope.

Construction noise, construction traffic noise and vibration would not exceed what was presented in the REF. Noise impacts for the residential property immediately east of the intersection of Brian Road and Appin Road would potentially be reduced as the proposal would be at a further distance than initially anticipated. During operation, the noise impacts would remain as they currently are. These levels would comply with the Road Noise Policy (RNP) management levels.

The noise and vibration safeguards presented in Table 6-17 of the REF would remain applicable. No additional safeguards are required.

Traffic and transport

A consistency review of the traffic and transport assessment, as presented in the REF, was conducted to determine if the anticipated impacts would change due to the revised proposal scope.

It is assumed that the number of vehicles visiting the construction site per hour would not exceed that presented in the REF as a result of the proposal changes to the scope of work.

While there would be some delay to existing traffic on Appin Road and Brian Road due to traffic management conditions, access would be maintained, including the transfer of vehicles onto the temporary road to allow construction on the existing road pavement. Impacts are expected to be minor.

The traffic configurations would remain the same as they currently operate and the speed limit would remain at 80km/h. As such, the previously assessed performance of the Appin Road and Brian Road intersection during operation would no longer apply. Instead, the intersection performance would remain at its current level of service during operation.

The traffic and transport safeguards presented in Table 6-19 of the REF would remain applicable. No additional safeguards are required.

Landscape character and visual impacts

A consistency review of the landscape character and visual impact assessment as presented in the REF was conducted to determine if the anticipated impacts would change due to the revised proposal scope.

Impacts on visual amenity would be generated during construction. These impacts would be reduced given the construction of the single-lane roundabout at Brian Road is no longer part of the scope. Visual impacts would be reduced through the use of temporary construction boundary fencing, which would partially screen construction activities from visual receivers, mitigating the impact.

During operation, the visual impacts would be reduced given the single-lane roundabout is no longer included in the project scope.

The landscape character and visual impact safeguards presented in Table 6-21 of the REF would remain applicable. No additional safeguards are required.

Next steps

Transport as the determining authority will consider the information in the REF and this submissions report and decide whether or not to proceed with the proposal.

Transport will inform the community and stakeholders of this decision. If a decision is made to proceed, Transport will continue to consult with the community and stakeholders prior to and during the construction phase.

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Figures

1. Introduction and background

1.1 The proposal

Transport for NSW (Transport), on behalf of Department of Planning, Housing and Infrastructure (DPHI), proposed to improve the safety features of Appin Road and install an underpass at the Ousedale Creek Corridor. The original proposal presented in the Brian Road Intersection Upgrade Review of Environmental Factors (REF) included:

- a new single-lane roundabout at the intersection of Appin Road and Brian Road
- a fauna underpass under Appin Road approximately 35m south of the new roundabout, comprising a new 2.4m diameter and 36m long reinforced concrete pipe
- refuge poles and tree logs at the fauna underpass entrances
- a new vegetated fauna path to the new fauna underpass linking the underpass to existing mature vegetation within the proposal boundary
- road and embankment widening, new safety barriers and fauna fencing on roadside locations
- fauna fence drop downs at either side of the underpass to allow trapped fauna inside the road reserve to escape
- installation of utility relocations, drainage, roadside furniture, pavement markings, street lighting and signage
- reinstatement of vegetation through the restoration of koala habitat
- establishment of a temporary road for diversion of Appin Road, ancillary facilities and lay down locations to support the work.

Following the exhibition of the REF and consideration of submissions, changes to the proposal have been made. The changes to the key features include:

- removal of the single-lane roundabout at the intersection of Appin Road and Brian Road from the proposed scope
- a box culvert underpass underneath Appin Road approximately 35m south of the Brian Road intersection, instead of the exhibited reinforced concrete pipe underpass in the same location
- widening of the previously channelised drainage swale on the western side to improve koala access
- reduction in the proposal footprint at the northern extent of the proposal by around 250m
- addition of a koala grid across Brian Road around 260m west of the intersection in line with the end of the koala exclusion fencing
- new koala escape poles and koala escape hatches on either side of Appin Road at the southern extent of the proposal and just north of the intersection of Brian Road and Appin Road as well as on either side of Brian Road at the western extent
- additional refuge poles and fauna furniture at the fauna underpass entrances and within the structure.
- pedestrian access gates adjacent to the koala grids at residential driveways.

The changes to the proposal are discussed in greater detail in Section 3 of this submission report.

The location of the proposed work (proposal) is shown in Figure 1-1 and the features of the proposed modification are shown in Figure 1-2.

1.2 REF display

The REF was publicly displayed for 31 days between 25 January 2023 and 24 February 2023 on the Transport project website http://www.transport.nsw.gov.au/ouesdale-creek and was available for download. The website link was advertised via the project email distribution list.

Transport distributed a community notification to affected property owners and the broader community.

The project team held two community information sessions at the Bradbury Markets on The Parkway, Saturday 4 February from 9 am to 12 pm and at the IGA Appin, and Saturday 11 February from 10 am to 2 pm. These sessions provided the opportunity for community members to ask the project team detailed questions and to provide feedback. The feedback received from the community during these sessions was treated as formal submissions and has been summarised and responded to in Section 2.

Transport also posted the proposal on Facebook which received 122 comments. The comments generally objected to the proposal as a whole or to specific aspects of the proposal. The key comment themes included:

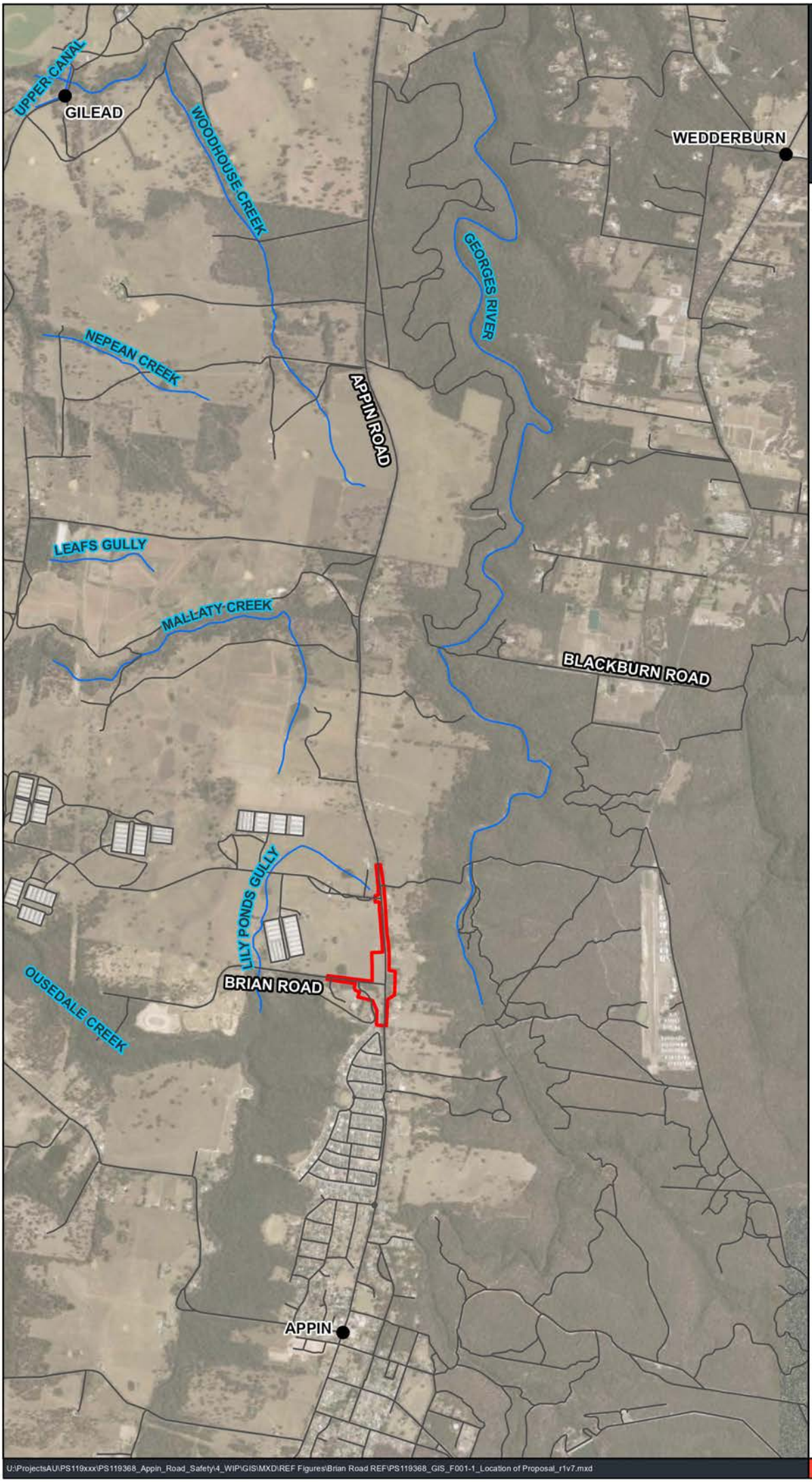
- requests to upgrade all of Appin Road to address safety and traffic concerns including road duplication, a bypass and fixing potholes
- questioned the need for a roundabout at the intersection
- concern for biodiversity
- the proposal will only serve surrounding developers rather than the public
- concern that the current infrastructure will not be adequate for future developments
- distrust in Transport and the NSW government due to failed promises such as a bypass
- requests for speed cameras and driving penalties along Appin Road
- question about the accuracy of some information in the Facebook post
- concern that the proposal is a waste of money
- concern that Transport and the NSW government are not delivering priority projects.

These themes are generally consistent with the formal submissions received and responses to the formal submissions is provided in Section 2.

1.3 Purpose of this report

This submissions report relates to the REF prepared for the Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade) and should be read in conjunction with that document.

Submissions received during the public exhibition of the REF relating to the proposal were collated by Transport. This submissions report summarises the issues raised and provides responses to each issue (Section 2). It details revisions to the proposal since the exhibition of the REF (Section 3), describes and assesses the environmental impact of changes to the proposal (Section 4) and identifies new or revised environmental management measures (Section 5).



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Ousedale Creek Koala Underpass (formally Brian Road Intersection Upgrade)

Figure 1-1
Location of Proposal

Legend

- Towns
- Roads
- Watercourses
- Proposal Site

0 300 600
Metres

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

1:32,000 Date: 29/11/2024

Data sources: - DNRME, TMR, Translink, Geoscience

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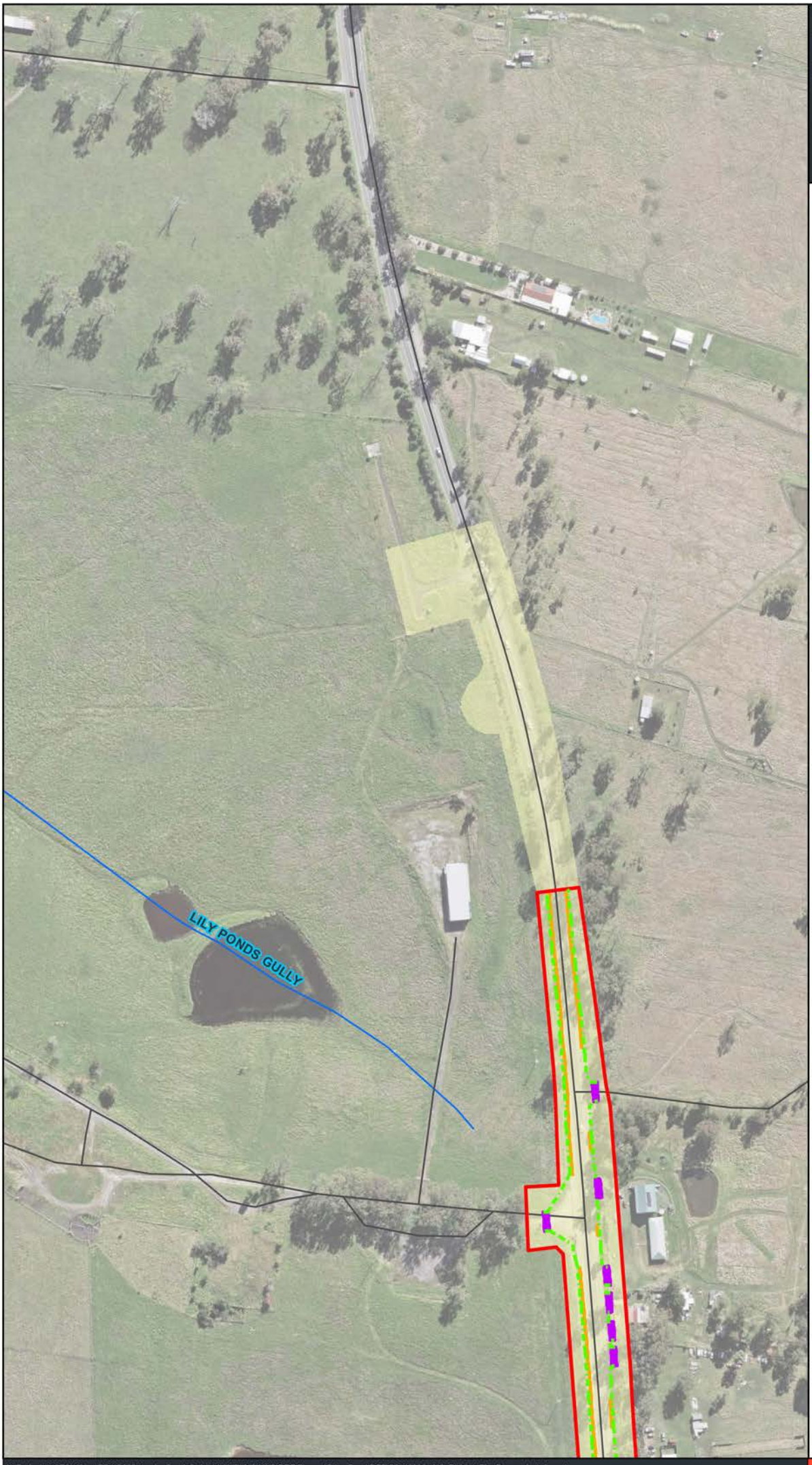

Ousedale Creek Koala Underpass (formerly Brian Road Intersection Upgrade)

Figure 1-2
The Proposal

Legend

- Escape Pole and Escape Hatches
- Refuge Pole
- Roads
- Brian Road Temporary Road
- Fauna Furniture Fauna
- Underpass Road Safety
- Barrier
- Koala Grid
- Fauna (Koala) Fence
- Indicative Ancillary Sites
- Proposal Site
- Original Proposal Boundary

Map 1 of 2

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

1:3,300 Date: 29/01/2025

Data sources: - DNRME, TMR, Translink, Geoscience

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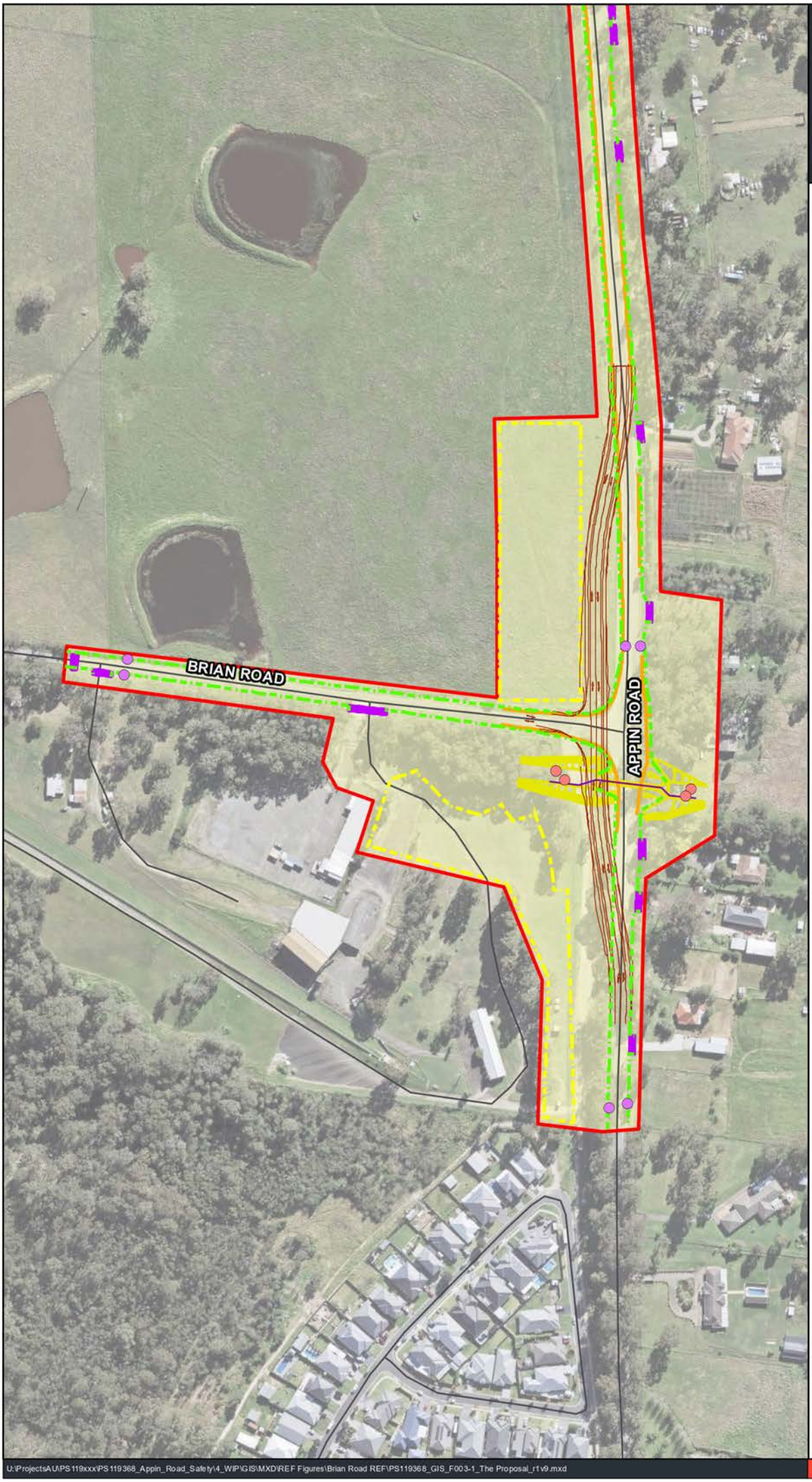

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Ousedale Creek Koala Underpass (formerly Brian Road Intersection Upgrade)

Figure 1-2
The Proposal

Legend

- Escape Pole and Escape Hatches
- Refuge Pole
- Roads
- Brian Road Temporary Road
- Fauna Furniture Fauna
- Underpass Road Safety
- Barrier
- Koala Grid
- Fauna (Koala) Fence
- Indicative Ancillary Sites
- Proposal Site
- Original Proposal Boundary

Map 2 of 2

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A4

1:3,300 Date: 29/01/2025

Data sources: - DNRME, TMR, Translink, Geoscience

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2. Response to issues

Transport received 104 submissions, accepted up until the 25 February 2023. Table 2-1 lists the submissions and the allocated submission number. The table also indicates where the issues from each submission have been addressed in Section 2 of this report.

