

Appin Road Upgrade, Mount Gilead to Ambarvale

Addendum Review of Environmental Factors
Submissions Report

January 2024



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.



Document control

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Versions

Version	Date	Amendment notes
V01	09/01/2023	Draft Response to Submissions for review by Lendlease
V02	23/01/2023	Draft Response to Submissions for review by Transport for NSW
V03	02/03/2023	Second Draft Response to Submissions for review by Lendlease
V04	20/03/2023	Draft Response to Submissions for review by Transport for NSW and Lendlease
V05	11/04/2023	Final Draft Response to Submissions report
V06	12/10/2023	Final Response to Submissions report, including refinements to the proposal and additional assessments – internal review.
V7	19/10/2023	Final Response to Submission Report, including additional assessment, updated figures, changes to text throughout.

Prepared by EMM Consulting Pty Limited and Lendlease Communities (Figtree Hill) Pty Limited for Transport for NSW.



Executive summary

The activity

The Appin Road Upgrade, Mount Gilead to Ambarvale, is the staged upgrade of a 5.4 kilometre section of Appin Road between Mount Gilead in the south and the intersection with St Johns Road, Ambarvale to the north. The Project includes intersection upgrades, widening part of the road from two to four lanes and the construction of new intersections for access to the proposed (and approved) Mount Gilead residential subdivision.

The *Appin Road Upgrade, Mount Gilead to Ambarvale Review of Environmental Factors (REF)*¹ was prepared for the Appin Road Upgrade in November 2018 (referred to in the Addendum REF (AREF) and this Submissions Report as the 'Project REF'). The Project REF was placed on public display between 19 November 2018 and 14 December 2018 for community and stakeholder comment. A Submissions Report, dated March 2019, was prepared to respond to issues raised.

One of the key issues raised in the response to submissions (March 2019), was the lack of safe passage of koalas across Appin Road. To address this issue, an AREF was prepared to modify the Project REF to facilitate the inclusion of two koala crossings under Appin Road and koala exclusion fencing on the eastern side of Appin Road (proposed amendments to the activity). Key features of the AREF included:

- Glen Lorne (Corridor A) koala underpass (single 2.4m diameter pipe) under the widened four-lane road
- Interim Browns Bush (Corridor B) koala underpass (twin 1.2m diameter pipes) under the existing two-lane alignment
- Inclusion of fauna furniture and monitoring equipment
- Koala grids along existing rural residential access points, existing fire trails and bushland access points
- Amended fence type at Beulah Biobank site (koala exclusion fencing) [southern portion]
- Amended fence type at Noorumba Reserve (koala exclusion fencing) [northern portion]
- Construction fencing.

¹ [Project documents - Appin Road improvements - Projects - Roads and Waterways – Transport for NSW](#)

Following exhibition of the AREF and consideration of submissions, further design refinements have been made and additional environmental safeguards proposed in this Submissions Report, as described below.

- Glen Lorne (Corridor A) koala underpass (single reinforced concrete box culvert (RCBC) 2.4 metres (h) x three metres (w) x 53 metres long), perpendicularly aligned to Appin Road at the southern edge of Noorumba Reserve (in the same general location as the AREF) with an elevated timber rail (1.5 metres above floor level) through the underpass and refuge poles at each end.
- Interim Browns Bush koala underpass (single RCBC 1.5 metres (h) x 2.4 metres (w) x 30 metres long), with a ledge approximately 400mm wide and raised 300mm above the ground.
- Re-aligned koala exclusion fencing designed to better guide koalas to the underpasses and improved 'tie-ins' with existing fencing and proposed noise walls (refer Section 4.4.1)
- Installation of 'to-specification' koala grids (refer Section 4.4.2)
- Addition of timber refuge poles outside RCBC openings to connect the underpass to nearby habitat (refer Section 4.3.2)
- Addition of timber escape poles which aim to enable koalas to escape from the road corridor (for example, should they enter the road corridor from the north through the suburb of Rosemeadow) (refer Section 4.4.3)
- The preparation and implementation of a Koala Monitoring and Adaptive Management Plan (refer Section 4.4.4).

Display of the Addendum Review of Environmental Factors (AREF)

The AREF was prepared by EMM Consulting Pty Ltd for Lendlease by or on behalf of Transport for NSW. For the purposes of the proposed works for the Project REF and AREF, Transport for NSW is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The AREF facilitates the proposed koala crossings, koala exclusion fencing and associated works and was publicly displayed between 22 November to 13 December 2022. The AREF and community update were placed on Transport for NSW's website and submissions portal and made available for download.²

There were approximately 1,500 visitors to the website, more than 200 downloads of the AREF documentation and more than 180 downloads of the community update. A media

² [Appin Road Upgrade - Mount Gilead to Ambarvale | Your Say Transport for NSW, available at yoursay.transport.nsw.gov.au/appin-road-upgrade](https://yoursay.transport.nsw.gov.au/appin-road-upgrade)

release on the proposed koala crossings and community consultation was also published by Transport for NSW on 5 December 2022.³

In addition to the above public display, a community event was held during the consultation period to give the community a chance to learn more about the proposal and provide feedback. This event took place on 3 December 2022 at Bradbury Markets, Bradbury between 9am and 2pm.

The purpose of the community consultation was to:

- inform community members and stakeholders about the AREF
- seek comments and submissions from the community and stakeholders.

Community members and stakeholders were asked to make submissions via the online form, email and mail or at the community market stall directly to the project team. The community consultation strategy included:

- email to local council(s), local State MP(s), the community and interested stakeholders
- letterbox drop to residents and businesses within 400 metres of the project site
- geo-targeted social media advertisement
- provision of a copy of the Archaeological Research Design (ARD) to the Project Registered Aboriginal Parties.

As part of the community consultation strategy, details of the public exhibition were advertised on Facebook reaching around 22,244 users in the local community through geo-targeting. The advertisement generated 152 Facebook comments (from 96 individual users), 28 shares and 975 link clicks to the website.

Transport for NSW received and considered a total of 93 submissions, including 88 submissions received during the exhibition period, and six late submissions including one from Dr Phillip's, on behalf of the International Fund for Animal Welfare, that was received received in April 2023. These submissions included:

- 84 from the general community (of which 56 were local, 22 were not local and 6 unspecified)
- six from special interest groups/non-government organisations (NGOs)
- one from Campbelltown City Council
- two from Members of Parliament.

Of the 93 submissions:

- 39% were supportive of the proposed amendments to the activity
- 19% were supportive but had design concerns

³ [Koala crossings to feature in safety upgrades throughout Sydney's south-west | Transport for NSW](#)

- 22% were neutral (with a number of these submissions identifying out-of-scope issues)
- 20% were non-supportive due to technical aspects of the proposed amendments to the activity or were opposed to other matters not directly related to the proposed amendments to the activity.

Summary of submissions and responses

Proposed amendments to the activity/ design alternatives / suggestions

Forty percent of responses proposed alternatives and suggestions to various design elements of the proposed underpasses. Specifically, 20% of the submissions received included feedback on the size, 15% related to the shape and 5% included suggestions on the number of underpasses. Most of these submissions suggested larger box culverts should be used, with specific reference to their suitability for larger fauna. The use of koala exclusion fencing, fauna furniture and fauna grids were also raised. Two submissions specifically mentioned that according to another ecologist, the design of the underpasses as proposed in the AREF is 'suboptimal'.

In response to these submissions and the receipt of additional advice by koala expert, Dr Steven Ward, a number of design refinements and amendments to the environmental management measures are proposed to address concerns raised about the size, shape and the number of underpasses included in the activity.

The proposed design refinements include the use of larger aperture underpasses in the form of rectangular reinforced concrete box culverts (RCBCs) rather than round pipes. The number of underpasses has not increased for the following reasons:

- A permanent larger structure, more suitable to a 4-lane road alignment (in the vicinity of the Browns Bush underpass: Corridor B – Woodhouse Creek to Beulah Biobank site) will be constructed in the future (refer Section 3.4.1)
- The locations of the two underpasses are consistent with the NSW Chief Scientist's advice relating to the road areas that the AREF covers (refer Section 3.4.2)
- It is noted that koala crossings can only be located where there is habitat/vegetation connectivity and therefore it is not feasible to construct underpasses every 500 metres.

A detailed description of the proposed design refinements is provided in the 'Refinements to the activity' section below in the Executive summary and Chapter 4 of the main report.