Table 2-1 Submissions

Respondent	Submission No.	Section number where issues are addressed
Community submissions		
Individual community members	1, 2, 3, 4 ,5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 62, 63, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 83, 84, 85, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103	2.2.1, 2.2.2, 2.3.1, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.8, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.8.1, 2.9.1, 2.10.1, 2.10.2, 2.10.4
Special interest and community groups	16, 59, 60, 61, 69, 82, 89	2.2.1, 2.2.2, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.7, 2.4.8, 2.6.1, 2.6.2, 2.7.1, 2.10.1
Government agency	104	2.3.2, 2.6.3, 2.7.1, 2.10.3

2.1 Overview of issues raised

A total of 104 submissions were received in response to the display of the REF. This included one submission from a government agency, seven submissions from key interest and community groups and 96 from the general community.

Each submission has been examined individually to understand the issues being raised. These issues have been categorised and responded to. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and Transport's response to these issues forms the basis of this chapter.

Of the 104 submissions:

- 5.8 per cent were supportive of the activity
- 10.6 per cent were supportive but raised some concerns
- 59.6 per cent objected to a certain aspect of the proposal
- 16.3 per cent objected to the proposal
- 7.7 per cent only raised matters out of scope.

Of the 104 submissions, 97 submissions raised matters within the scope of the proposal and this submissions report. Of these 97 submissions, 25 submissions raised matters not directly related to the proposal as well as explicitly raising matters within the scope of the proposal.

A sumary of the supportive, partially supportive, non-supportive and out of scope matters raised in these submissions from the community, special interest groups, and government organisations is provided in Table 2-2.

Table 2-2 Summary of the main issues by respondent group

Issue	Issue summary	Respondents
The project	• expressed support for the entire project or aspects of the project • questioned the need and justification of the proposed roundabout	Individual community members, community interest groups, government agency
Project development	• questioned the option assessment • questioned the design development	Individual community members, community interest groups
Brian Road Intersection Upgrade REF	• questioned the accuracy of the REF • requested the environmental assessment consider the National Parks and Wildlife Service (NPWS) policy	Individual community members, government agency
Biodiversity	• raised general concern for koalas and habitat loss • requested for the proposal design to follow expert advice including the NSW Office of the Chief Scientist and Engineer (OCSE) and the Cumberland Plains Conservation Plan (CPCP) • requested that the proposed underpass be removed from the scope entirely, or refined to promote connectivity for koalas and other wildlife rather than fragmentation • requested that the proposed koala exclusion measures such as the fencing and grids be removed from the scope entirely, or refined to promote connectivity for koalas and other wildlife rather than fragmentation • requested specific biodiversity offset measures	Individual community members, community interest groups
Traffic	• questioned the impacts of traffic and transport • raised concern about general traffic impacts associated with the roundabout • raised concern for the safety of road users and requested additional safety measures • raised concern about space being made for active and public Transport and requested a dedicated shared path	Individual community members
Planning and land use	• questioned the property acquisition and lease strategy • requested the proposal be designed and constructed in coordination with the surrounding development • expressed concern about the construction activities on NPWS land	Community interest groups, government agency
Consultation	• request for further consultation	Community interest groups, government agency
Noise impacts	• expressed concern about the construction noise impacts on sensitive receivers	Individual community members
Hazards and risks	• expressed concern about hazards and risks associated with constructing on mine subsidence land	Individual community members

Issue	Issue summary	Respondents
Other	• commented on other proposed or approved work not subject to the REF or this submissions report • requested other upgrades to Appin Road or other nearby infrastructure be included in the proposal scope • expressed concern about soil and erosion impacts and requested appropriate mitigation measures	Individual community members, community interest groups, government agency

Of the 104 submissions, 39 were one of two different form letters. Form letter one was submitted 34 times and form letter two was submitted five times.

A total of 16 submissions expressed support for the project either generally or regarding a specific feature of the proposal including the underpass, koala exclusion fencing and roundabout. Submissions supported the need for and justification of the proposal but suggested that design changes were necessary. Submissions expressing support for the proposal are noted. A response to submissions that support the proposal but questioned some technical aspects of the design have been provided in the following sections.

Submissions supporting the proposed roundabout at the Brian Road intersection were noted. However, the updated proposal scope no longer includes the construction of a roundabout at this intersection. Details regarding the updated scope are discussed in Section 1.1.

2.2 Issue 2: Needs and options conisidered

2.2.1 Roundabout need and justification

Submission number(s)

2, 4, 5, 6, 7, 9, 12, 13, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 32, 34, 35, 36, 38, 39, 40, 42, 47, 49, 50, 52, 69, 99

Issue description

Submissions questioned the need for the proposed roundabout at the Brian Road intersection. Submissions criticised the justification that it would provide a more efficient and safer intersection. Submissions expressed a range of concerns including:

- it would be a waste of funding
- it does not align with the broader work proposed and approved along Appin Road, particularly the Appin Road Upgrade project (Appin Road Upgrade, Mount Gilead to Ambervale) which includes road duplication to establish a dual carriageway
- current traffic demands at the intersection do not warrant a roundabout
- the roundabout would worsen safety and efficiency for freight trucks, motorcyclists and cyclists
- the roundabout design is biased towards mass landowners and has been designed to accommodate future development and truck usage rather than to support the local community's needs
- the justification for the proposed roundabout is corrupt and will damage the NSW government's reputation.

Some submissions stated that if the roundabout was further pursued, it should be funded by local developers rather than the Australian government.

Submissions requested the roundabout be removed from the proposal scope. Some submissions suggested the proposed roundabout be changed to a signalised intersection to accommodate future growth in the area.

Response

Transport has considered submissions opposing the proposed roundabout at the Brian Road intersection questioning its need and justification. In response to these concerns, the scope of the proposal no longer includes a roundabout. For this reason, the proposal has been renamed to the Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection

Upgrade proposal). Changes to the project are further discussed in Section 3 of this submissions report. The key changes to the proposal are discussed in Section 3.

2.2.2 Options and design development

Submission number(s)

89, 95

Issue description

Submissions requested the REF clarify who the four underpass options were assessed by. Submissions stated that Lendlease should not be influencing the underpass design.

Response

The options assessment was conducted by WSP in collaboration with Transport as outlined in Section 1.2 of the REF. Lendlease is not involved in the design nor the delivery of the Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal).

2.3 Issue 3: Brian Road Intersection Upgrade REF

2.3.1 Accuracy of the REF

Submission number(s)

68

Issue description

A submission questioned the accuracy of the REF, particularly regarding the location of the proposal site. The concerns included:

- the REF suggests the proposal is next to Dharawal National Park and the Georges River when rather the proposal site is 3km away from Dharawal National Park and 300m from the Georges River
- figures in the REF are inaccurate as they show Lysaght Road which is not in use.

Response

The project site is adjacent to CPCP 'avoided land' on the eastern side which extends into bushland within Dharawal National Park. While it is noted that Dharawal National Park is not directly adjacent to the proposal site, it was mentioned in the REF to provide context.

After confirming the claims that Lysaght Road is not a public road, it has been removed from all the relevant figures within this submissions report.

2.3.2 Impact assessment

Submission number(s)

104

Issue description

One submission requested the environmental assessment consider the NPWS Developments adjacent to NPWS lands: Guidelines for consent planning authorities (NPWS 2020).

Response

Currently there is no land reserved under the NPW Act adjacent to the proposal. Transport acknowledges that this may change in the future. Although the mitigation measures were developed without specific reference to the NPWS developments adjacent to NPWS lands: Guidelines for consent planning authorities (NPWS 2020), they are in general accordance with the requirements.

2.4 Issue 4: Biodiversity

2.4.1 Concern for koalas

Submission number(s)

10, 17, 24, 68, 82, 95

Issue description

Submissions expressed general concern for koalas due to the construction and operation of the proposal. Submissions raised specific concerns including:

- who would be responsible for rescuing animals displaced by the proposal, stating that the government must take responsibility
- noise and light pollution impacts, requesting the construction work occur between 9 am and 4 pm to limit the noise and light pollution impacts on fauna and follow the National Light Pollution Guidelines for Wildlife (DCCEEW 2023)
- pollution from cars using Appin Road.

Submissions stated that the impacts on koalas are significant enough to warrant an Environmental Impact Statement under Section 5.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), or a Species Impact Statement or Biodiversity Development Assessment Report (BDAR) under Section 7.8 of the *Biodiversity Conservation Act 2016* (BC Act).

Response

One of the key features of the updated Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal) is to limit vehicle strikes by providing safe passage for koalas underneath Appin Road. Given the updated proposal no longer includes the construction of a roundabout, any perceived or potential impacts due to its construction on koalas and habitat would not occur. The proposal is expected to result in the removal of 5.96ha of vegetation, including 2.59ha of native vegetation. The management measures and safeguards would minimise these impacts as much as reasonably possible. Further, the proposal is expected to improve the protection of the local koala population. The proposed Ousedale Creek Underpass would support the connectivity of the corridor and allow koalas to travel underneath Appin Road safely. The other features of the proposal including the koala exclusion fencing, koala grids, escape poles and escape hatches would aim to reduce the risk of vehicle strikes.

Transport would be responsible for ensuring impacts to biodiversity are mitigated. A Flora and Fauna Management Plan (including koala focus) will be prepared in accordance with Transport's Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport from NSW Projects (Transport 2024) and The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development (DPE 2022). It would be implemented as part of the Construction Environment Management Plan (CEMP). The Plan would be used during construction and would be monitored closely by the site management team. Before vegetation removal within the proposal site, a suitably qualified ecologist must assess the subject land and conduct pre-clearance surveys for koalas. If koalas are identified, a tree-felling protocol would be implemented along with a translocation plan where required. Community members would not be required to carry out this work.

Light pollution during construction was considered in the impact assessment. Construction activities would be scheduled predominantly between standard work hours, these being between 7 am and 6 pm on Monday to Friday and 8 am to 1 pm on Saturday. Further, these standard working hours would occur outside of the typical nocturnal periods of most animals and as such would not interrupt behaviours such as foraging. During peak periods, out-of-hours work may occur to reduce traffic impacts. This work would require additional lighting to ensure the safety of workers and drivers. Management measures and safeguards to limit noise and vibration impacts have been detailed in Section 7.2 of the REF. These include the preparation and implementation of a Construction Noise and Vibration Management Plan (CNVMP) that will contain a comprehensive night work approval procedure. The temporary lights are typically white in nature and would be designed to prevent light spills.

The lighting design would be in accordance with Australian Standard 4282-1997 Control of Obtrusive Effect of Outdoor Lighting (AS Standards 1997). The National Light Pollution Guidelines for Wildlife (DEECCW 2023) references AS4282-1997 and advises that they should be followed to meet the required guidelines. As outlined in Section 6.1.4 of the REF, shading and artificial light impacts as well as noise impacts will be minimised wherever practicable during construction. Concern for koalas' health due to vehicle pollution is acknowledged. However, the use of Appin Road is not expected to change because of the proposal. As such, vehicle pollution would not exceed what is currently being produced once the proposal is operational.

The REF was prepared to fulfil the requirements of Section 5.5 of the EP&A Act including that Transport examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment because of the activity. Section 7.3 of the BC Act requires that the significance of the impact on threatened species and endangered ecological communities is assessed using a 5 part test to determine if a Species Impact Statement or BDAR is required. This assessment concluded that the impacts on Threatened Ecological Communities (TECs) and threatened species are unlikely to be significant. As such, neither a Species Impact Statement nor a BDAR is required to support the proposal.

A Flora and Fauna Management Plan would be developed and implemented to ensure the safety of koalas during construction. This will include safeguards such as temporary koala exclusion fencing, traffic calming measures and hygiene procedures. These safeguards were provided in Table 7-1 of the REF. Additional safeguards have been added in response to the submission received. A consolidated list of the safeguards is provided in Table 5-1 of this submission report.

2.4.2 Proposed Ousedale Creek Underpass

Submission number(s)

14, 19, 24, 56, 57, 58, 59, 60, 61, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103

Issue description

Some submissions opposed or questioned the need for the underpass and the design. Concerns raised in submissions included:

- underpasses are an ineffective method of preserving connectivity across major linear infrastructure
- historic and future vegetation clearing and land use change within the vicinity of the proposal limits koala habitat
- it should connect to a corridor that is at least 425m wide
- it is too narrow and long
- it is not suitable for other wildlife such as kangaroos and wallabies.

Submissions raised concern about the location of the underpass stating there are too many surrounding constraints including the proposed roundabout, Appin Way Greyhound Track, Delta Force Paintball, Macarthur Motorcycle Club and Appin Road itself. Submissions suggested that the surrounding land uses limit the extent of the Ousedale Creek Corridor and the functionality of the underpass.

Submissions stated the underpass should be straight to ensure a clear line of sight. Submissions suggested that both the underpass and fauna furniture be managed to ensure it remains dry and does not attract predators.

Response

As per the updated proposal scope, Transport is proposing to construct the Ousedale Creek Underpass, a koala-friendly crossing under Appin Road near Brian Road. The crossing is crucial to provide safe koala passage between the proposed national park along the Georges River and koala habitat on the western side of Appin Road. Each of the east-west corridors was considered by the OSCE and the CPCP has relied on this advice in determining the most effective corridors for safe koala movement. Following the construction of the underpass, a vegetated fauna path would be established to link the entrances of the underpass to the surrounding habitat.

Future urban development in the region is guided by a strategic conservation planning approach that identifies certified urban capable land and distinguishes it from avoided land or transport corridors. This approach aims to avoid and minimise impacts on biodiversity values, particularly the koala corridors identified in the CPCP. Transport acknowledges the challenges associated with the historic vegetation clearing in the area.

DPHI is committed to creating new public reserves and private conservation lands to connect important areas of habitat to help restore degraded landscapes and boost the Ousedale Creek Corridor. To achieve this, DPHI are progressing with land acquisitions in the area, including on either side of the proposed underpass, to connect to the proposed national park along the Georges River and the Ousedale Creek habitat corridors in accordance with the CPCP. While these activities are anticipated to enhance the effectiveness of the proposed underpass, they are outside the scope of this proposal. Based on feedback received from the public exhibition of the REF, modification of the crossing structure is proposed. The underpass proposed in the REF was a reinforced concrete pipe 2.4m in diameter and 36m long. The underpass has been redesigned to a reinforced concrete box culvert 3m wide and 2.4m high. A more detailed description of these changes is provided in Section 3.2. The Chief Scientist does not provide advice on the required dimensions of the underpass. To assist in the movement of wildlife through the underpass, fauna furniture has been included in the design.

While concern for other species is noted, the priority for the proposed wildlife protection measures is koalas. In raising concerns about the suitability of the underpass for other species, some submissions referred to *Roads and macropods: Interactions and implications* (Blacker and Jones 2014). While this article suggests standard dimensions of 3m by 3m, it states that kangaroos and wallabies can use culverts as small as 1.2m by 2.4m. Use by macropods of a range of culvert sizes is confirmed by Transport monitoring data. See Biodiversity | Transport for NSW. The previously narrow channelised drainage swale on the western side of the culvert has also been widened and opened to better funnel koalas into the underpass.

While the surrounding land use constraints are noted, the location of the Ousedale Creek Underpass was considered to meet the proposal objectives and was the best out of the four options. The four options were analysed in terms of their ability to provide east-west connectivity, surrounding property, cost value and utilities. The options assessment is presented in Section 2.4 of the REF.

The proposed underpass is straight, ensuring line of sight to either end for wildlife is maintained. Transport would be responsible for continuing maintenance and upkeep of the proposed underpass, fauna furniture and fauna refuge poles. The effectiveness of the underpasses would be monitored using cameras once constructed to ensure the needs of the project have been met.

2.4.3 Consistency with expert advice – underpass design

Submission number(s)

53, 54, 55, 57, 59, 60, 64, 65, 66, 67, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103

Issue description

Submissions requested the Ousedale Creek Underpass be redesigned in accordance with best practice Transport and NPWS policies as well as the CPCP and the OCSE. Submissions requested the proposal acknowledge the National Koala Recovery Plan (DAWE 2022) and the NSW Koala Strategy (DPE 2022a). Submissions also requested:

- an increase in the underpass diameter
- the design reduces the impact of threats, light and noise on koalas.

Response

The location of the crossing was identified in the CPCP along the corridor. The advice provided by the OCSE states that infrastructure that cuts across a designated corridor should include an underpass or overpass to enable the movement of koalas along the corridor (Chief Scientist & Engineer 2020). They suggest that the underpass should be designed to maximise the likelihood of koala use by including attributes such as a clear line of sight, avoidance of predator death traps, keeping dry, including furniture such as logs and being as big as possible (Chief Scientist & Engineer 2021a).