Consistency with NSW Chief Scientist's report and expert scientific advice

An issue was raised that the proposed amendments to the activity are not consistent with expert scientific advice including that of the NSW Chief Scientist (Advice on the protection of the Campbelltown koala population (Office of the NSW Chief Scientist & Engineer (OCSE) 2020), the Advice regarding the protection of koala populations associated with the Cumberland Plain Conservation Plan (CPCP) (OCSE 2021)), Dr Phillips (report of 19 August 2019 and 17 April 2023) and another ecologist (who commented in their capacity as a private citizen).

Fourteen submissions related to the NSW Chief Scientist advice, with six concerned that the proposed amendments to the activity 'downgrade the objectives of the Chief Scientist's report' and one specifically querying if the height and width of the underpasses meet specified requirements in the NSW Chief Scientist's report. The rest were general in nature.

It is noted that the Project REF was prepared and exhibited in 2018 (and determined in early 2019), prior to the release of the first, and subsequent, reports from the OCSE. Following the release of these documents, and the publishing of the CPCP in August 2022, the AREF was prepared to facilitate relevant requirements in relation to the protection and management of koalas set out in the NSW Chief Scientist's reports and CPCP.

The proposed works are intended to meet the objectives of the NSW Chief Scientist's report which supports and facilitates "stabilising and increasing koala numbers over the longer-term to ensure genetically diverse and viable populations across NSW." The proposed koala crossings and koala exclusion fencing will ensure that koalas can move safely between habitat areas, protecting koala numbers from decline by vehicle strike while facilitating genetic diversity, assisting with longer-term stability and population increase.

The Project REF and AREF include the provision of koala exclusion fencing on both sides of Appin Road between the northern extent of Noorumba Reserve and the southern extent of Beulah biobank site. The other section of Appin Road, between Beulah biobank site and the northern limit of residential development in Appin, does not form part of the Project REF or the AREF scope. That section forms part of the Appin Road Safety Improvements and Brian Road Intersection Upgrade work proposed by Transport for NSW. Notwithstanding, coordination with the Appin Road Safety Improvements project has been captured as an additional safeguard (refer Table 6-1). The safeguard makes provision for the installation of Type 2 koala exclusion fencing south of the Beulah Biobank site on both sides of Appin Road for 700 metres (refer Figure 1-1). This will be implemented if the Appin Road Upgrade is constructed as a standalone project or prior to the Appin Road Safety Improvements project being constructed. This additional fencing would be subject to an additional environmental assessment.

The CPCP, which is an outcome of the NSW Chief Scientist's report, outlines that koala exclusion fencing will be installed along the "section of Appin Road where it passes through koala habitat". The proposal is consistent with current NSW Government policies and recommendations outlined in the NSW Chief Scientist's report as it provides koala exclusion fencing on both sides of Appin Road from the northern extent of Glen Lorne Reserve to the southern extent of Browns Bush, where it ties into the proposed fencing under the Appin Road Safety Improvements project. The Appin Road Upgrade, along with the Appin Road Safety Improvements project and Brian Road Intersection Upgrade, have provided a coordinated approach to ensure Appin Road has koala exclusion fencing on both sides for a continuous length of about 7.6km, between Mt Gilead and Appin.

In regard to connectivity structures, Lendlease had publicly raised the idea of a tree-top bridge at Glen Lorne as part of their draft Koala Management Plan. It is noted that this design is not included in the Project REF or AREF. The NSW Chief Scientist responded to the idea, stating "*the Menangle Creek to Noorumba Reserve corridor (A) should be used for koala*

movement if a connectivity structure can feasibly be constructed on Appin Road. The proposed tree-top bridge is not likely to be adequate and would not be used by koalas. A land bridge should be considered to allow koalas and other fauna to cross Appin Road, an example of this is being developed for wallabies at Mona Vale”.

A land bridge (overpass) was considered but wasn't deemed to be a viable option at Glen Lorne as the area required for construction would detrimentally impact the biobank site (refer Sections 3.4, 3.5 and 4.1 for further discussion) and require extensive vegetation clearance, in the order of 8.1ha. The design refinements provide an option which is preferable as it limits impacts to the existing biobank site, which is also koala habitat, while providing koala connectivity via an underpass designed to maximise useability for koalas.

The NSW Chief Scientist's report does not prescribe design criteria for koala crossings.

Dr Phillips' advice (August 2019) was considered by the OCSE independent expert panel, who were responsible for issuing the OCSE reports used to inform the CPCR. In assessing the works proposed by the AREF, it is these most recent documents issued by the NSW Government that have been adhered to by Transport for NSW and Lendlease. Dr Phillips' submission (April 2023) was considered, and refinements made to the proposed amendments to the activity where feasible and supported by best practice research and results.

Approval process is not satisfactory

Seventeen percent of submissions received raised concerns about lack of transparency during the planning approval process and independence/adequacy of the environmental assessments that were undertaken. One submission mentioned that Dr Stephen Phillips advised that an environmental impact statement (EIS) should have been required instead of the Project REF and that it was Dr Phillips' opinion that the proposed activities were likely to significantly impact koalas.

Lendlease has worked with Transport for NSW to ensure all the reports relating to the proposed refinements/amendments to the activity have been rigorously reviewed. All submissions have been received by Transport for NSW. Quality Assurance measures have been implemented throughout the process. All submissions are recorded, reviewed, and confirmed in association with Transport for NSW.

All aspects of the environment potentially impacted upon by the activity as modified have been considered in the AREF document.

A significant impact to a threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* does not specifically trigger the Division 5.2 state significant infrastructure/EIS planning pathway under the *EP&A Act*. Section 7.8(4) of the BC Act provides that if the likely significant effect on threatened species is the only likely significant effect on the environment, an EIS may be dispensed with and Part 5 (div 5.1) of the *Environmental Planning and Assessment Act 1979* applies as if references to an EIS were references to a species impact statement (SIS) or biodiversity development assessment report (BDAR). The biodiversity assessment concluded that the proposal was unlikely to have a significant impact

on threatened species or threatened ecological communities therefore an SIS or BDAR is not required.

The AREF and this Submissions Report gave consideration to previous Transport for NSW road projects to determine suitable underpass structures at Appin Road based on the experience in other parts of NSW (See Appendix I of the AREF) and Transport for NSW [Koala connectivity report \(7 July 2023\)](#).

As part of this Submissions Report, *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act) assessments of significance for impacts to the koala and other NSW and Commonwealth listed species have been reviewed and updated (refer Chapter 5 and Appendix B) to ensure that the likelihood of significant impacts to these species arising from the works proposed by - the Project REF, the AREF, additional refinements made in response to submissions and other minor boundary adjustments to accommodate detailed design - have been comprehensively assessed. This additional assessment has confirmed that the overall project, including the proposed amendments to the activity, is unlikely to have a significant impact on the koala or any other NSW or Commonwealth listed species.⁴

There is no requirement under the *Environmental Planning and Assessment Act 1979* or *Environmental Planning and Assessment Regulations 2021* for the independent assessment of proposed amendments to the activity.

One submission requested an extension of the exhibition period. The AREF was publicly displayed for the required 21 days, with the exhibition period finishing 16 days before Christmas. The duration of the exhibition period was consistent with the requirements of the Transport for NSW REF procedure. Notwithstanding, six submissions received after the closing date were still accepted and addressed within this Submission Report, one of which was provided by Dr Stephen Phillips (April 2023).

Construction impacts on koalas

Several environmental safeguards and management measures have been added/amended that relate to construction impacts as well as operation. In addition, fencing will occur sequentially to (and prior to) each section of works to ensure full coverage during construction. Consultation with adjacent roadwork projects will occur to ensure continuity with the overall fencing strategy.

Refinements to the activity

In response to the submissions received following the display of the AREF, and receipt of additional advice from Lendlease's koala expert, Dr Steven Ward, several refinements are proposed to the design and mitigations measures. These include:

- Glen Lorne Underpass:

⁴ [Appendix B \(Biodiversity Impact Assessment for Addendum Appin Road Upgrade Review of Environmental Factors – Gilead to Ambarvale NSW\) p13.](#)