The underpass proposed in the REF was a reinforced concrete pipe 2.4m in diameter and 36m long. To address community feedback, the underpass has been redesigned and would be a reinforced concrete box culvert 3m wide and 2.4m high. A more detailed description of these changes is provided in Section 3.2. Culverts, typically concrete box culverts, have been installed on many roads around Australia and the world to facilitate the movement of wildlife under roads. Concrete box culverts are a standard installation option in NSW and Queensland for koalas, with many studies and evaluations showing they are readily used by the species. The larger size of the box culvert compared to the pipe should benefit Koala connectivity as evidenced by TfNSW monitoring showing successful koala use of these structures. The previously narrow channelised drainage swale on the western side of the culvert has also been widened and opened to better funnel koalas into the underpass.

Fauna rails are included in the underpass design to allow koalas to climb up and out of reach of predators and remain dry. Koala use of the underpass would be subject to monitoring programs using cameras which could provide information on predator presence.

Submissions expressing concern over the noise and light impacts on koalas using the underpass are noted. Given the existing noise levels along Appin Road, wildlife within the habitat surrounding the road would possess some tolerance to increased anthropogenic disturbances. It is unlikely there would be a significant impact because of noise and light pollution once the road is operational.

2.4.4 Consistency with expert advice – location and connectivity

Submission number(s)

13, 53, 54, 55, 57, 59, 60, 64, 65, 66, 67, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 96, 97, 98, 100, 101, 102, 103

Issue description

Submissions stated that Transport should implement all underpasses recommended by the Chief Scientist. Some submissions suggested that the underpass be located at Mallaty Creek or at Mount Gilead.

Submissions also requested the following measures in accordance with OCSE expert advice:

- installing multiple culverts to maximise connectivity
- extend koala habitat to Appin Road
- consider land purchases to complete the corridor.

Response

The OCSE considered each of the east-west corridors and provided advice. The CPCP relied on this advice in determining the most effective corridors for safe koala movement. The Ousedale Creek Corridor was identified in the OCSE as the preferred east-west connection allowing koala movement between the Georges River and Nepean River habitat corridors as it has the most intact habitat. Further, the CPCP conservation program's commitments and actions specific to protect the Southern koala population were developed and based on advice from the OCSE (2020 and 2021) and the NSW Koala Strategy 2018-21.

The vegetation along Mallaty Creek does not meet the requirements of an effective koala corridor with average widths ranging between 200-300m, short of the recommended average minimum width. The OSCE also noted several constraints on the viability of the vegetation along Mallaty Creek given the bisecting aqueduct, powerlines, gas lines and a proposed busway (Chief Scientist & Engineer 2020).

The OSCE recognises the importance of installing multiple underpasses to provide several routes underneath Appin Road. The Appin Road Upgrade to the north of the proposal includes the installation of two underpasses located at Noorumba Reserve and Beulah Biobank, to help facilitate east-west connectivity. These underpasses and the proposal are expected to provide cumulative benefits and support the connectivity of koala habitats within the CPCP area. As such, in line with OCSE advice, Mallaty Creek should be fenced to exclude koalas with remnant vegetation to be retained and protected as avoided land under the CPCP to retain the biodiversity and amenity values.

Following the construction of the underpass, revegetation work would take place to establish a vegetated fauna connection between the underpass, the proposed national park along the Georges River and koala habitat on the western side of Appin Road. Revegetation work for this purpose would be outlined in the Urban Design and Landscaping detailed design and Biodiversity Offset Strategy for the proposal. The plans would include a focus on koalas to ensure the connectivity of the Ousedale Creek Corridor and surrounding koala habitat.

DPHI are progressing with land acquisitions, including on either side of the proposed underpass, to connect to the Koala National Park along the Georges River and the Ousedale Creek corridors. These activities are outside the scope of this proposal.

2.4.5 Requests for other wildlife connectivity measures

Submission number(s)

29, 54, 55, 57, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 79, 80, 81, 83, 84, 85, 86, 87, 88, 89, 90, 91, 94, 95, 100, 102, 103

Issue description

Submissions requested other wildlife crossing structures either in addition to the underpass or instead of it including:

- overpasses
- raised bridges
- glider poles
- multiple underpasses to provide alternative routes across Appin Road.

Response

Connectivity measures for arboreal fauna, such as rope bridges and glide poles, have not been provided at this location given the lack of continuous tree canopy near the road. Over time, the planned revegetation work as part of this project and the broader CPCP revegetation efforts for the Ousedale Creek Corridor could indicate that providing arboreal connectivity could be worthwhile.

The Appin Road Upgrade to the north of the proposal includes the installation of two underpasses to facilitate east-west connectivity. These underpasses and the proposal are expected to provide cumulative benefits and support the connectivity of koala habitats within the CPCP area. While the proposal includes revegetation work to establish a fauna path expanding habitat to connect the underpass to koala habitat, widening other corridors is not within the scope of Transport projects.

2.4.6 Koala exclusion fencing

Submission number(s)

14, 17, 51, 68, 99

Issue description

Submissions expressed concern over the design of the koala exclusion fencing such as:

- it will further fragment koala habitat instead of providing connectivity
- it is not tall enough to stop larger animals from jumping over
- it does not extend further south along Appin Road
- could increase the likelihood of mortality in the event of a bushfire.

A submission stated that koala exclusion fencing needs to be cyclone-proof to limit maintenance and the potential for gaps to form in the fence.

Response

The Ousedale Creek Corridor has been identified by the OCSE as the preferred east-west corridor link between the Georges and Nepean Rivers. This is because this corridor has the most intact koala habitat. The proposed koala exclusion fencing would redirect koalas away from Appin Road to the underpass which would provide for safe access under Appin Road.

The proposed koala exclusion fencing is considered best practice and has been designed in consultation with koala experts and DPHI. The slippery top design has been tested in a feasibility study outlined in the CPCP Sub Plan B: Koalas (NSW Department of Planning and Environment (DPE) 2022c). It consists of a fence 1.5m tall with a 60cm steel or heavy plastic sheeting attached towards the top of the fence on the side of the koala habitat. The proposed fence design is an alternative to the floppy-top fence design. The NSW Government is shifting away from using the floppy top design due to cost, difficulty fixing damages and other urban design considerations (NSW DPIE, 2020).

Gates and grids would be included in the fence to support landholder access and to assist fauna to escape during bushfires. DPHI is consulting with key agency and delivery partners including RFS and NPWS, to help manage fire in strategic locations on conservation land within the CPCP area.

Fence end effects have been considered. The koala exclusion fencing would extend for approximately 250m south of Brian Road intersection north to connect to the Appin Road Safety Improvements project and west 260m along Brian Road. Transport also notes DPHI are investigating solutions to address concerns over fence end effects that were raised during the public display of the REF.

Transport would be responsible for continuing maintenance and upkeep of the proposed koala exclusion fencing to ensure it continues to meet the proposal objectives over time.

2.4.7 Koala grids

Submission number(s)

82

Issue description

Submissions requested extra koala grids be added to either end of the fence across Appin Road and Brian Road.

Response

As per the updated scope, koala grids have been proposed at existing driveways and across Brian Road at the fence limits. Grids across Appin Road would not be feasible as it would create a safety risk for road users.

2.4.8 Offsetting

Submission number(s)

53, 54, 55, 56, 57, 59, 60, 68, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 91, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103

Issue description

Submissions expressed concern with the current offset strategy outlined in the REF. They stated given the surrounding vegetation is a key habitat for koalas that the Transport Conservation Fund is not a suitable mitigation measure. Submissions requested that all trees including hollow-bearing habitat trees should be physically replaced within the vicinity to ensure the region remains a suitable habitat for koalas.

Response

While the removal of vegetation required to deliver the proposal has the potential to impact koala habitat, the proposal is expected to produce an overall benefit to koalas by increasing the east-west connectivity of the Ousedale Creek Corridor.

Submissions requesting local tree plantings are prioritised in the Biodiversity Offset Strategy have been considered. The biodiversity impact assessment has considered the impacts on native vegetation and the subsequent offsetting requirements. In accordance with Transport's No Net Loss Guidelines, the offset threshold is triggered given the proposal involves the clearing of Critically Endangered Ecological Community (CEEC). In accordance with Transport's Tree and Hollow Replacement guidelines, a planting minimum of 278 trees would be required to offset the loss of vegetation and habitat due to the proposal (Transport 2023). None of the trees were identified as habitat trees. As such, hollow replacements are not considered necessary. Transport would prepare and implement a Biodiversity Offset Strategy to address these requirements. Ideally, tree and hollow replacement work would take place within the subject land. Contribution to the Transport Conservation Fund would only occur if it is not possible to meet the replacement requirements within the proposal boundary or land in proximity to the proposal.

Other biodiversity safeguards would aid in the re-establishment of native vegetation during construction. As outlined in Table 6-3 of the REF, native vegetation would be planted in accordance with *Guide 3 of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects* (Transport 2024). This would be achieved by managing site conditions, material servicing and procurement, and seed and plant stock installation and establishment.

It would involve inspection, monitoring and maintenance of the site in accordance with the Landscape Management Plan, a revegetation strategy detailed in the Biodiversity Offset Strategy, and maintenance specifications.

2.5 Issue 5: Traffic

2.5.1 Impact assessment approach

Submission number(s)

68

Issue description

Submissions expressed concern that the traffic and transport assessment has not considered the expected population growth in the area.

Response

Concerns regarding the traffic and transport impact assessment have been noted. The assessment evaluated two scenarios including the existing Brian Road T-intersection layout and the proposed single-lane roundabout layout. Traffic modelling was undertaken for peak periods to account for the worst-case scenario. It was advised by Transport that the proposed intersection upgrade was not expected to result in additional traffic impacts. Additionally, given the proposed rezoning surrounding the site has not been approved yet, there is no clear prediction of the population growth rate. As such, no traffic growth rate was applied to estimate future traffic volumes after the completion of the work. Further, given the proposed intersection upgrade is no longer included in the scope of work, the traffic and transport impact assessment of the intersection no longer applies.

2.5.2 Operational traffic impacts

Submission number(s)

4, 10, 14, 17, 20, 22, 24, 25, 29, 30, 39, 47, 50, 99

Issue description

Submissions expressed concern that the proposed roundabout would have significant traffic impacts, stating that the traffic is already bad during peak periods. Several submissions attributed these traffic impacts to the reduced speed proposed at the intersection.

Response

Section 6.3.3 of the REF outlined that while there would be some delay associated with the construction and operation of the proposal, impacts would be limited. Further, the Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal) no longer includes a roundabout and associated upgrades to the intersection. As such, the revised proposal would not change the current operation of Appin Road. The initially proposed 50km/h speed limit at the intersection would no longer apply. The speed limit would remain at 80km/h. A consistency review of the traffic and transport assessment presented in the REF is detailed in Section 4.3 of this submissions report. Further, significant traffic impacts are not expected to enhance hazards associated with bushfire events.

2.5.3 Safety

Submission number(s)

8, 15, 40, 99

Issue description

Some submissions stated that the proposed roundabout could lead to more accidents along Appin Road, stating that the sudden change in speed from 80km/h and 50km/h is dangerous. A submission stated that the speed is not well signposted.

A submission requested the roundabout be designed to include specific safety features. These included:

- 25km/h speed limit at the roundabout
- high grip pavement
- traffic cameras
- no vegetation around the roundabout.

Response

Given the proposed Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal) no longer includes a roundabout and associated upgrades to the intersection, the safety concerns and suggested safety measures are no longer relevant. The speed along Appin Road within the proposal site would remain 80km/h. This speed limit is less than the minimum design criteria for Appin Road, and as such is considered a safe speed.

2.5.4 Active/ public transport

Submission number(s)

37, 41

Issue description

Submissions questioned what safety considerations have been made for pedestrians and cyclists along Appin Road. Submissions requested a dedicated separate shared path for pedestrians and cyclists to ensure safety, encourage active transport in the area and stimulate the local economy. Another submission requested the intersection upgrades be designed in collaboration with Bicycle NSW or Cycling Australia.

Response

Appin Road has no dedicated pedestrian and cycling facilities within the proposal. Implementing a shared path to accommodate pedestrians and cyclists would require the widening of the current road. This would require considerable removal of vegetation and would encroach into private property. These impacts would not be in keeping with the objectives of the proposal to minimise social and environmental impact. Further, the installation of a shared path within the project area would have minimal benefits as it would not connect to a shared path beyond the project extent along Appin Road.

The proposal was shown to still meet the safety objectives of the project outlined in 2.3.1 of the REF. While the proposal does not include the installation of a shared path, the proposal does not preclude pedestrian and cyclist access along the road. Pedestrians currently make use of the road shoulder and cyclists currently use the trafficable lanes. Given the proposal no longer includes intersection upgrades, collaboration with Bicycle NSW or Cycling Australia is not considered necessary.

2.6 Issue 6: Planning and land use

2.6.1 Property acquistion and lease

Submission number(s)

69

Issue description

A submission requested that the proposed partial acquisition and temporary lease for the construction of their property be reviewed.

Response

Private lands are being acquired for the project's construction and to ensure a functional corridor with no barriers affecting the use of the future underpass by koalas. The Office of Strategic Lands (OLS) which manages the Planning Ministerial Corporation is currently looking to aquire the land for the future national park along the Georges River. It is unlikely that the road infrastructure, including the koala underpass, would form part of the land to be reserved under the NPW Act. If that changes in the future, Transport would seed authorisation from NPWS under the NPW Act or the *National Parks and Wildlife Regulation 2019.*

2.6.2 Surrounding development

Submission number(s)

69

Issue description

A submission requested that the proposal be consistent with future urban development in the area, particularly the rezoning of 345 Appin Road, also known as the Appin (part) precinct. Appin (part) precinct will provide up to 12,900 new homes, regional open space and local centres. The submission stated that as part of this future development, a major upgrade to the intersection of Appin Road and Brian Road would be necessary to accommodate population and traffic increases. The submission stated that this would likely include an upgrade to a signalised intersection and expressed concern that the proposed upgrades to the intersection as presented in the REF would waste both time and money.

Response

While the future development within the region was acknowledged throughout the design and assessment of the proposal, adjacent projects subject to development applications are not within the scope of this proposal. Regardless, the Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection proposal) no longer includes an upgrade to the intersection. As such, any potential future adjacent development that requires the use of this intersection would not be impacted. The revised scope including the underpass, koala exclusion fencing and associated koala protection measures is also unlikely to impact future development.

2.6.3 Future land reservation under the National Parks and Wildlife Act 1974

Submission number(s)

104

Issue description

NPWS questioned if any key features of the proposal would be located in the proposed national park along the Georges River. They also stated that access to or works within land reserved under the NPW Act cannot occur as part of this proposal unless authorisation is granted by NPWS under the NPW Act or the *National Parks and Wildlife Regulation 2019.*

NPWS stated that if construction were to occur on land reserved under the NPW Act, clear direction regarding authorised and restricted access as well as appropriate mitigation measures must be provided as part of all documents including the CEMP. They stated that the CEMP should also include incident management measures should the construction of the proposal directly impact the park.

Response

The koala exclusion fencing and the koala grids are located along Appin Road and would not extend beyond the road corridor. The proposed Ousedale Creek underpass is located on private land that is currently being aquired by the Office of Strategic Lands (OSL). This aquistsion is being funded by DPHI (formally DPIE) under the CPCP. DPHI will transfer the land to NPWS for reservation under the NPW Act. This land may be subdivided in the future to zone the land where the underpass would be located as SP2 infrastructure. At this stage, it is unkrown whether Transport would require access to future NPWS land for the construction of this project. If the proposed national park along the Georges River is acquired and held under the NPW Act prior to the construction of the proposal, Transport would seek authorisation from NPWS under the NPW Act or the *National Parks and Wildlife Regulation 2019* if access to such land is required to construct the proposal.

The CEMP would clearly delineate areas with authorised and restricted access and all workers would be required to follow this plan. The CEMP would also outline protocols in the event the construction activities lead to an incident directly impacting neighbouring properties. This would include any land acquired by NPWS.

2.7 Issue 7: Consultation

2.7.1 Ongoing or future consultation

Submission number(s)

69, 104

Issue description

A submission requested further consultation with Transport to discuss the proposed Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal) and the content of their planning proposal. NPWS stated that the construction of the proposal triggers consultation under Section 2.15 of the Transport and Infrastructure SEPP. They requested that the details of koala exclusion fencing to the common boundary of NPWS land be confirmed in consultation with NPWS. NPWS stated that future notifications to NPWS can be provided via the NSW Planning Portal or via email to npws.envplanningadvice@environment.nsw.gov.au. They also requested that a final copy of the REF be provided to NPWS once the proposal is determined.

Response

A consultation strategy for the proposal was developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the project team. Initial communication and consultation activities began in November 2018 where activities focused on raising awareness amongst the community of the environmental and technical aspects of the proposal and ensuring they were consulted where appropriate.

Community and stakeholders were encouraged to provide feedback on the REF during its display period between 25 January 2023 and 24 February 2023. The community and stakeholders have been encouraged to contact the project team via phone 1800 684 490 or email projects@transport.nsw.gov.au for further information.

The need for consultation with NPWS in accordance with the Transport and Infrastructure SEPP is not required as the land for the proposed national park along the Georges River has not been acquired by NPWS and would not be acquired prior to the determination of this proposal. A final copy of the REF once determined will be available to NPWS.

Consultation will continue with all affected property owners throughout the project to mitigate any potential impacts.

2.8 Issue 8: Noise impacts

2.8.1 Operational noise impacts

Submission number(s)

68

Issue description

A submission requested the work take place between 9 am and 4 pm to limit noise impacts for residents.