- A Reinforced Concrete Box Culvert (RCBC) 2.4 metres (h) x three metres (w) x 53 metres long, perpendicularly aligned to Appin Road at the southern edge of Noorumba Reserve (in the same general location as the AREF), is now proposed instead of a single round concrete pipe (2.4 metres in diameter).
- An elevated timber rail (1.5 metres above floor level) will be installed and be directed towards refuge poles at each end.
- Interim Browns Bush Underpass:
 - One RCBC 1.5 metres (h) x 2.4 metres (w) x 30 metres long, is now proposed instead of twin round concrete pipes (each 1.2 metres in diameter).
 - A ledge will be installed to help provide dry, safe passage under the road. The ledge will be placed on one side of the underpass and be approximately 400mm wide and raised 300mm above the ground.
- Batters to underpass openings will be no steeper than a 16% gradient.
- Re-aligned koala exclusion fencing designed to better guide koalas to the underpasses and improved 'tie-ins' with existing fencing and proposed noise walls (refer Section 4.4.1).
- Installation of 'to-specification' koala grids (refer Section 4.4.2).
- Addition of timber refuge poles outside RCBC openings to connect the underpass to nearby habitat (refer Section 4.3.2).
- Addition of timber escape poles which aim to enable koalas to escape from the road corridor (for example, should they enter the road corridor from the north through the suburb of Rosemeadow) (refer Section 4.4.3).
- If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then:
 - Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700 metres south of Beulah Reserve on both sides of Appin Road.
 - Install the fence within 12 months of substantial completion of Lendlease's exclusion fencing at Beulah Reserve or at another date as agreed by Transport.
- The preparation and implementation of a Koala Monitoring and Adaptive Management Plan (refer Section 4.4.4).
- Minor realignment of the project boundary to accommodate the design refinements, including:
 - at the eastern exit of the Glen Lorne underpass to accommodate the new perpendicular alignment of the Glen Lorne underpass.
 - at the western exit of the Glen Lorne underpass to accommodate required drainage pipeline.

- along the eastern side of Appin Road to accommodate high voltage connection point.
- at the eastern side of Appin Road, to accommodate a new material storage and compound location for construction purposes.

Based on the design refinements and amendments to management measures proposed in response to submissions and inputs from ecological (specifically koala) experts, the activity provides the best possible outcome for the local koala population, taking account of project scope and constraints.

Additional assessment

The Biodiversity Impact Assessment, which provides an assessment of the likely impact to threatened species and ecological communities together with the Assessment of Significance, was prepared for the AREF and has been updated to address proposed design refinements and to accommodate the detailed design (refer Chapter 5).

The updated assessment states that:

‘by addressing connectivity, the conclusion is that the impacts anticipated by the original REF, as amended, and the additional impacts arising from the addendum REF, plus the additional refinements to the proposal in response to submissions received and other minor REF boundary adjustments to accommodate the detailed design are unlikely to have a significant impact on the koala or any other NSW or Commonwealth listed species’ and that ‘all residual impacts will be offset in accordance with the RMS Offset Guidelines (RMS 2016) and a Biodiversity Offset Strategy will be prepared prior to the commencement of the action’.

Section 5.2 summarises the heritage assessments that have already been undertaken for additional disturbed areas within the updated project footprint. The updated assessment states that:

‘The works proposed as part of Fauna Underpass Impacts (additional) extend the area of impact to the northwest of that area assessed under the Archaeological Technical Report (ATR). The proposed impacts will occur within the same landform, and in immediate proximity to the testing area (Figure 2 of the ATR). The assessment of the ATR can be applied to Fauna Underpass Impacts (additional) without the need for further archaeological excavations.

The additional area reflective of the high voltage connection point fall outside of the previous assessment and as such there is potential for historical archaeology (associated with the former carriageway) to be present within the material compound and storage location. As the consultant has identified archaeological potential, an unexpected finds procedure is not adequate as the archaeological resources are expected. Therefore, a monitoring or test excavation in accordance with the s139 exceptions ([Section 139\(4\) excavation permit exceptions | NSW Environment and Heritage](#)) would be appropriate, compliant with The Heritage Act and consistent with best practice.

An additional management measure has been incorporated that will require monitoring by a suitable qualified person during initial ground disturbance with the material compound and storage location.

Section 5.3 summarises the additional traffic and transport assessment for impacts to property access as a result of the proposal.

Section 5.4 assesses the impact of the proposed changes to all other environmental factors.

New and revised management measures

Additional environmental safeguards and management measures have been added, following expert input from koala ecologist Dr Steven Ward and in response to suggestions raised in submissions. A summary of updated environmental safeguards and management measures additional to those presented in the AREF is provided below. The full list of environmental safeguards, along with responsibility and timing, is provided in Table 6-1 Summary of environmental safeguards and management measures.

Impact	Environmental safeguard	Reference
Koala underpasses	<p>The following design features will be included as part of any koala underpass:</p> <ul style="list-style-type: none"> • Fauna underpass will be installed within 12 months of the completion of the fauna exclusion fencing • Fauna furniture will be included in and at the entrances to each of the underpasses, and should include (but not be limited to) <ul style="list-style-type: none"> – Escape poles (x8) installed within 100m of the underpass on both sides of Appin Road. Placed with the centre of the outer (roadside) pole 300mm from the fence, and the inner pole ending 1200mm above ground level – Refuge poles (200mm (d) x 4m (h) with a fork at 3m above ground, extending to closest forest vegetation at 8-10m spacing – Install within culvert, elevated timber rail minimum 1.5m above ground, extending length of structure and connected to refuge poles at apron edge. – Install from apron edge, refuge poles (200mmD, 4m above ground, fork at 3m above ground level) extending to closest forest at 8-10m spacing 	Additional safeguard B16

	<ul style="list-style-type: none"> – Place logs on batters to assist koalas accessing the underpasses. • A natural light source will be provided to the middle of the Glen Lorne underpass • Native revegetation at ingress/egress to culverts including koala feed tree and shrub species • Monitoring (for a minimum period of two years) of underpasses via the use of devices such as infrared sensor cameras, will occur at each underpass entry/egress point to identify what animals are using the underpasses and at what times • Monitoring data will be provided to Transport for NSW on an annual basis once construction of the underpasses and installation of the cameras has been undertaken. 	
<p>Koala exclusion fence design features</p>	<p>The following design features will be included as part of any koala exclusion fence:</p> <ul style="list-style-type: none"> • Installation of koala grids at all feasible access points to Appin Road in the relevant section. Tie in fencing at these grids will incorporate a fenced return in accordance with the detailed design • All tie-ins with existing fencing and the proposed noise walls will be designed to avoid gaps that could allow koala access to Appin Road • Fencing alignments will be designed to guide koalas to underpass entrances and avoid sharp angles that may impede koala movement • Fencing will occur sequentially to (and prior to) each section of works, to ensure full coverage during construction • If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then: <ul style="list-style-type: none"> – Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700m south of Beulah Reserve on both sides of Appin Road 	<p>Additional safeguard B17</p>

	<ul style="list-style-type: none"> – Install the fence within 12 months of substantial completion of Lendlease’s exclusion fencing at Beulah Reserve or at another date as agreed by Transport. 	
Pre-clearing survey and management for Koala	<ul style="list-style-type: none"> • Where possible, all clearing for construction will be scheduled to occur during periods outside of the koala breeding season (September to December). • When clearing occurs during the koala breeding season, additional management measures including pre-clearance surveys and presence of a qualified fauna management team will be implemented, including • Two stage clearing in accordance with Transport for NSW guidelines. • Additional pre-clearance surveys to confirm that vegetation is free of koalas prior to clearing on a daily basis, including thermal drone imaging of all trees on the morning of clearing. • Should koala be present, then work will cease in the vicinity of the koala until the koala has moved on. • Fencing installation as soon as practical to prevent further vehicle strikes. 	Additional safeguard B18
Pre-clearing survey and management for native fauna	<p>Pre-clearance surveys for native fauna will be undertaken by a qualified ecologist in the month prior to clearing. Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following:</p> <ul style="list-style-type: none"> • Clearly marking (using paint or flagging tape) all habitat trees prior to the commencement of clearing operations by an ecologist. • On-site, full-time supervision by trained handlers to inspect habitat trees including fallen tree hollows for fauna. • Relocation of any fauna discovered to nearby bushland prior to commencing clearing as appropriate. 	Additional safeguard B19