Response

Construction activities would be scheduled predominantly between standard work hours, these being between 7 am and 6 pm on Monday to Friday and 8 am to 1 pm on Saturday. During peak periods, out-of-hours work may occur to reduce traffic impacts. Out-of-hours work would be subject to respite periods in the Transport Construction Noise and Vibration Guideline (Transport 2023). The type of respite period would be determined based on the impact of the works on each receiver. During night work, the majority of receivers predicted to exceed noise management levels would only be subject to low or moderate noise levels while up to 11 properties may be highly noise-affected. These impacts would be mitigated by the noise and vibration safeguards and management measures outlined in Section 6.2.4 of the REF and Table 5-1 of this submissions report.

2.9 Issue 9: Hazards and risks

2.9.1 Mine subsidence land

Submission number(s)

29

Issue description

A submission raised concern regarding the location of the proposal in relation to mine subsidence land.

Response

The REF has considered the risks associated with conducting the proposal on mine subsidence land and the required statutory consultation. Consultation with Subsidence Advisory NSW was completed which provided guidance on navigating these risks. The advice notes that the proposal should be designed to remain safe, serviceable and readily repairable under estimated subsidence design parameters between chain 975 and 4300. The proposal has been designed in accordance with this advice.

2.10 Issue 10: Other

2.10.1 Requests to widen Appin Road

Submission number(s)

1, 2, 4, 5, 6, 7, 11, 18, 25, 26, 34, 38, 40, 43, 44, 48, 50, 52, 69

Issue description

Submissions requested that the proposal scope be updated to include at least a dual carriageway. While some submissions requested only two lanes in each direction, others requested four lanes in each direction. A submission requested a multilane carriageway be constructed prior to surrounding development going ahead. Another submission stated that the shoulder widening and safety barriers are only a temporary measure and should not be pursued.

Response

Concerns regarding the current and future capacity of Appin Road have been considered. The Ousedale Creek Koala Underpass proposal (formally the Brian Road Intersection Upgrade proposal) aims to support the ecological function of the Ousedale Creek Corridor and improve safety for all road users by reducing the number and severity of crashes along Appin Road and minimise the social and environmental impacts of the proposal. Widening the road to accommodate a dual carriageway would require additional vegetation removal and acquisition of properties. While duplicating Appin Road to include at least a dual carriageway could potentially increase road efficiency and reduce traffic congestion, it would not be in keeping with the objectives of the proposal. As such, it is not within the scope of this proposal. The approved Appin Road Upgrade includes road duplication from a single to dual carriageway between Fitzgibbon Lane to approximately 2.5km south of Copperfield Drive and will help facilitate traffic flow along Appin Road.

The updated proposal scope no longer includes the construction of a roundabout at the intersection of Appin Road and Brian Road. The existing traffic configurations remain as per the revised scope and no longer include road widening. The safety barriers are essential to ensure the safety of all road users and property owners is maintained. The extent of these barriers is subject to the detailed design.

2.10.2 Other infrastructure upgrade requests

Submission number(s)

7, 9, 13, 15, 21, 23, 24, 36, 38, 42, 44, 45, 46, 48, 51, 63, 68

Issue description

Submissions suggested the following infrastructure upgrades:

- general upgrades along Appin Road including fixing the surface and to help with fire safety
- roundabouts at different locations along Appin Road
- signalised intersections along Appin Road
- an on and off ramp at Appin along Appin Road
- a bypass around Appin township
- construction of the Outer Sydney Orbital..

A submission expressed concern that the Brian Road intersection was going to be upgraded to a signalised intersection.

Response

The work that has been suggested within these submissions is not within the scope of the Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade proposal).

The approved Appin Road Upgrade project aims to improve road safety and road connectivity for all road users. The Appin Road Safety Improvements proposal aims to address current safety concerns along Appin Road. These two programs of work would help address some of the concerns raised in submissions in relation to upgrades to Appin Road.

The proposal is not expected to increase the safety risk for road users during bushfire events. Transport recommends road users follow the advice of the Rural Fire Service (RFS). Information on how to safely travel along roads within bushfire areas is available at https://www.rfs.nsw.gov.au/plan-and-prepare/travelling-in-a-bush-fire-area.

2.10.3 Soil and erosion

Submission number(s)

104

Issue description

A submission requested that sedimentation and erosion controls be utilised where necessary to not increase the risk of erosion or movement of sediment onto NPWS land. The submission also recommended the CEMP specify these required controls.

Response

Relevent soil and erosion safeguards were outlined in Section 6.8 of the REF. These safeguards include the preparation of Erosion and Sediment Control Plan/s to be implemented as part of the Soil and Water Management Plan. The Soil and Water Management Plan will then be included in the CEMP during the detailed design/ pre-construction phase. The Erosion and Sediment Control Plan/s will address any foreseeable risks in relation to soil erosion and water pollution, including those relating to NPWS lands and protected waterways. The plan will also outline how these risks will be addressed throughout construction. Transport will also consult with NPWS regarding any access work adjacent to or within their land. The operation and ongoing maintenance of the road would be consistent with the current use of Appin Road and would be managed using existing controls. There would be no expected increased risk of erosion or water pollution due to the work.

2.10.4 Other

Submission number(s)

68

Issue description

A submission expressed concern about gabion baskets under Kings Falls Bridge that was displaced during a flood.

Response

While concerns over the impacts of recent flooding events in the area are noted, they do not relate to and are outside the scope of the Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade proposal). DPHI and Transport are working to replace the existing ramps at this site with fauna furniture using natural logs 200mm in diameter to mimic trees and provide a crossing structure across the underpasses. The original crossing platforms were removed and replaced with horizontal logs in Feburay 2025. These changes aim to encourage koalas to use the crossing and resolve the damage caused to the original koala structures. Transport also installed vertical supports at either end of the underpasses within metres of vegetation.

3. Changes to the proposal

In response to submissions received following the display of the REF, several design changes were made to the proposal. These changes are detailed in Sections 3.1 to 3.5. An updated assessment and consistency review of the environmental impacts due to changes to the proposal are provided in Section 4. Overall, it is considered that the proposed changes would result in a positive outcome for the local community and the local Campbelltown koala population by reducing impacts whilst maintaining koala protection measures.

The key features of the updated proposal are shown in Figure 1-2.

3.1 Change 1: Single-lane roundabout

3.1.1 Description

The proposal as exhibited in the REF included a single lane roundabout at the intersection of Brian Road and Appin Road. The roundabout was initially designed to respond to growing safety concerns along Appin Road by transforming the right-hand turn intersection into a roundabout with a reduced speed of 50km/h.

To address the feedback around the justification of the proposed single-lane roundabout at the intersection, the roundabout has been removed from the proposal scope. The current traffic configurations would remain, including the right-hand turn lane and a posted speed along Appin Road of 80km/h.

The removal of the roundabout from the proposal scope aims to balance community feedback and engagement with maintaining the safety objectives of the proposal in other areas of the design. These include the Ousedale Creek Underpass, koala grids and koala escape poles. Further, the proposed koala exclusion fencing remains part of the proposal scope and would continue to assist in addressing safety issues by limiting the likelihood of crashes caused by striking an animal.

As a result of the roundabout removal, the proposed koala exclusion fencing at the intersection of Brian Road and Appin Road would be straightened to follow the existing path of Appin Road. The updated proposal scope is shown in Figure 1-2.

3.2 Change 2: Underpass

3.2.1 Description

To address feedback around the efficacy of the proposed round reinforced concrete pipe underpass (2.4m in diameter and 36m in length), the underpass at Ousedale Creek has been redesigned to incorporate a reinforced concrete box culvert 3m wide, 2.4m high and about 36m long. An example of a box culvert underpass is shown in Figure 3-1. The design of the underpass would be confirmed during detailed design.

Changes have also been made to the previously narrow ‘channelised’ drainage swale on the western side of the underpass. This has been widened to improve the likelihood of a koala finding the underpass and to avoid a steep batter on the southern side that could discourage koala access.

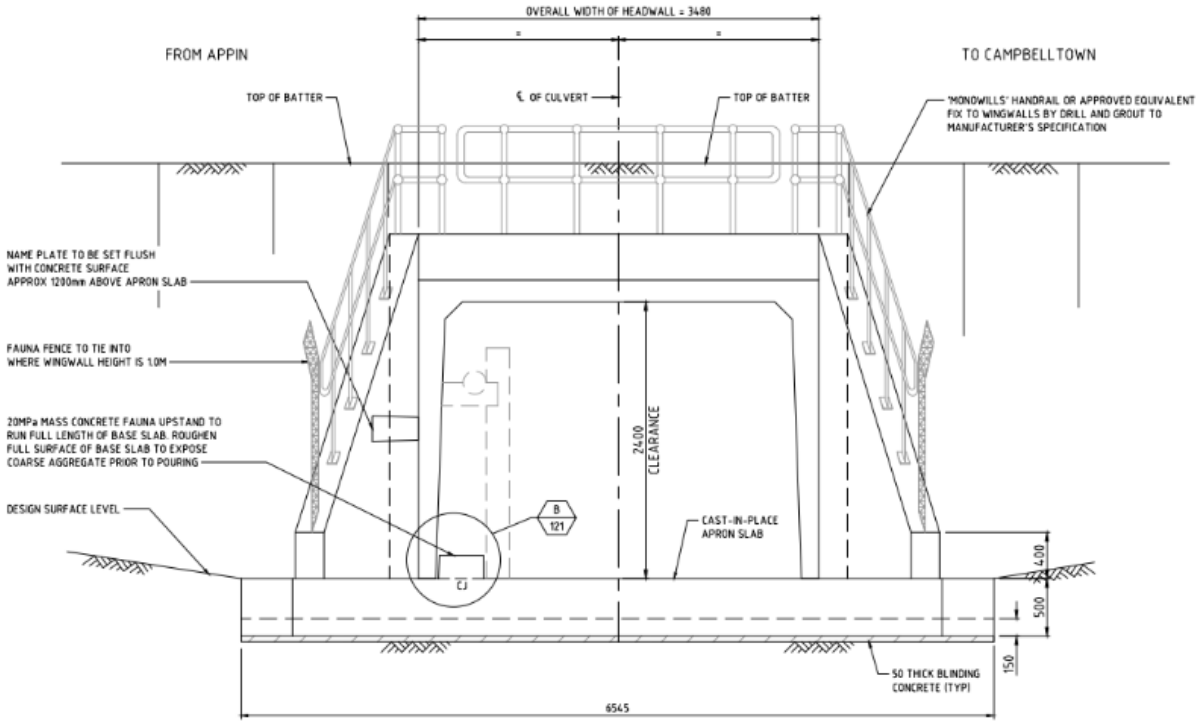

Figure 3-1 Typical box culvert underpass design

3.3 Change 4: Proposal footprint reduction

3.3.1 Description

The original design included koala exclusion fencing as far as chainage 950. To align with the Appin Road Safety Improvements proposal, the proposal site has been reduced to its northern limit. The koala exclusion fencing now extends only to chainage 720. The Appin Road Safety Improvements proposal includes koala exclusion fencing up until chainage 720. This design change ensures the koala exclusion fencing at the northern limit of the Ousedale Creek Koala Underpass proposal (fomally referred to as the Brian Road Intersection Upgrade) links to the southern limit of the Appin Road Safety Improvements proposal. The changes to the koala exclusion fencing and safety barrier are shown in Figure 1-2. As a result of this change, the overall proposal site at the northern extent is reduced by about 250m.

3.4 Change 5: Koala grids

3.4.1 Description

As outlined in Section 3.2.1 of the REF, the proposal includes the installation of koala grids where a break in the koala exclusion fencing is required for property access. This measure ensures that access to properties is maintained without compromising the effectiveness of the koala exclusion fencing. The koala grid would connect to the fauna fence to restrict fauna movement onto the road.

In addition to these koala grids, another grid would be provided across Brian Road around 260m west of the intersection in line with the end of the koala exclusion fencing to limit movement from the koala habitat to the road. These changes are designed to minimise koala vehicle strikes by restricting koala access to Brian Road. The location of this koala grid is shown in Figure 1-2.

Koala grids have not been proposed across Appin Road at the northern and southern extent of the proposal site. At the northern end of the site, the kola exclusion fencing would meet up with the koala exclusion fencing included in the Appin Road Safety Improvements proposal. Further, the koala exclusion fencing at the southern extent of the site would link up to existing property fences along Appin Road, limiting the need for another grid at this location.

The koala grids are based on a standard cattle grid design but have been modified by mounting vertical metal bars to the flat bearers to minimise the likelihood of koalas using the flat bearers to traverse the grid. An example of these grids is shown in Figure 3-2.

Figure 3-2 Example of grids to be installed across existing driveways and Brian Road with vertical bar on the bearers to discourage access

3.5 Change 6: Fauna escape poles, escape hatches and fauna furniture

3.5.1 Description

The Ousedale Creek Koala Underpass proposal (formally referred to as the Brian Road Intersection Upgrade) initially included the installation of refuge poles and tree logs at the fauna underpass entrances. These features of the proposal have been provided as a safety measure to help koalas escape predators.

In addition to fauna furniture at the entrances of the underpass, an elevated timber rail would extend the entire length of the underpass to provide a safe and dry passage for koalas when necessary. The elevated timber rail would be at a minimum of 1.5m above the ground and connect to the refuge poles at either end of the underpass.

Further, new koala escape poles and escape hatches have been proposed in the design changes to ensure that any koalas that are trapped along Brian Road and Appin Road can get over or under the fence. Escape poles and escape hatches would be located on either side of the road within 100m of the fence ends at the southern extent on Appin Road, within 100m of the fence end on Brian Road and within 100m north of the Brian Road intersection. The escape poles would be made from 200-300mm timber, with the centre of the outer (roadside) pole 300mm from the fence and the inner pole ending 1200mm above ground level. Both the outer and inner poles would extend above the horizontal connector to provide resting points. Escape hatches are a recently available innovation from Queensland and allow one-way passage of koalas under fence structures.

The location of the fauna escape poles and hatches, the updated fauna furniture location and refuge poles are shown Figure 1-2. Additional refuge poles would be installed between the underpass and the mature vegetation within the proposal boundary. The exact location and number of the refuge poles would be determined during detailed design.

4. Environmental assessment and consistency review

This chapter outlines the additional biodiversity assessment conducted in response to the changes to the proposal. It also outlines the consistency review conducted for noise and vibration, traffic and transport, and landscape character and visual impacts.

4.1 Biodiversity

4.1.1 Methodology

The methodology for the updated assessment of biodiversity impacts included:

- a desktop review of relevant database records and previous studies within the proposal site (a 10km buffer) of the proposal site) to identify Commonwealth and state-listed threatened species, populations and ecological communities field surveys undertaken for the proposal site, including:
  - plot-based vegetation survey of the proposal site using field survey methods in line with the Biodiversity Assessment Method (BAM) (OEH, 2017), including mapping of hollow-bearing trees
  - targeted flora and fauna surveys in September 2022 for threatened species
- a habitat assessment and likelihood of occurrence was undertaken for threatened and migratory species and endangered populations occurring in the proposed site
- an assessment of significance for threatened species and ecological communities identified during the field surveys or that are considered to have a moderate or high likelihood of occurring in the proposal site
- identification of impacts and associated mitigation measures to reduce and manage impacts.

4.1.2 Summary of additional study

The reduction of the project boundary at the northern end of the proposal site has resulted in reduced clearing requirements. An updated biodiversity assessment (Appendix A) was required to determine the biodiversity impacts of the revised proposal boundary, particularly in terms of vegetation removal. Updates to the biodiversity assessment were also required to address the design change to the dimensions of the koala underpass, as well as the additional koala escape poles, koala grids, koala escape hatches and fauna furniture included in the updated proposal scope.

4.1.3 Description of existing environment

The proposal site is located within the Cumberland subregion of the Sydney Basin Bioregion.

The native vegetation to the east of the proposal site has good connectivity to remnant native vegetation surrounding Georges River and the Wedderburn locality, which then extends into bushland within Holsworthy Military Reserve and Dharawal National Park. To the west, connectivity is mosaic, with remnant vegetation patches spreading between cleared agricultural land to more significant bushland surrounding the Nepean River approximately 3km from the proposal site.

Plant community types and threatened ecological communities

Only one Plant community type (PCT) was recorded within the proposal site, PCT 3320: Cumberland Shale Plains Woodland, in addition to exotic vegetation. PCT 3320 is consistent with Cumberland Plain Woodland in the Sydney Basin Bioregion threatened ecological community (TEC) that is listed as Critically Endangered under the BC Act and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Refer to Table 4-1.

Table 4-1 Plant community types found within the proposal site

Plant community type	Condition	Threatened ecological community?		Original area (ha) in proposal site	Refined area (ha) in proposal site	Difference
		BC Act	EPBC Act			
PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically endangered	Critically endangered	2.32	2.26	0.06 less
PCT 3320: Cumberland Shale Plains Woodland	Low	Critically endangered	N/A	0.26	0.26	No change
PCT 3320: Cumberland Shale Plains Woodland	Derived Native Shrubland (DNS)	Critically endangered	N/A	0.07	0.07	No change
Exotic vegetation	Not applicable	N/A	N/A	3.37	3.37	No change

Groundwater dependent ecosystems

The proposal site is considered to have a low potential for groundwater interaction. Drier forest types associated with PCT 3320 are not obligate groundwater-dependant ecosystems (GDEs) (i.e. they are not entirely dependent on groundwater) but are likely to be opportunistic facultative GDEs that depend on the subsurface presence of groundwater (often accessed via the capillary fringe – subsurface water just above the water table) in some locations but not in others, particularly where an alternative source of water (i.e. rainfall) cannot be accessed to maintain ecological function.

Threatened flora

Based on the BioNet Atlas search, 41 threatened flora species listed under the BC Act have been previously identified in the proposal site.

Species considered to have a moderate likelihood of occurring within the proposal site include *Pimelea curviflora var. curviflora* and *Pimelea spicata* (Spiked Rice-flower). However, surveys for these species did not identify them within the proposal site.

Threatened fauna

Based on the BioNet Atlas search, 57 threatened fauna species listed under the BC Act have been previously identified in the locality. This includes 30 birds, 18 mammals, four frogs, three invertebrates and two reptiles.

Species considered to have a moderate or high likelihood of occurrence include:

- woodland Birds
  - Dusky Woodswallow, *Artamus cyanopterus*
  - Scarlet Robin, *Petroica boodang*
  - Varied Sittella, *Daphoenositta chrysoptera*
- blossom dependent species
  - Swift Parrot, *Lathamus discolor*
  - Grey-headed Flying-fox, *Pteropus poliocephalus*
  - Little Lorikeet, *Glossopsitta pusilla*
- Microchiropteran Bats
  - Greater Broad-nosed Bat, *Scoteanax rueppellii*
  - Eastern False Pipistrelle, *Falsistrellus tasmaniensis*
  - Little Bent-wing Bat, *Miniopterus australis*

  - Large Bent-wing Bat, *Miniopterus magnater*
  - Eastern Freetail Bat, *Mormopterus norfolkensis*
  - Southern Myotis, *Myotis aelleni*
  - Large-eared Pied Bat, *Chalinolobus dwyeri*
- gliders
  - Squirrel Glider, *Petaurus norfolcensis*
  - Yellow-bellied Glider, *Petaurus australis*
- Gang-gang Cockatoo, *Callocephalon fimbriatum*
- Glossy Black-cockatoo, *Calyptorhynchus lathami*
- Powerful Owl, *Ninox strenua*
- diurnal Birds of Prey
  - Square-tailed Kite, *Lophoictinia isura*
  - Little Eagle, *Hieraaetus morphnoides*
- Koala, *Phascolarctos cinereus*
- Cumberland Plain Land Snail, *Meridolum corneovirens.*

Wildlife connectivity corridor

Wildlife corridors consist of native vegetation that joins two or more areas of similar habitat and are critical for sustaining ecological processes, such as provision for animal movement and the maintenance of viable populations. Koalas are known to travel through the proposal site.

Weeds and pests

Seven priority weed species declared for the Greater Sydney region were recorded in the proposal site during the field survey:

- Asparagus Fern, *Asparagus aethiopicus*
- Bridal Creeper, *Asparagus asparagoides*
- Fireweed, *Senecio madagascarensis*
- African Olive, *Olea europaea subsp. cuspidata*
- Chilean Needlegrass, *Nassella neesiana*
- Blackberry, *Rubus fruticosus* sp. Agg.

The following pest species are likely to inhabit the proposal:

- European fox, *vulpes vulpes*
- European rabbit, *Oryctolagus cuniculus*
- Wild dog, *Canis lupus*

Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) that are of relevance to the proposal site include:

- TEC – Cumberland Plain Shale Woodlands
- threatened flora, including *Pimelea curviflora var. curviflora* and *Pimelea spicata* (Spiked Rice-flower)
- threatened fauna, including *Pteropus poliocephalus* (Grey-headed Flying-fox), *Callocephalon fimbriatum* (Gang-Gang Cockatoo), *Lathamus discolor* (Swift Parrot), *Phascolarctos cinereus* (Koala), and *Petaurus australis* (Yellow-bellied Glider)
- migratory birds, including Fork-tailed Swift and White-throated Needletail.

Aquatic ecology

No aquatic habitats exist within the proposal site. The closest mapped Key Fish Habitat (KFH) is associated with the Georges River which is located between 400m and 600m to the east of the proposal site. Further assessment of aquatic ecology was not required for the proposal.

4.1.4 Potential impacts

Construction

Removal of native vegetation

The proposal, as modified by the changes described in Chapter 3, would result in the removal of 2.59 hectares of native vegetation, of which 2.26 hectares are listed under the EPBC and BC Acts. Table 4-2 presents a summary of the direct impact on native vegetation.

Table 4-2 Plant community types expected to be directly impacted

Plant community type	Condition	TEC Status	Original area (ha) to be impacted	Updated area (ha) to be impacted	Difference from the impact described the REF
PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically endangered (BC Act)	2.32	2.26	0.06 less area impacted
PCT 3320: Cumberland Shale Plains Woodland	Low	Critically endangered (BC Act)	0.26	0.26	No change
PCT 3320: Cumberland Shale Plains Woodland	DNS	Critically endangered (BC Act)	0.07	0.07	No change

Removal of threatened fauna habitat

The removal of 2.59 hectares of native vegetation would remove available habitat for the threatened species outlined in Table 4-2.

New Assessments of Significance have not been completed for the modified proposal, since the original assessments completed in the REF concluded that the proposal was unlikely to have a significant impact on any threatened fauna species. The modified proposal would result in a reduction in impact to native vegetation and consequently a likely reduction in impacts on any threatened fauna species. Mitigation measures will be implemented for koalas to minimise impact on the local population.

Removal of threatened flora

No threatened flora species were identified within the proposal site therefore, the proposal is unlikely to result in the removal of any threatened flora species.

Injury and mortality

Fauna injury or death has the greatest potential to occur during construction when vegetation clearing occurs. The extent of this impact would be proportionate to the extent of vegetation that is cleared. The highest risk of injury and mortality would be most likely along the southern edge of the intersection of Brian Road and Appin Road where there is greater connectivity of remnant native vegetation along Brian Road and to the east of Appin Road. Less mobile species (e.g. ground-dwelling reptiles), or those that are nocturnal and nest or roost in trees during the day (e.g. arboreal mammals and microbat species), may find it difficult to rapidly move away from vegetation clearing when disturbed. The proposal site is only likely to contain a limited number of arboreal species (e.g. possums) and birds that may be impacted during vegetation removal. Reptiles and frogs may be impacted during construction as the habitat is cleared.

Entrapment of wildlife in any trenches or pits that are dug is a possibility if the trenches are deep and steep-sided. Wildlife may become trapped in or may choose to shelter in machinery that is stored in the proposal site overnight. If these animals were to remain inside the machinery, or under the wheels or tracks, they may be injured or may die once the machinery is in use.

Construction would result in increased activity of plant equipment and vehicles entering the proposal site, which would increase the chance of accidental fauna mortality from collisions. Such incidents would create a direct impact on population numbers but are considered to be unlikely to occur and not result in a significant impact on local fauna populations.

A temporary fauna fence would be installed for the construction of the proposal to restrict fauna movements into the proposal site. A Flora and Fauna Management Plan will be prepared in accordance with Transport's *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Projects* (Transport 2024) and *The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* (DPE 2023). This plan would ensure injury and mortality, particularly to koalas and the Cumberland Plains Land Snail, are minimised and mitigated during construction activities. The contents of this plan are outlined in Table 4-3.

Groundwater-dependent ecosystems

The proposal is unlikely to impact groundwater-dependent ecosystems.

Operation

Edge effects on adjacent native vegetation and habitat

Due to the small width of roadside vegetation proposed for removal, the activity, as modified, is not expected to significantly increase the impacts of edge effects on any vegetation in the proposal site, including corridors or active or proposed biobank sites.

Wildlife connectivity and habitat fragmentation, injury and mortality

The installation of koala exclusion fencing on both sides of Appin Road in conjunction with an underpass connecting the Ousedale Creek koala corridors would reduce the likelihood of vehicle strikes at these locations, which means fewer koalas would be injured or killed by vehicles. The additional koala grid across Brian Road would increase the effectiveness of the koala exclusion fencing. The new koala escape poles and escape hatches along Appin Road and Brian Road would further limit the number of koalas injured or killed by vehicles as they would be able to get off the road and find refuge at multiple locations along the proposal site.

The underpass would further allow for movement to, between or within the habitat critical to the survival of the koala on either side of Appin Road. The design change to the underpass is expected to benefit koalas. Culverts, typically concrete box culverts, have been installed on many roads around Australia and the world to facilitate the movement of wildlife under roads. Concrete box culverts are a standard installation option in New South Wales and Queensland for koalas, with many studies and evaluations showing they are readily used by the species. The larger size of the box culvert compared to the pipe should benefit koala connectivity as evidenced by TfNSW monitoring showing successful koala use of these structures. See fauna connectivity database here Biodiversity | Transport for NSW. Koala use of the structures would be subject to a monitoring program using cameras.

Invasion and spread of weeds and pests

Seven priority weed species declared for the Greater Sydney region were recorded in the proposal site during the field survey. These species can be managed using standard mitigation measures as outlined in Section 5.2.

The proposal site is likely a habitat for a range of commonly occurring pest species including European Fox and European rabbit. The proposal has the potential to disperse pest species out of the proposal site across the surrounding landscape. However, the magnitude of this impact would be low and specific mitigation measures are not deemed necessary.

Changes to hydrology

The proposal may result in further alteration to the hydrology of the proposal site due to an increase in surface runoff in both construction and operation. However, these changes would be relatively minor and are not expected to result in serious adverse impacts on local surface water quality as there are no waterways adjacent to the proposal.

Noise, light, dust and vibration

Considering the existing levels of noise and vibration from the use of the existing Appin Road and Brian Road by vehicles, habitats surrounding the proposal site are already impacted by urban noises and lights and would present some tolerance to increased anthropogenic disturbances. It is unlikely there would be a significant increase in noise and vibration during the operation of the road due to marginally increased traffic flow that would result in any increased impacts to biodiversity within the proposal site. While temporary dust impacts may arise during construction, these would return to previous levels once construction and revegetation/landscaping have been completed.

4.1.5 Revised safeguards and management measures

The biodiversity safeguards presented in Table 6-3 of the REF would remain applicable. Additional or amended safeguards are outlined in Table 4-3. Additional and/or modified environmental safeguards and management measures to those presented in the REF have been bolded and deleted measures, or parts of measures, have been struck out. The full list of mitigation measures is outlined in Table 5-1.

Table 4-3 Biodiversity safeguards and management measures

Impact	Environmental safeguard	Responsibility	Timing	Reference
Impacts to biodiversity	A Flora and Fauna Management Plan (including koala focus) will be prepared in accordance with the ~~*Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA 2011)~~ **Transport's *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW projects* (Transport 2024)** and *The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* (DPE 2023) and implemented as part of the CEMP. It will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the Guideline for landscape character and visual impact assessment (Transport 2020) • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI Policy and guidelines for fish habitat conservation and management (2013) • protocols to manage weeds and pathogens • **hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.** The koala component shall include content (including that required in the CPCP) on: • temporary koala exclusion fencing to be installed **as an immediate priority of the** enabling work~~s~~ • permanent koala exclusion fencing to be installed for the operation phase to encourage the use of the new safe connectivity structure • new connectivity structure under Appin Road to be installed • **drainage swales on the western side will be designed with the widest possible entrance angles and batters no steeper than 1:4 on the southern side** • **koala refuge poles extending to the proposal boundary on the eastern and western sides of the underpass** • **removal of any property boundary fencing (or other structures) within project boundaries likely to impede koala access to structures.** • **koala use of the structures will be subject to a monitoring program to test the impact of revegetation activities on koala usage of the underpass** • before vegetation is removed, a suitably qualified ecologist must assess the subject land and do pre-clearance surveys **prior to the proposed clearing** for koalas. If koalas are identified, implement a tree-felling protocol	Contractor	**Detailed design/ pre-construction/ during construction / post construction**	Section 4.8 of QA G36 Environment Protection Additional Safeguard

Impact	Environmental safeguard	Responsibility	Timing	Reference
	• an ecologist will do a final pre-clearing check for koalas immediately prior to tree removal and will be present during all clearing operations • a stop work protocol will apply if a koala is found to be present in a tree. Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following: • a pre-clearing survey by an ecologist to confirm clearing boundaries, exclusion zones, protected habitat features including habitat trees, relocation areas for any displaced fauna and revegetation areas prior to starting work • on-site, full-time supervision by ecologist to inspect habitat tress including fallen tree hollows for fauna • relocation of any fauna discovered to nearby bushland prior to commencing clearing as appropriate – liaison with local wildlife organisations in the case of injured fauna where necessary • measures to ensure the safety of koalas during the construction of the infrastructure, including traffic calming measures • koala escape poles and hatches will be installed within 100m of the southern fence ends, within 100m of the fence ends on Brian Road and within 100m north of the intersection. Escape poles should be made from 200-300mm timber (Æ timber), with the centre of the outer (roadside) pole 300mm from the fence and the inner pole ending 1200mm above ground level. Both the outer and inner poles should extend above the horizontal connector to provide resting points. An angled brace may be required to support the horizontal connector. A sheet of galvanised steel should be installed on the fence adjacent to the inner pole. • ~~for development within the Koala habitat protected Flora and Fauna Management Plan will be developed and implemented which includes:~~ – ~~before construction, temporary exclusion fencing to prevent Koalas from entering the subject land~~ – ~~hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.~~			
Impacts to biodiversity	Ensure any fauna encountered onsite would be managed in accordance with Transport for NSW Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects Guide 9 (Fauna Handling) (Transport for NSW, 2024)	Contractor	Pre-construction	Standard safeguard
Removal of native vegetation	A Biodiversity Offset Strategy will be implemented. The Biodiversity Offset Strategy will include details of seed collection prior to clearing, tree hollow salvage and a koala habitat tree replanting program strategy in consultation Wollondilly Shire Council and the Department of Planning, Housing and Infrastructure to support the commitments in the CPCP.	Transport	Detailed design	Additional safeguard
Groundwater dependant ecosystems	Interruptions to water flows associated with groundwater-dependent ecosystems would be minimised through detailed design.	Transport/ contractor	Detailed design/ pre-construction	Standard safeguard

Impact	Environmental safeguard	Responsibility	Timing	Reference
Pathogen management	**Ensure the Flora and Fauna Management Plan includes management measures to control and/or prevent the introduction and/ or spread of disease-causing agents such as bacteria and fungi by Guide 7 of the Biodiversity Management Guideline: Protecting and Managing Biodiversity of Transport for NSW Projects (Transport 2024)**	**Contractor**	**Pre-construction**	**Standard safeguard**
Invasion and spread of weeds	**A Weed Management Plan will be prepared in accordance with *Guide 6: Weed management* of the *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects* (Transport 2024). It will include:** • **the identification of weeds on site (confirmed during the pre-clearing survey)** • **weed management priorities and objectives** • **exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site** • **the location of weed-infested areas** • **weed control methods** • **measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements** • **a monitoring program to measure the success of weed management communication with local Council noxious weed representatives.**	**Contractor**	**During construction**	**Standard safeguard B12**

4.1.6 Biodiversity offsets

The proposal contains 2.59ha of native vegetation (0.06ha less impact than the original design) and 3.37ha of exotic vegetation. The offsetting requirements were determined in accordance with:

- Transport Biodiversity Policy
- No Net Loss Guidelines and supporting resources
- Tree and Hollow Replacement Guidelines and supporting resources.

The offset thresholds as per Transports No Net Loss Guidelines are provided in Table 4-4. An assessment of vegetation impacts against these thresholds is provided in Table 4-5.

Table 4-4 Offset thresholds

Impact	Threshold
Work involving the clearing of a CEEC	Where there is any clearing of a CEEC in 'moderate to good' condition
Work involving the clearing of an EEC	Where clearing of an EEC ≥ 2ha in 'moderate to good' condition
Work involving the clearing of VEC	Where clearing of VEC ≥ 5ha in 'moderate to good' condition
Work involving the clearing of any habitat for a known species credit fauna species or clearing of breeding habitat (as defined by the TBDC) for dual-credit fauna species (excluding exotic and planted vegetation that cannot be assigned to a plant community type)	Where clearing ≥ 1ha in 'moderate to good' condition
Work involving the removal of known threatened flora species and their habitat.	Where the loss of individuals is ≥10 or where clearing of habitat is ≥ 1ha
Type 1 or Type 2 key fish habitats	Where there is a net loss of habitat
Any residual biodiversity impact that doesn't require offsets in accordance with the No Net Loss Guideline is to be assessed against the requirements of the Tree and Hollow Replacement Guideline.	**Any clearing of hollows and/or trees ≥5cm DBH**

Table 4-5 Assessment of vegetation impacts against thresholds

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?
1	PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically Endangered (BC Act and EPBC Act)	2.26	Offset threshold triggered of work involving the clearing of a CEEC
2	PCT 3320: Cumberland Shale Plains Woodland	Low	Critically Endangered (BC Act)	0.26	Threshold not triggered, however tree and hollow replacement guidelines regarding tree removal replacement
N/A	PCT 3320: Cumberland Shale Plains Woodland	DNS	Critically Endangered (BC Act)	0.07	Threshold not triggered

The subject land contains 2.26ha of PCT 3320 in moderate condition that will trigger offset thresholds under the Transport No Net Loss Guidelines. Transport will also implement a tree and hollow replacement plan for vegetation removal of low-condition PCT3320. Within the subject land, outside of moderate condition PCTs, there was a total of 67 trees consisting of:

- 25 small trees
- 27 medium trees
- 15 large trees.

In relation to the tree and hollow replacement requirements, this would result in planting a minimum of 278 trees to replace those being removed. If replacement is not feasible, or the entire replacement cannot be accommodated locally or can only be partially met, any remaining requirement can be met by transferring funds into the Transport Conservation Fund as per rates outlined in the Tree and Hollow replacement guidelines. If tree and hollow replacement is not feasible, the required minimum contribution would be $31,625. A breakdown of the required contributions and/or replacements is outlined in Table 4-6.