	<ul style="list-style-type: none"> Liaison with local wildlife organisations in the case of injured fauna, as necessary. <p>Fencing in and around construction areas will be installed as soon as practical and prior to any other construction works.</p>	
Maintenance of fencing during construction	<p>During construction, the overall fencing strategy will be regularly reviewed by the Contractor’s Environment Manager and Project Control Group to ensure continuity between sections of fencing and monitoring of efficacy. The fencing strategy will prescribe monitoring requirements for koala exclusion fencing to ensure continuous efficacy.</p> <p>Transport for NSW will undertake inspections as required.</p>	Additional safeguard B20
Maintenance of koala exclusion fencing during operation	<p>After completion and handover to the Asset Owner, inspection and maintenance of fencing along designated roads will be undertaken in line with the relevant asset and maintenance plan and standards (Transport for NSW).</p>	Additional safeguard B21
Planting of vegetation near underpasses	<p>Native vegetation at ingress/egress to underpasses including koala feed tree and shrub species will be undertaken as early as possible following completion of the underpass installation.</p>	Additional safeguard B22
Protection of koalas’ program during construction	<p>Every person working on the construction site will be inducted and trained in the protection of koalas. This program will train workers to identify koala habitat, key threats, mitigation strategies and strict stop work protocols to follow when a koala is spotted. (Koala Management Plan Progress Update May 2020 Transport for NSW)</p>	Additional safeguard B23
Formation of a Koala Interest Group	<p>Prior to commencement of construction a Koala Interest Group will be formed by Lendlease, and open to representatives from various stakeholders, such as Campbelltown City Council, local wildlife organisations, koala rescue and carers, Landcare, and Department of Planning and Environment (DPE). Details of Koala Interest Group scope should be included in the Construction Environmental Management Plan. Terms of Reference for the group</p>	Additional safeguard B24

	will be prepared by Lendlease prior to the first meeting.	
Koala Furniture – Refuge Poles	Installation of timber koala refuge poles, extending from the underpasses to nearby bushland, to help koalas escape potential attacks from predators including dogs until suitable vegetation has regrown in these locations.	Additional safeguard B25
Koala Furniture - Escape Poles	Installation of timber koala escape poles, within the road corridor close to where fencing ends to enable koalas to escape from the road corridor.	Additional safeguard B26
Pre-clearance Inspection	Prior to commencement of construction, pre-clearance surveys and monitoring of the surrounding area where vegetation is to be removed to identify fauna, patterns of activity, and hollow-bearing trees.	Additional safeguard B27
Koala Adaptive Management Plan	Monitor koala presence and any koala road injury/mortality along Appin Road, to trigger adaptive management of the koala exclusion fencing and review of fencing design, location or extent depending on the presence of koalas and their location and the location of mortalities. This is to include engagement with wildlife carer groups to identify early any issues with koala presence or injury/mortality.	Additional safeguard B29
Additional monitoring Mansfield Creek	Monitor koala habitat within and adjacent to Mansfield Field Creek Reserve for two years to determine the likelihood of koalas accessing the fenced section of Appin Road via this location. Additional exclusion measures to be agreed with Campbelltown Council.	Additional safeguard B30
Aboriginal heritage	The HV connection works cannot commence until the additional archaeological investigations have been undertaken at that location. This will be undertaken in accordance with the methodology presented in the ARD. A report indicating the assessment has been undertaken will be provided to Transport for NSW prior to construction at that location.	Additional safeguard AH4
Non-Aboriginal heritage	The Material Compound and Storage location is subject to archaeological monitoring in accordance with the requirements provided in the GML Heritage Assessment (October 2023). A report of the monitoring program would be provided to Transport for NSW prior to use of the site.	Additional safeguard H7

	<p>If relics are discovered a notification under section 146 of the NSW Heritage Act 1977 is required and additional assessment and approval may be necessary before work can recommence at that affected area. Any salvage work would require a section 140 permit.</p>	
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Conclusion

Section 5.5(1) of the EP&A Act requires Transport for NSW as the determining authority to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. All aspects of the environment potentially impacted upon by reason of the activity as modified have been considered in the AREF document and this Response to Submissions report.

Section 5.7(1) of the EP&A Act specifies that an EIS is required where an activity is likely to “significantly affect the environment”, and a determining authority shall not carry out an activity or grant an approval in relation to an activity without an EIS in that event. It is noted that ‘environment’ is broadly defined to include all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings. This submission, supported by additional assessment of significance enclosed, concludes that the AREF and amendments to the activity as proposed do not significantly affect the environment so as to require an EIS.

Next steps

Transport for NSW, as the determining authority, will consider the information in the AREF and this submissions report and make a decision whether or not to proceed with the activity.