Table 4-6 Minimum replacement and contribution requirements of trees and hollows within the proposal

Tree size category	Total number of trees / hollows	Replacement requirements	Contribution requirement
Large tree (DBH 50cm-100cm)	15	Plant a minimum of eight trees = 120 trees	$1000/tree = $15,000
Medium tree (DBH 20cm-49cm)	27	Plant a minimum of four trees = 108 trees	$500/tree = $13,500
Small tree (DBH 5cm-19cm)	25	Plant minimum 2 trees = 50 trees	$125/tree = $3,125
TOTAL	**74**	**278 trees**	**$31,625**

4.2 Noise and vibration

4.2.1 Methodology

Construction noise and vibration have been assessed in accordance with the following:

- Interim Construction Noise Guideline (DECCW, 2009)
- Construction Noise and Vibration Guideline (Transport for NSW, 2016d)
- NSW Road Noise Policy (RNP) (DECCW, 2011)
- Noise Criteria Guideline (RMS, 2015a)
- Noise Mitigation Guidelines (RMS, 2015b)
- Noise model validation guideline (RMS, 2018)
- At-Receiver Noise Treatment Guideline (Draft) (RMS, 2017)
- Noise Policy for Industry (EPA, 2017)
- Environmental Noise Management Manual (TRANSPORT, 2001)
- Australian Standard AS 1055: Description and measurement of environmental noise
- Assessing Vibration: A Technical Guideline (AVTG) (DEC, 2006)
- German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures (German Building and Civil Standards Committee, 1999)
- British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration (General Mechanical Engineering Standards Policy Committee, 1993).

The noise and vibration assessment carried out to assess the impact of the proposal comprised:

- identifying noise and vibration-sensitive receivers within the proposal site
- determining the background noise levels within the proposal site
- predicting how building and operating the proposal would impact noise and vibration-sensitive receivers
- identifying the adverse impact that would need safeguarding or management measures under the proposal.

4.2.2 Summary of consistency review

A consistency review was undertaken to ensure that the change in scope would not result in any significant changes to the expected noise and vibration impacts outlined Section 6.2 of the REF.

Further consultation was not undertaken as part of this review.

4.2.3 Description of existing environment

The existing environment remains the same as presented in Section 6.2.2 of the REF exhibited online.

4.2.4 Potential impacts

Construction

Construction noise impacts

Any noise predicted as a result of the construction of the roundabout at the intersection of Brian Road and Appin Road would no longer occur. Given the realignment of the road design, the placement of the koala exclusion fencing would occur at a slightly greater distance from the residents to the east of the proposal site. While residents are still expected to experience noise impacts due to the installation of the underpass and other koala protection measures, noise impacts would be reduced.

Construction traffic noise impacts

During the construction phase of the proposal, heavy vehicles would be required for the delivery of materials and equipment and light vehicles would transport workers to and from the site. The additional road traffic may impact receivers. The REF stated that the proposal is expected to generate approximately 20 light vehicles and 10 heavy vehicles in a peak-hour period. The change in scope would not result in an increase of light or heavy vehicles required to complete the construction of the proposal.

The primary access route for construction traffic would be along Appin Road and access to the ancillary facilities would also be from Brian Road. Construction traffic is predicted to approach the site evenly from the north and south of the proposal. It is expected that the relative increase of traffic volumes with construction vehicles and the predicted construction noise impacts would not exceed what is presented in Table 6-13 and Table 6-14 of the REF.

Construction vibration assessment

The number of identified sensitive receivers within the recommended offset distance would remain the same as detailed in Table 6-15 of the REF.

Operation

Given the speed reduction to 50km/h is no longer included as part of the scope, operational road traffic noise levels would not change from their current levels. The predicted road traffic noise level would reach 60.1 dB(A) during the day ($L_{Aeq\ (15\ hours)}$) and 54.8 dB(A) during the night ($L_{Aeq(9\ hours)}$) at 290 Appin Road. This would comply with the RNP management levels.

4.2.5 Revised safeguards and management measures

The noise and vibration safeguards presented in Table 6-17 of the REF would remain applicable. No additional safeguards are required.

4.3 Traffic and Transport

4.3.1 Methodology

The methodology for the traffic and transport assessment included:

- summarising the existing traffic and transport network, including road network, crash data, public Transport, and pedestrian and cyclist facilities
- identifying existing traffic volumes at the Appin Road and Brian Road intersection during weekday AM, PM peak hours and Sunday midday peak hour
- identifying the generated traffic during the peak construction period
- presenting SIDRA results of the Appin Road and Brian Road intersection for the existing unsignalised 3-way T-intersection and proposed roundabout layout.

4.3.2 Summary of consistency review

A consistency review was undertaken to ensure that the change in scope would not result in any significant changes to the expected traffic and transport impacts outlined in Section 6.3 of the REF.

Further consultation was not undertaken as part of this review.

4.3.3 Description of existing environment

The existing environment remains the same as presented in Section 6.3.2 of the REF exhibited online.

4.3.4 Potential impacts

Construction

Increased traffic from workers and heavy vehicles associated with the delivery of machinery and materials would access the site during the construction period. The traffic volumes and frequency of movements would vary with the time of day and the stage of construction. The majority of light vehicle trips inbound would occur before the morning peak period and likewise, outbound trips would generally occur after the afternoon peak period. Bulk haulage operations would continue throughout the day.

As indicated in the REF, the number of heavy and light vehicles visiting the proposal site during construction is considered to be a relatively low volume when compared to existing traffic volumes and therefore would be easily accommodated within the surrounding road network. It is assumed that the number of vehicles visiting the construction site per hour would not exceed that presented in the REF as a result of the proposal changes.

While there would be some delay to existing traffic on Appin Road and Brian Road due to traffic management conditions, access ouldwould be maintained, including the transfer of vehicles onto the temporary road to allow construction on the existing road pavement, and impacts would be minor.

Operation

The proposal no longer includes the single-lane roundabout or the speed limit reduction to 50km/h during the operation of the proposal at the intersection of Appin Road and Brian Road. The traffic configurations would remain the same as they currently operate and the speed limit would remain at 80km/h. As such, the previously assessed performance of the Appin Road and Brian Road intersection would no longer apply. Instead, the intersection performance would remain at its current level of service during operation.

4.3.5 Revised safeguards and management measures

The traffic and transport safeguards presented in Table 6-19 of the REF would remain applicable. No additional safeguards are required.

4.4 Landscape character and visual impacts

4.4.1 Methodology

A visual impact assessment was completed for the original proposal in accordance with the Guidelines for landscape and visual impact assessment (Transport, 2020a).

A site inspection and photographic survey of the site was completed in September 2022 (refer to Appendix G of the REF).

4.4.2 Summary of consistency review

A consistency review was undertaken to ensure that the change in scope would not result in any significant changes to the expected landscape character and visual impacts outlined in Section 6.4 of the REF.

Further consultation was not undertaken as part of this review.

4.4.3 Description of existing environment

The existing environment remains the same as presented in Section 6.4.2 of the REF exhibited online.

4.4.4 Potential impacts

Construction

Impacts on visual amenities would be generated during construction. These impacts would be reduced given the construction of the single-lane roundabout at the intersection of Appin Road and Brian Road is no longer part of the scope. Visual impacts would be reduced by temporary construction boundary fencing, which would partially screen construction activities from visual receivers.

Operation

As the majority of the updated scope of work is within the road corridor, including the implementation of koala grids and escape poles, the sensitivity to change is considered to be low. Landscape character views from the corridor would remain unaffected by the proposal.

The magnitude of change is likely to be low as the proposal is generally within the road corridor and consists of low-level elements. The proposed fauna underpass is below the road and would not be easily visible from the road.

The sensitivity of the landscape character associated with the intersection of Appin Road and Brian Road is low. Generally, the magnitude of impacts would remain low as the proposal is generally within or directly next to the existing road corridor and would be reviewed as minor modifications to the existing arrangement. Residents on the eastern side of Appin Road near the Brian Road intersection would no longer experience significant changes due to the descoping of the proposal.

The overall impact is low as the proposal would not impact existing views of open pasture and distant vegetated ridgelines.

4.4.5 Revised safeguards and management measures

The noise and vibration safeguards presented in Table 6-17 of the REF would remain applicable. No additional safeguards are required.

4.5 Other impacts

Other environmental factors and any potential changes are outlined in Table 4-7.

Table 4-7 Other environmental factors

Environmental factor	Change from assessment presented in REF
Aboriginal cultural heritage	No change
Non-Aboriginal heritage	No change
Socio-economic, property and land use	Potential increase in land acquisition extent. The NSW Government is acquiring lands to construct the koala underpass. This acquisition also includes purchasing land to ensure koalas can use the underpass without barriers, once built. DPHI is leading these land acquisitions pursuant to the *Land Acquisition (Just Terms Compensation) Act 1991.*
Contamination, soils and geology	No change
Hydrology, hydrogeology and water quality	No change
Waste and resources	Fewer materials would be required due to the change of scope. The safeguards and management measures would remain the same.
Air quality	No change
Hazards and risk management	No change
Bushfire	No change
Sustainability, climate change and greenhouse gas emissions	No change
Cumulative	No change

5. Environmental management

The REF for the Brian Road Intersection Upgrade identified the framework for environmental management, including safeguards and management measures that would be adopted to avoid or reduce environmental impacts (section 7.2 of the REF).

After consideration of the issues raised in the public submissions and changes to the proposal, the safeguards and management measures have been revised. Additional and amended safeguards and management measures relate to the biodiversity impacts associated with the updated scope. Amended safeguards and management measures are outlined in Table 5-1.

Should the proposal proceed, environmental management would be guided by the framework and measures outlined below.

5.1 Environmental management plans (or system)

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

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

The CEMP will be prepared prior to the construction of the proposal and must be reviewed and certified by environment staff prior to the start of any on-site work. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the QA Specification G36 – Environmental Protection (Management System) and QA Specification G10 - Control of Traffic.

5.2 Summary of safeguards and management measures

The REF for the proposal identified a range of environmental outcomes and management measures that would be required to avoid or reduce environmental impacts.

After consideration of the issues raised in public submissions, the environmental management measures for the proposal (refer to Section 7.2 of the REF) have been revised. Should the proposal proceed, the environmental management measures in Table 5-1 will guide the subsequent phases of the proposal. Additional and/or modified environmental safeguards and management measures to those presented in the REF have been bolded and deleted measures, or parts of measures, have been struck out.

Table 5-1 Summary of environmental safeguards and management measures

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B1	Impacts to biodiversity	A Flora and Fauna Management Plan (including a Koala focus) will be prepared in accordance with ~~Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ **Transport's Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024)** and The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development (DPE 2023) and implemented as part of the CEMP. It will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the Guideline for landscape character and visual impact assessment (Transport for NSW 2020) • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI Policy and guidelines for fish habitat conservation and management (2013) • protocols to manage weeds and pathogens • **hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.** The koala component shall include content (including that required in the CPCP) on: • temporary koala exclusion fencing to be installed **as an immediate priority of the** enabling work • permanent koala exclusion fencing to be installed for the operation phase to encourage the use of the new safe connectivity structure • new connectivity structure under Appin Road to be installed • **drainage swales on the western side will be designed with the widest possible entrance angles and batters no steeper than 1:4 on the southern side**	Contractor	**Detailed design/ pre-construction/ during construction / post construction**	**Standard safeguard B1** Section 4.8 of QA G36 Environment Protection Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
		• **koala refuge poles extending to the proposal boundary on the eastern and western sides of the underpass** • removal of any property boundary fencing (or other structures) within project boundaries likely to impede koala access to structures • **koala use of the structures will be subject to a monitoring program to test the impact of revegetation activities on koala usage of the underpass** • before vegetation is removed, a suitably qualified ecologist must assess the subject land and do pre-clearance surveys **prior to the proposed clearing** for koalas. If koalas are identified, implement a tree-felling protocol • **an ecologist will do a final pre-clearing check for koalas immediately prior to tree removal and will be present during all clearing operations** • **a stop work protocol will apply if a koala is found to be present in a tree.** **Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following:** • **a pre-clearing survey by an ecologist to confirm clearing boundaries, exclusion zones, protected habitat features including habitat trees, relocation areas for any displaced fauna and revegetation areas prior to starting work** • **on-site, full-time supervision by ecologist to inspect habitat tress including fallen tree hollows for fauna** • **relocation of any fauna discovered to nearby bushland prior to commencing clearing as appropriate** - **liaison with local wildlife organisations in the case of injured fauna where necessary** • **measures to ensure the safety of koalas during the construction of the infrastructure, including traffic calming measures** • **koala escape poles and hatches will be installed within 100m of the southern fence ends, within 100m of the fence ends on Brian Road and within 100m north of the intersection. Escape poles should be made from 200-300mm timber (Æ timber), with the centre of the outer (roadside) pole 300mm from the fence and the inner pole ending 1200mm above ground level. Both the outer and inner poles should extend above the horizontal connector to provide resting points. An angled brace may be required to support the horizontal connector. A sheet of galvanised steel should be installed on the fence adjacent to the inner pole.** • ~~for development within koala habitat protected by the CPCP, a Flora and Fauna Management Plan will be developed and implemented which includes:~~ - ~~before construction, temporary exclusion fencing to prevent koalas from entering the subject land~~ - ~~hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.~~			

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B2	**General biodiversity mitigation**	**A Biodiversity Offset Strategy will be implemented. The Biodiversity Offset Strategy will include details of seed collection prior to clearing, tree hollow salvage and a koala habitat tree replanting program strategy in consultation Wollondilly Shire Council and the Department of Planning, Housing and Infrastructure to support the commitments in the CPCP.**	**Contractor**	**Construction**	**Standard safeguard B2**
B3	**Groundwater dependant ecosystems**	**Interruptions to water flows associated with groundwater-dependent ecosystems would be minimised through detailed design.**	**Transport/ contractor**	**Detailed design/ pre-construction**	**Standard safeguard B3**
B4	**Pathogen management**	**Ensure the Flora and Fauna Management Plan includes management measures to control and/or prevent the introduction and/ or spread of disease-causing agents such as bacteria and fungi by Guide 7 of the Biodiversity Management Guideline: Protecting and Managing Biodiversity of Transport for NSW Projects (Transport 2024)**	**Contractor**	**Pre-construction**	**Standard safeguard B4**
B5	Removal of native vegetation	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Transport	Detailed design	Standard safeguard B5
B6	Removal of native vegetation	Pre-clearing surveys will be undertaken in accordance with ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024). They shall confirm clearing boundaries, exclusion zones, protected habitat features and revegetation areas prior to starting work. The location of biodiversity controls on site will be identified in toolbox talks.	Contractor	Prior to construction	Standard safeguard B6
B7	Removal of native vegetation	Vegetation removal will be undertaken in accordance with ~~Guide 4: Clearing of vegetation and removal of bush rock of the Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ Guide 4: Clearing of vegetation and removal of bush rock of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).	Contractor	During construction	Additional safeguard
B8	Removal of native vegetation	Native vegetation will be re-established in accordance with ~~Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ Guide 3: Re-establishment of native vegetation of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).	Contractor	Post construction	Additional safeguard
B9	Removal of native vegetation	The unexpected species find procedure is to be followed under ~~Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the subject land.	Contractor	During construction	Standard safeguard B7
B10	Removal of threatened fauna habitat	Threatened fauna habitat removal will be minimised through detailed design.	Contractor	Detailed design	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B11	Removal of threatened fauna habitat	Habitat removal will be undertaken in accordance with ~~Guide 4: Clearing of vegetation and removal of bush rock of the Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA 2011)~~ Guide 4: Clearing of vegetation and removal of bush rock of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).	Contractor	During construction	Additional safeguard
B12	Removal of threatened fauna habitat	Habitat will be replaced or re-instated 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)~~ Guide 5: Re-use of woody debris and bushrock and Guide 8: Nest boxes of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).	Contractor	During construction	Additional safeguard
B13	Removal of threatened fauna habitat	The unexpected species find procedure is to be followed under ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024) if threatened fauna, not assessed in the biodiversity assessment, are identified in the subject land.	Contractor	During construction	Standard safeguard B8
B14	Removal of threatened fauna habitat	Pre-clearing surveys will be undertaken in accordance with ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024)	Contractor	During construction	Standard safeguard B9
B15	Removal of threatened flora	Pre-clearing surveys will be undertaken in accordance with ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024)	Contractor	During construction	Standard safeguard B10
B16	Removal of threatened flora	The unexpected species find procedure is to be followed under ~~Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ Guide 1: Pre-clearing process of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024) if threatened flora species, not assessed in the biodiversity assessment, are identified in the subject land.	Contractor	During construction	Standard safeguard B11
B17	Changes to hydrology	Changes to existing surface water flows will be minimised through detailed design.	Contractor	Detailed design	Additional safeguard
B18	Fragmentation of identified habitat corridors	The proposed Koala connectivity measures implemented will be installed under the supervision of an experienced ecologist.	Contractor	During construction	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B19	Edge effects on adjacent native vegetation and habitat	Exclusion zones will be set up at the limit of clearing in accordance with ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ **Guide 2: Exclusion zones of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).** This will include temporary koala exclusion fencing as proposed.	Contractor	During construction	Additional safeguard
B20	Injury and mortality of fauna	Fauna will be managed in accordance with ~~Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ **Guide 9: Fauna handling of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).** This will include temporary koala exclusion fencing as proposed.	Contractor	During construction	Additional safeguard
B21	Invasion and spread of weeds	**A Weed Management Plan will be prepared in accordance with Guide 6: Weed management of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024). It will include:** • **the identification of weeds on site (confirmed during the pre-clearing survey)** • **weed management priorities and objectives** • **exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site** • **the location of weed-infested areas** • **weed control methods** • **measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements** • **a monitoring program to measure the success of weed management communication with local Council noxious weed representatives.**	Contractor	During construction	Standard safeguard B12
B22	Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with ~~Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ **Guide 2: Exclusion zones of the Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects (Transport 2024).**	Contractor	During construction	Additional safeguard
B23	Noise, light, dust and vibration	Shading and artificial light impacts will be minimised through detailed design.	Contractor	Detailed design	Additional safeguard

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
B24	Noise, light, dust and vibration	Shading and artificial light impacts will be minimised wherever practicable during construction. Noise and dust during construction will be minimised wherever practicable during construction.	Contractor	During construction	Additional safeguard
NV1	Construction noise and vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and identify: • all potential significant noise and vibration-generating activities associated with the activity • feasible and reasonable mitigation measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Transport, 2014) • a monitoring program to assess performance against relevant noise and vibration criteria • arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint-handling procedures Contingency measures are to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Pre-construction	Standard safeguard NV1 Section 4.6 of QA G36 Environment Protection
NV2	Construction noise and vibration	The CNVMP will also contain a comprehensive night work approval procedure, including: • maintain a rolling schedule of upcoming night work periods • inclusion of scheduled respite for the community for extended periods of night work • methods for assessment and review of impacts, • methods for expanded community engagement, notification and agreements • records of community engagement, and proposed mitigation measures.	Contractor	Pre-construction	Standard safeguard NV1
NV3	Construction noise and vibration	All sensitive receivers likely to be affected will be notified at least 5 working days prior to the commencement start of any work associated with the scenario that may have an adverse noise or vibration impact. The notification will include details of: • the construction activities likely to have noise or vibration impact • construction period and construction hours • any proposed mitigation measures for noise and vibration • contact information for the proposal, including out-of-hours contact project • complaint and incident reporting and how to obtain further information.	Contractor	Pre-construction	Standard safeguard NV2

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV4	Construction noise and vibration	All employees, contractors and subcontractors are to receive awareness training in control of noise and vibration as part of their regular site induction and updated prior to any significant period of night work: • all relevant proposal-specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise-generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.	Contractor	Pre-construction	Standard safeguard NV3
NV5	Construction noise and vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive periods. Where it is unavoidable to conduct work in standard hours for the safety of workers and the public, for the safe and efficient operation of the road network or to maintain critical access to local services, then an assessment and approval process will be undertaken as per the CNVMP and ~~RMS~~ Construction Noise and Vibration Guideline – **Public Transport Infrastructure (Transport, 2023).**	Contractor	Pre-construction	Standard safeguard NV4
NV6	Construction noise and vibration	Where feasible and reasonable, high noise generating work (75dB(A) L_{Aeq} at the receiver) should be carried out during standard construction hours and in continuous blocks of no more than 3 hours with at least 1-hour respite between each block of work generating high noise impact, where the location of the work likely to impact the same receiver.	Contractor	Pre-construction	Standard safeguard NV5
NV7	Construction noise and vibration	Where high noise generating activities (75dB(A) L_{Aeq} at the receiver) are required out of hours the following will be implemented: • the equipment will be used prior to 10 pm where feasible and reasonable. Where the above cannot be achieved, the equipment can be used where feasible and reasonable controls are implemented and there is engagement with any highly noise-affected community receivers.	Contractor	Pre-construction	Standard safeguard NV6
NV8	Construction noise and vibration	The following will be implemented for deliveries to and from the Proposal: • loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers or • loading/unloading areas are to be shielded or screened if close to sensitive receivers • delivery vehicles are to be fitted with straps rather than chains for unloading, wherever possible. When establishing work areas, site compounds and laydowns consideration will be given to arranging the site to limit the need for reversing associated with regular/repeatable movements, where safe and space permits.	Contractor	Pre-construction	Standard safeguard NV7

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
NV9	Construction 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	Pre-construction	Standard safeguard NV8
NV10	Construction noise and vibration	Consideration will be given to the layout of the ancillary facilities in order to maximise distance and shielding to nearby receivers (e.g. positioning of site sheds, earth bunds and hoarding to maximise shielding to residential receivers). Longer-term screening and shielding at the boundaries of the site will also be included in the CEMP, following a quantitative assessment of the risk of noise impact in pre-construction and proximity to sensitive receivers.	Contractor	Pre-construction	Standard safeguard NV9
NV11	Construction noise and vibration	Vibration-intensive equipment size will be selected to avoid working within the structural damage minimum working distances. The use of less vibration-intensive methods of construction or equipment will be considered where feasible and reasonable.	Contractor	Pre-construction	Standard safeguard NV10
NV12	Construction noise and vibration	Where the use of vibration-intensive equipment within the relevant minimum working distances cannot be avoided, 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. This will be conducted during the development of the CEMP and reviewed prior to the commencement of vibration-intensive work. A copy of the report will be provided to the relevant landowner or land manager.	Contractor	Pre-construction	Standard safeguard NV11
NV13	Construction noise and vibration	Vibration-generating activities will be managed to minimise the potential for impacts on structures and sensitive receiver(s), including maximising minimum safe working distances where practicable, or use of alternate methods to minimise vibration where minimum safe working distances cannot be achieved. Where alternatives cannot be implemented, vibration monitoring is to be undertaken and receivers notified at least 5 days in advance of work.	Contractor	Pre-construction	Standard safeguard NV12

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
T1	Traffic and Transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport Traffic Control at Work Sites Manual (Transport 2010) and QA Specification G10 Control of Traffic (Transport for NSW, 2008). The TMP will include: • confirmation of haulage routes • measures to maintain access to local roads and properties • site-specific traffic control measures (including signage) to manage and regulate traffic movement • measures to maintain pedestrian and cyclist access • requirements and methods to consult and inform the local community of impacts on the local road network • access to construction sites including entry and exit locations and measures to prevent construction vehicles • queuing on public roads • a response plan for any construction traffic incident • consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic • monitoring, review and amendment mechanisms.	Contractor	Pre-construction/ construction	Standard safeguard TT1 Section 2.2 of QA G10 Control of Traffic
T2	Property Access	Property access will be maintained where feasible and reasonable and property owners will be consulted before starting any work that may be temporarily restricted or control access.	Contractor	Construction	Standard safeguard TT2
T3	Management at ancillary sites	The following traffic management provisions will be provided at each ancillary facility: • appropriate 'sight distances' to allow traffic to safely enter and exit • temporary painted road lines to provide delineation • suitable intersection arrangements where required • other controls to separate, slow down, or temporarily stop traffic to allow for sale entry and exit.	Contractor	Construction	Standard safeguard TT3
V1	Visual impacts	Impact on trees in close proximity to the road edge will be minimised to ensure that the character of the corridor is maintained.	Contractor	Pre-construction/ construction	Standard safeguard V1
V2	Visual impacts	Consideration will be given to replanting trees. **Tree removal would be managed according to the Biodiversity Offset Scheme and associated Biodiversity Offset Credits as well as revegetation efforts outside the proposal boundary.**	Contractor/ Transport	Pre-construction/ construction	Standard safeguard V1
SUD1	Landscape plan and urban design	A Landscape Management Plan will be developed and implemented as part of the detailed design.	Contractor/ Transport	Pre-construction/ construction	Standard safeguard SUD1

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
AH1	Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Transport for NSW, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Standard safeguard AH1 Section 4.9 of QA G36 Environment Protection
NAH1	Non-Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Transport for NSW, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Standard safeguard NAH1 Section 4.9 of QA G36 Environment Protection
S1	Socio-economic	A Communication **and Stakeholder Engagement** Plan (**CSEP~~PCP~~**) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The **CSEP~~PCP~~** will include (as a minimum): • mechanisms **such as letterbox drops and web updates** to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • contact **email~~name~~** and number for complaints. the **CSEP~~PCP~~** will be prepared in accordance with the **Community Engagement Policy (Transport 2023)** ~~Community Involvement and Communications Resource Manual (Transport 2008).~~	Contractor	Detailed design/ pre-construction	Standard safeguard SE1
S2	Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012) and the Land Acquisition (Just Terms Compensation) Act 1991.	Transport	Pre-construction/ construction	Standard safeguard SE2
S3	Impact on businesses and the community during construction	Road users, including freight companies, will be informed of changed conditions, including any disruptions to access during construction.	Contractor	Construction	Standard safeguard SE3
S4	Emergency access	Access for emergency vehicles will be maintained at all times during construction. Any site-specific requirements will be determined in consultation with the relevant emergency services agency.	Contractor	Construction	Standard safeguard SE4
S5	Impact to properties	Consultation will be carried out with all affected property owners during detailed design and construction to develop and implement measures to reduce the impact on land use viability, infrastructure and severance.	Transport	Detailed design	Standard safeguard SE5

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
S6	Impact to utilities	Residents and businesses will be notified before any utility interruption. A utility management plan will be prepared to include: • utility company consultation • maintenance and emergency access requirements • construction staging and programming conflicts.	Transport. Contractor	Pre-construction/ construction	Standard safeguard SE6
C1	Contaminated land	A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of Contamination (Transport for NSW, 2013) and implemented as part of the CEMP. The plan will include, but not be limited to: • capture and management of any surface runoff contaminated by exposure to the contaminated land • further investigations are required to determine the extent, concentration and type of contamination, as identified in the detailed site investigation (Phase 2) • management of the remediation and subsequent validation of the contaminated land, including any certification required • measures to ensure the safety of site personnel and local communities during construction.	Contractor	Detailed design/ pre-construction	Standard safeguard C1 Section 4.2 of QA G36 Environment Protection
C2	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other work that may impact 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 for NSW Senior Manager Environment and Sustainability and/or EPA.	Contractor	Construction	Standard safeguard C2 Section 4.2 of QA G36 Environment Protection
C3	Soils	A site-specific Erosion and Sediment Control Plan/s will be prepared and implemented as part of the Soil and Water Management Plan. The Plan will include arrangements for managing wet weather events, including monitoring potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	Detailed design/ pre-construction	Standard safeguard C3
C4	Accidental spill	A site-specific emergency spill plan will be developed and include spill-management measures in accordance with the Transport Code of Practice for Water Management (Transport, 1999) and relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport EPA officers).	Contractor	Detailed design/ pre-construction	Standard safeguard C4
GW1	Hydrology and flooding	The layout and detail of the drainage system including water scour protection will be refined during detailed design.	Transport	Detailed design	Standard safeguarded GW1
GW2	Stormwater discharge	Dirty water will not be released into drainage infrastructure and/or waterways.	Transport	Construction	Standard safeguarded GW2

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
GW3	Stormwater discharge and pollutant loads	Water quality controls will be implemented to prevent materials, including concrete and sediment, from entering drainage infrastructure or waterways.	Contractor	Detailed design/ pre-construction	Standard safeguarded GW3
GW4	Groundwater	Following a stormwater event, the excavated trench for the underpass may encounter groundwater seepage. The water will be pumped out.	Contractor	Construction	Standard safeguarded GW4
W1	General waste management	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • measures to avoid and minimise waste associated with the proposal • classification of wastes and management options (re-use, recycle, stockpile, disposal) • statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, Transport and disposal • monitoring, record keeping and reporting. The WMP will be prepared taking into account the Environmental Procedure – Management of Wastes on Transport for NSW Land (Roads and Maritime, 2014) and relevant Transport for NSW Waste Fact Sheets.	Contractor	Detailed design/ pre-construction	Standard safeguarded W1
W2	General waste impact	Waste accumulation, littering and general tidiness will be monitored during routine site inspections.	Contractor	Construction	Standard safeguarded W2
W3	Resource minimisation	Recycled, durable, and low embodied energy products will be used to reduce primary resource demand in instances where the materials are cost and performance-competitive and comparable in environmental performance (e.g. where quality control specifications allow).	Contractor	Detailed design/ pre-construction	Standard safeguarded W3
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • potential sources of air pollution • air quality management objectives consistent with any relevant published EPA and/or NSW DPE guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces.	Contractor	Pre-construction	Standard safeguard AQ1

No.	Impact	Environmental safeguards and management measures	Responsibility	Timing	Reference
HR1	Hazards and risk management	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing identified risks • contingency measures to be implemented in the event of unexpected hazards, risks arising and emergencies. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or OEH publications.	Contractor	Detailed design/ pre-construction	Standard safeguard HR1
GG1	Greenhouse gas and climate change	Detailed design will consider opportunities to reduce building and construction material quantities and use appropriate materials wherever reasonable and feasible. Pavement and/or roadway design will ensure resilience against extreme temperatures and intense and more frequent rainfall events.	Contractor	Detailed design/ pre-construction	

5.3 Licensing and approvals

Table 5-2 summarises the licenses and approvals required for the proposal and outlines the associated legal instrument and the timing of the license or approval.

Table 5-2 Summary of licensing and approval required.

Instrument	Requirement	Timing
Mine Subsidence Compensation Act 1961	Approval to alter or erect improvements or to subdivide land within a mine subsidence district from the Mine Subsidence Board.	Completed. Refer to Appendix A of the REF.

6. Definitions

Term	Definition
AQMP	Air Quality Management Plan
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016* NSW
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
cm	Centimetre
CNVMP	Construction Noise and Vibration Management Plan
CPCP	Cumberland Plain Conservation Plan
DNS	Derived Native Shrubland
DPHI	Department of Planning, Housing and Infrastructure
EPA	Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* Cth
GDE	Groundwater Dependant Ecosystems
ha	Hectare
HRMP	Hazards and Risks Management Plan
KFH	Key Fish Habitat
km/h	Kilometres per hour
m	Metres
mm	Millimetres
NPW Act	*National Parks and Wildlife Act 1974* NSW
NPWS	National Parks and Wildlife Service
NVMP	Noise and vibration Management Plan
OLS	Office of Strategic Lands
PCT	Plant Community Type
REF	Review of Environmental Factors Report
RFS	Rural Fire Service
RNP	Road Noise Policy

Term	Definition
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
TMP	Traffic Management Plan
WMP	Waste Management Plan

7. References

Australian Standards 1997, AS4282-1997 Control of Obtrusive Effect of Outdoor Lighting

Blacker, A., Jones, D. (2014) Roads and macropods: Interactions and implications, Australian Mammalogy, 36: 1-4.

Chief Scientist & Engineer, 2020, Advice on the protection of the Campbelltown Koala population – Koala Independent Expert Panel

Chief Scientist & Engineer, 2021a, Advice regarding the protection of Koala populations associated with the Cumberland Plain Conservation Plan

Chief Scientist & Engineer, 2021b, Response to questions about advice provided in the Koala Independent Expert Panel report 'Advice on the protection of the Campbelltown Koala Population.

DAWE 2022, National Recovery Plan for the Koala: Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory). Department of Agriculture, Water and the Environment, Canberra. March 2022. CC BY 4.0

DECC, 2009, Interim Construction Noise Guideline, Sydney

DECC, 2006, Assessing Vibration: A Technical Guideline, Sydney

DECCW, 2009, Interim Construction Noise Guideline

DECCW, 2011, NSW Road Noise Policy, Sydney

DEECCW, 2023, National Light Pollution Guidelines for Wildlife

Department of the Environment and Heritage, 2006, Climate Change Impacts and Risk Management; A Guide for Business and Government, Australian Greenhouse Office, Canberra

Department of Infrastructure, Planning and Natural Resources, 2004, Guideline for Preparation of Environmental Management Plans, Sydney

DPIE, 2020, How to keep koalas off the road, koala vehicle strike fact sheet 2.

DPIE, 2021, Greater Macarthur 2040 Update

DPE, 2022a, NSW Koala Strategy Plan 2021-26

DPE, 2022b, The Cumberland Plain Conservation Plan

DPE, 2022c, Sub-Plan B: Koalas

DPE 2023, Cumberland Plains Conservation Plan Guidelines for Infrastructure Development

EPA, 2017, Noise Policy for Industry, Sydney

General Mechanical Engineering Standards Policy Committee, 1993, British Standard BS 7385-2:1993 – Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration

German Building and Civil Standards Committee, 1999, German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures

National Parks and Wildlife Service 2020, Developments adjacent to NPWS lands: Guidelines for consent and planning authorities, National Parks and Wildlife Service, Department of Planning Industry and Environment, Sydney, NSW.

OEH, 2017, Biodiversity Assessment Method

RMS, 2012, Land Acquisition Information Guide

RMS, 2015a, Noise Criteria Guideline

RMS, 2015b, Noise Mitigation Guidelines

RMS, 2017, At-Receiver Noise Treatment Guideline

RMS, 2018, Noise model validation guideline

RMS, 2016, Biodiversity Management Guideline: Protecting and Managing biodiversity on RTA Projects

Transport, 1999, Code of Practice for Water Management

Transport, 2001, Environmental Noise Management Manual

Transport, 2008, Community Involvement and Communications Resource Manual

Transport, 2010, Transport Traffic Control at Work Sites Manual

Transport, 2024, Biodiversity Management Guideline: Protecting and Managing biodiversity on Transport for NSW Projects

Transport, 2013, Guideline for the Management of Contamination

Transport, 2014, Beyond the Pavement: urban design policy, process and principles

Transport, 2016a, Unexpected Heritage Finds Guideline, Sydney

Transport, 2016b, Vegetation Offset Guide, Sydney

Transport, 2016c, Construction Noise and Vibration Guideline, Sydney

Transport, 2020, Guideline for landscape and visual impact assessment

Transport, 2022, Biodiversity Policy

Transport, 2023, Tree and hollow replacement guidelines

Appendix A: Biodiversity Assessment Memo

Memo

To:	Henry Fok
From:	Toby Lambert
Subject:	**Ousedale Creek Koala Underpass Biodiversity updates**
Our ref:	PS119368-WSP-SYD-ECO-MEM-00001 RevB
Date:	**20 June 2025**

1. Introduction

Appin Road is a major arterial road connecting South-Western Sydney to the Illawarra. It passes through the town of Appin, and the Wollongong, Wollondilly and Campbelltown Local Government Areas. It provides a key link for motorists travelling from the Illawarra to Campbelltown and is used for the transportation of freight from the coast at Port Kembla to South-Western Sydney via the town of Appin. It is sometimes used as an alternative route to Picton Road and has an average use of over 10,000 vehicles per day.

In response to community feedback during the exhibition of the Brian Road Intersection Upgrade Review of Environment Factors (REF), the proposed single-lane roundabout at the intersection of Brian Road and Appin Road and the road and embankment widening are no longer included in the scope. A number of other changes to the key features have been made and are provided in Section 3.

2. Existing environment

The Ousedale Creek Koala Underpass subject land follows Appin Road through areas of remnant bushland and disturbed agricultural/residential properties as it transitions through areas of a single Plant Community Type (PCT) with varying conditions. The 2022 surveys conducted by WSP found consistency with the previously completed mapping by Eco Logical in 2018, mostly expanding existing mapping to include small additional areas or where additional areas were of a lower condition than of surrounding previously mapped vegetation.

The native vegetation observed in the subject land corresponds with the characteristic assemblage species of PCT 3320. These species included *E. crebra*, *E. eugenioides* and *E. moluccana*. This vegetation community is listed as Critically Endangered under the *Biodiversity Conservation Act 2016* and the *Environment Protection and Biodiversity Conservation Act 1999*. Plant Community Type 3320: Cumberland Shale Plains Woodland corresponds to Cumberland Plain Woodland in the Sydney Basin Bioregion.

The vegetation in the subject land was separated into four types based on species composition and condition:

- PCT 3320: Cumberland Shale Plain Woodland – moderate condition
- PCT 3320: Cumberland Shale Plain Woodland – low condition
- PCT 3320: Cumberland Shale Plain Woodland – Derived Native Shrubland (DNS)
- Exotic vegetation or pastures.

The updated scope of works has not resulted in any alterations to the listed vegetation communities and condition classes within the Subject Land from the original REF boundary.

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2.1 Threatened species

2.1.1 Threatened flora

Based on the BioNet Atlas search, 41 threatened flora species listed under the BC Act have been previously identified in the locality. No threatened flora species have been identified within the Subject Land, however *Pimelea curviflora* var. *curviflora* and *Pimelea spicata* (Spiked Rice-flower) are considered moderately likely to occur within the Subject Land based on suitable habitat and distribution of these species.

2.1.2 Threatened fauna

Based on the BioNet Atlas search, 57 threatened fauna species listed under the BC Act have been previously identified in the locality. This includes 18 mammals, 30 birds, four frogs, two reptiles and three invertebrates. The Subject Land is known to provide habitat for the Koala, Little Lorikeet and Cumberland Plain Land Snail and is considered likely to provide habitat for 19 other threatened species including:

- Woodland Birds (Dusky Woodswallow, Scarlet Robin, Varied Sittella)
- Blossom Dependent Species (Swift Parrot, Grey-headed Flying-fox)
- Microchiropteran Bats (Greater Broad-nosed Bat, Eastern False Pipistrelle, Little Bent-wing Bat, Large Bent-wing Bat, Eastern Freetail Bat, Southern Myotis, Large-eared Pied Bat)
- Gliders (Squirrel Glider, Yellow-bellied Glider)
- Gang-gang Cockatoo
- Glossy Black-cockatoo
- Powerful Owl
- Diurnal Birds of Prey (Square-tailed Kite, Little Eagle).

These species listed above are considered to have a moderate or high likelihood of occurrence.

3. Changes to project scope of works

Following the exhibition of the REF and consideration of submissions, changes to the proposal have been made, including the removal of the single land roundabout. Key features of the revised scope of works include:

- a fauna underpass under Appin Road approximately 35m south of the intersection of Appin Road and Brian Road, comprising a reinforced concrete box culvert (3m wide, 2.4m high and about 36m long)
- refuge poles and tree logs at the fauna underpass entrances
- koala escape poles and koala escape hatches along Appin Road and Brian Road
- koala grids at property driveways and across Brian Road around 260m west of the intersection in line with the end of the koala exclusion fencing
- a new vegetated fauna path that will connect to the new fauna underpass leading to existing mature vegetation within the proposal boundary
- safety barriers and koala exclusion fencing on roadside locations
- fauna fence drop downs at either side of the underpass to allow trapped fauna inside the road reserve to escape
- installation of relocated utilities including drainage, roadside furniture, pavement markings, street lighting and signage
- reinstatement of vegetation through the restoration of koala habitat
- establishment of a temporary road for diversion of Appin Road, ancillary facilities and lay down locations to support the work
- pedestrian access gates adjacent to the koala grids at residential driveways.

The reduction of the project boundary at the northern end of the proposal site has resulted in reduced clearing requirements. An updated biodiversity assessment was required to determine the biodiversity impacts of the revised proposal boundary, particularly in terms of vegetation removal. Updates to the biodiversity assessment were also required to address the design change to the dimensions of the koala underpass, as well as the additional koala escape poles, koala grids, koala escape hatches and fauna furniture included in the updated proposal scope.

3.1 Changes to construction impacts

3.1.1 Removal of native vegetation

The amended design is expected to result in the removal of 5.96ha of vegetation in total, including 3.37ha of exotic vegetation, 2.58ha of native vegetation communities, of which 2.26ha is listed both under the EPBC and BC Acts – Cumberland Plain Woodland and Shale Sandstone Transition Forest. Assessments of the significance of impact were undertaken in accordance with the EP&A Act and EPBC Act for Cumberland Plain Woodland and Shale Sandstone Transition Forest to determine the likely impact on these communities. No significant impact for both state listed *BC Act* and federally listed *EPBC Act* species or communities are expected from the current project works. Table 3.1 outlines the impact of original Brian Road Intersection Upgrade REF in comparison to the current Ousedale Creek Koala Underpass REF.

Table 3.1 Summary of direct impacts on native vegetation

Veg. zone	Plant community type (PCT)	Broad condition class	TEC	Original area to be impacted (ha or m²)	Refined area to be impacted (ha or m²)	Difference
Zone 1	PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically Endangered (BC Act and EPBC Act)	2.32ha	2.26ha	0.06ha less impact
Zone 2	PCT 3320: Cumberland Shale Plains Woodland	Low	Critically Endangered (BC Act)	0.26ha	0.26ha	No change
n/a	PCT 3320: Cumberland Shale Plains Woodland	DNS	Critically Endangered (BC Act)	0.07ha	0.07ha	No change

3.1.2 Removal of threatened fauna habitat

The revised proposal would result in the removal of five hollow-bearing trees (seven hollows in total), with hollows ranging in size from five centimetres to 25 centimetres. The proposal would also remove a total of 2.52ha of woodland supporting flowering tree species such as Eucalypts; 0.07ha of vegetation supporting shrubland and 3.37ha of exotic vegetation. The number of hollows removed does not differ from the original proposal. However, there is a reduction in the threatened fauna habitat impact area from 2.58 ha to 2.52 ha which represents a <0.06 ha reduction in potential impact to the 22 threatened fauna species mentioned in Section 2.1.2.

3.1.3 Removal of threatened flora

While there is potential habitat for *Pimelea curviflora* var. *curviflora* and *Pimelea spicata* no threatened flora species were identified within the proposal site therefore, the proposal is unlikely to result in the removal of any known threatened flora species.

3.1.4 Injury and mortality

Fauna injury or death has the greatest potential to occur during construction when vegetation clearing occurs. The extent of this impact would be proportionate to the extent of vegetation that is cleared. The highest risk of injury and mortality would be most likely along the southern edge of the intersection of Brian Road and Appin Road where there is greater connectivity of remnant native vegetation along Brian Road and to the east of Appin Road. Less mobile species (e.g. ground-dwelling reptiles), or those that are nocturnal and nest or roost in trees during the day (e.g. arboreal mammals and microbat species), may find it difficult to rapidly move away from vegetation clearing when disturbed. The proposal site is only likely to contain a limited number of arboreal species (e.g. possums) and birds that may be impacted during vegetation removal. Reptiles and frogs may be impacted during construction as the habitat is cleared.

Entrapment of wildlife in any trenches or pits that are dug is a possibility if the trenches are deep and steep-sided. Wildlife may become trapped in or may choose to shelter in machinery that is stored in the proposal site overnight. If these animals were to remain inside the machinery, or under the wheels or tracks, they may be injured or may die once the machinery is in use.

Construction would result in increased activity of plant equipment and vehicles entering the proposal site, which would increase the chance of accidental fauna mortality from collisions. Such incidents would create a direct impact on population numbers but are considered to be unlikely to occur and not result in a significant impact on local fauna populations.

A temporary fauna fence would be installed for the construction of the proposal to restrict fauna movements into the proposal site. A Flora and Fauna Management Plan will be prepared in accordance with Transport's *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Projects* (Transport 2024) and *The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* (DPE 2023). This plan would ensure injury and mortality, particularly to koalas and the Cumberland Plains Land Snail, are minimised and mitigated during construction activities. The contents of this plan are outlined in updated mitigation measures presented below.

3.2 Changes of operational impacts

3.2.1 Edge effects on adjacent native vegetation and habitat

Due to the small width of roadside vegetation proposed for removal, the activity is not expected to significantly increase the impacts of edge effects on any vegetation in the proposal site, including corridors or active or proposed biobank sites.

3.2.2 Wildlife connectivity and habitat fragmentation, injury and mortality

The installation of koala exclusion fencing on both sides of Appin Road in conjunction with an underpass connecting the Ousedale Creek koala corridors would reduce the likelihood of vehicle strikes at these locations, which means fewer koalas would be injured or killed by vehicles. The additional koala grid across Brian Road would increase the effectiveness of the koala exclusion fencing. The new koala escape poles and escape hatches along Appin Road and Brian Road would further limit the number of koalas injured or killed by vehicles as they would be able to get off the road and find refuge at multiple locations along the proposal site.

The underpass would further allow for movement to, between or within the habitat critical to the survival of the koala on either side of Appin Road. The design change to the underpass is expected to benefit koalas. Culverts, typically concrete box culverts, have been installed on many roads around Australia and the world to facilitate the movement of wildlife under roads. Concrete box culverts are a standard installation option in New South Wales and Queensland for koalas, with many studies and evaluations showing they are readily used by the species. The larger size of the box culvert compared to the pipe should benefit koala connectivity as evidenced by TfNSW monitoring showing successful koala use of these structures. See fauna connectivity database here Biodiversity | Transport for NSW. Koala use of the structures would be subject to a monitoring program using cameras.

The design of the underpass includes fauna rails located inside to be installed within the culvert which would allow koalas to avoid predators. Refuge poles would also be installed at the entrances of the underpass. Noise and light impacts are not expected to influence koalas' use of the underpass given they already possess some tolerance to anthropogenic disturbances. A new vegetated fauna path will be developed to connect the new fauna underpass to existing mature vegetation within the proposal boundary with reinstatement of vegetation through the restoration of koala habitat. Drainage swales on the western side have been modified since exhibition to allow the widest possible entrance angles to facility koala access.

3.3 Revised safeguards and management measures

The biodiversity safeguards presented in the original REF would remain applicable. Additional and/or modified environmental safeguards and management measures to those presented in the REF have been bolded and deleted measures, or parts of measures, have been struck out.

Table 3.2 Biodiversity safeguards

Impact	Environmental safeguard	Responsibility	Timing	Reference
Impacts to biodiversity	A Flora and Fauna Management Plan (including koala focus) will be prepared in accordance with the ~~*Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects* (RTA 2011)~~ **Transport's *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW projects* (Transport 2024)** and *The Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* (DPE 2023) and implemented as part of the CEMP. It will include, but not be limited to: — plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas — requirements set out in the Guideline for landscape character and visual impact assessment (Transport 2020) — pre-clearing survey requirements — procedures for unexpected threatened species finds and fauna handling — procedures addressing relevant matters specified in the DPI Policy and guidelines for fish habitat conservation and management (2013) — protocols to manage weeds and pathogens — **hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.** The koala component shall include content (including that required in the CPCP) on: — temporary koala exclusion fencing to be installed **as an immediate priority of the** enabling work~~s~~ — permanent koala exclusion fencing to be installed for the operation phase to encourage the use of the new safe connectivity structure — new connectivity structure under Appin Road to be installed — **drainage swales on the western side will be designed with the widest possible entrance angles and batters no steeper than 1:4 on the southern side** — **koala refuge poles extending to the proposal boundary on the eastern and western sides of the underpass** — **removal of any property boundary fencing (or other structures) within project boundaries likely to impede koala access to structures.** — **koala use of the structures will be subject to a monitoring program to test the impact of revegetation activities on koala usage of the underpass** — before vegetation is removed, a suitably qualified ecologist must assess the subject land and do pre-clearance surveys **prior to the proposed clearing** for koalas. If koalas are identified, implement a tree-felling protocol	Contractor	**Detailed design/ pre-construction/ during construction / post construction**	Section 4.8 of QA G36 Environment Protection Additional Safeguard

Impact	Environmental safeguard	Responsibility	Timing	Reference
	— **an ecologist will do a final pre-clearing check for koalas immediately prior to tree removal and will be present during all clearing operations** — **a stop work protocol will apply if a koala is found to be present in a tree.** **Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following:** — **a pre-clearing survey by an ecologist to confirm clearing boundaries, exclusion zones, protected habitat features including habitat trees, relocation areas for any displaced fauna and revegetation areas prior to starting work** — **on-site, full-time supervision by ecologist to inspect habitat tress including fallen tree hollows for fauna** — **relocation of any fauna discovered to nearby bushland prior to commencing clearing as appropriate** — **liaison with local wildlife organisations in the case of injured fauna where necessary** — **measures to ensure the safety of koalas during the construction of the infrastructure, including traffic calming measures** — **koala escape poles and hatches will be installed within 100m of the southern fence ends, within 100m of the fence ends on Brian Road and within 100m north of the intersection. Escape poles should be made from 200-300mm timber (Æ timber), with the centre of the outer (roadside) pole 300mm from the fence and the inner pole ending 1200mm above ground level. Both the outer and inner poles should extend above the horizontal connector to provide resting points. An angled brace may be required to support the horizontal connector. A sheet of galvanised steel should be installed on the fence adjacent to the inner pole.** — ~~for development within the Koala habitat protected Flora and Fauna Management Plan will be developed and implemented which includes:~~ — ~~before construction, temporary exclusion fencing to prevent Koalas from entering the subject land~~ — ~~hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.~~			
Impacts to biodiversity	**Ensure any fauna encountered onsite would be managed in accordance with Transport for NSW Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects Guide 9 (Fauna Handling) (Transport for NSW, 2024)**	**Contractor**	**Pre-construction**	**Standard safeguard**

Impact	Environmental safeguard	Responsibility	Timing	Reference
Removal of native vegetation	**A Biodiversity Offset Strategy will be implemented. The Biodiversity Offset Strategy will include details of seed collection prior to clearing, tree hollow salvage and a koala habitat tree replanting program strategy in consultation Wollondilly Shire Council and the Department of Planning, Housing and Infrastructure to support the commitments in the CPCP.**	**Transport**	**Detailed design**	**Additional safeguard**
Groundwater dependant ecosystems	**Interruptions to water flows associated with groundwater-dependent ecosystems would be minimised through detailed design.**	**Transport/ contractor**	**Detailed design/ pre-construction**	**Standard safeguard**
Pathogen management	**Ensure the Flora and Fauna Management Plan includes management measures to control and/or prevent the introduction and/ or spread of disease-causing agents such as bacteria and fungi by Guide 7 of the Biodiversity Management Guideline: Protecting and Managing Biodiversity of Transport for NSW Projects (Transport 2024)**	**Contractor**	**Pre-construction**	**Standard safeguard**
Invasion and spread of weeds	**A Weed Management Plan will be prepared in accordance with *Guide 6: Weed management* of the *Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW Projects* (Transport 2024). It will include:** **— the identification of weeds on site (confirmed during the pre-clearing survey)** **— weed management priorities and objectives** **— exclusion zones, protected habitat features and revegetation areas prior to starting work within or directly next to the site** **— the location of weed-infested areas** **— weed control methods** **— measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements** **— a monitoring program to measure the success of weed management communication with local Council noxious weed representatives.**	**Contractor**	**During construction**	**Standard safeguard B12**

3.4 Biodiversity offsets

The proposal contains 2.59ha of native vegetation (0.06ha less impact than the original design) and 3.37ha of exotic vegetation. The offsetting requirements were determined in accordance with:

- Transport Biodiversity Policy
- No Net Loss Guidelines and supporting resources
- Tree and Hollow Replacement Guidelines and supporting resources.

An assessment of vegetation impacts against the offset thresholds is provided in below in Table 3.3.

Table 3.3 Offset thresholds from the proposed impacts

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?
1	PCT 3320: Cumberland Shale Plains Woodland	Moderate	Critically Endangered (BC Act and EPBC Act)	2.26	Offset threshold triggered of work involving the clearing of a CEEC
2	PCT 3320: Cumberland Shale Plains Woodland	Low	Critically Endangered (BC Act)	0.26	Threshold not triggered, however tree and hollow replacement guidelines regarding tree removal replacement
N/A	PCT 3320: Cumberland Shale Plains Woodland	DNS	Critically Endangered (BC Act)	0.07	Threshold not triggered

The subject land contains 2.26ha of PCT 3320 in moderate condition that will trigger offset thresholds under the Transport No Net Loss Guidelines. Transport will also implement a tree and hollow replacement plan for vegetation removal of low-condition PCT3320. Within the subject land, outside of moderate condition PCTs, there was a total of 67 trees consisting of:

- 25 small trees
- 27 medium trees
- 15 large trees

In relation to the tree and hollow replacement requirements, this would result in planting a minimum of 278 trees to replace those being removed. If replacement is not feasible, or the entire replacement cannot be accommodated locally or can only be partially met, any remaining requirement can be met by transferring funds into the Transport Conservation Fund as per rates outlined in the Tree and Hollow replacement guidelines. If tree and hollow replacement is not feasible, the required minimum contribution would be $31,625. A breakdown of the required contributions and/or replacements is outlined below.

Table 3.4 Tree and hollow replacement plan requirements

Tree size category	Total number of trees/ hollows	Replacement requirements	Contribution requirement
Large tree (DBH 50cm-100cm)	15	Plant a minimum of eight trees = 120 trees	$1000/tree = $15,000
Medium tree (DBH 20cm-49cm)	27	Plant a minimum of four trees = 108 trees	$500/tree = $13,500
Small tree (DBH 5cm-19cm)	25	Plant minimum 2 trees = 50 trees	$125/tree = $3,125
TOTAL	**74**	**278 trees**	**$31,625**

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