The community and stakeholders will be informed of this decision. Where a decision is made to proceed, Lendlease will continue to consult with the community and stakeholders prior to the construction phase. Lendlease will manage community and stakeholder updates and issues in consultation with Transport for NSW during the construction phase.

REF, Addendum REF and RtS interaction and operation if activity proceeds

If Transport for NSW, on consideration of the information in the AREF and this submissions report, makes a decision to proceed with the activity, the activity approved under the REF will have been amended by the Addendum REF and the amendments to the activity as described in this Submission Report.

By way of summary, the activity therefore approved would be comprised of:

- Glen Lorne Underpass:
 - A reinforced concrete box culvert (RCBC) 2.4 metres (h) x three metres (w) x 53 metres long, perpendicularly aligned to Appin Road at the southern edge of Noorumba Reserve (in the same general location as the AREF), is now proposed instead of a round concrete pipe (2.4 metres in diameter)

- An elevated timber rail (1.5 metres above floor level) will be installed and be directed towards refuge poles at each end.
- Interim Browns Bush Underpass:
 - One RCBC 1.5 metres (h) x 2.4 metres (w) x 30 metres long, is now proposed instead of twin round concrete pipes (each 1.2 metres in diameter)
 - A ledge will be installed to help provide dry, safe passage under the road. The ledge will be placed on one side of the underpass and be approximately 400mm wide and raised 300mm above the ground.
- Batters to underpass openings will be no steeper than 16% gradient
- Re-aligned koala exclusion fencing designed to better guide koalas to the underpasses and improved ‘tie-ins’ with existing fencing and proposed noise walls (refer Section 4.4.1)
- Installation of ‘to-specification’ koala grids (refer Section 4.4.2)
- Addition of timber refuge poles outside RCBC openings to connect the underpass to nearby habitat (refer Section 4.3.2)
- Addition of timber escape poles which aim to enable koalas to escape from the road corridor (for example, should they enter the road corridor from the north through the suburb of Rosemeadow) (refer Section 4.4.3)
- If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then:
 - Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700metres south of Beulah Reserve on both sides of Appin Road
 - Install the fence within 12 months of substantial completion of Lendlease’s exclusion fencing at Beulah Reserve or at another date as agreed by Transport.
- The preparation and implementation of a Koala Monitoring and Adaptive Management Plan (refer Section 4.4.4)
- Minor realignment of the project boundary to accommodate the design refinements has been required, including:
 - at the eastern exit of the Glen Lorne underpass to accommodate its new perpendicular alignment.
 - at the western exit of the Glen Lorne underpass to accommodate required drainage pipeline
 - along the eastern side of Appin Road to accommodate high voltage connection point
 - at the eastern side of Appin Road, to accommodate a new material storage and compound location for construction purposes.

The environmental assessments undertaken as part of the REF and AREF should be considered in concert with the environmental assessments undertaken and annexed to this

Submissions Report. Considered together, these documents demonstrate that the requirement of the EP&A Act for an activity to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity has occurred and is continuing to occur.

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1 Introduction and background

1.1 The activity

The Appin Road Upgrade, Mount Gilead to Ambarvale, is the staged upgrade of a 5.4 kilometre section of Appin Road between Mount Gilead in the south and the intersection with St Johns Road, Ambarvale to the north. The Project includes intersection upgrades, widening part of the road from two to four lanes and the construction of new intersections for access to the proposed (and approved) Mount Gilead residential subdivision.

The *Appin Road Upgrade, Mount Gilead to Ambarvale Review of Environmental Factors (REF)*⁵ was prepared for the Appin Road Upgrade in November 2018 (referred to in the Addendum REF (AREF) and this Submissions Report as the Project REF). The Project REF was placed on public display between 19 November 2018 and 14 December 2018 for community and stakeholder comment. A submissions report, dated March 2019, was prepared to respond to issues raised.

A modification to the Project REF was required to facilitate the inclusion of two koala crossings under Appin Road and additional koala exclusion fencing on the eastern side of Appin Road (proposed modification to the activity). Accordingly, an AREF was prepared (November 2022).

Key features of the AREF activity included:

- Glen Lorne (Corridor A) koala underpass (single 2.4m diameter pipe) under the widened four-lane road
- Interim Browns Bush (Corridor B) koala underpass (twin 1.2m diameter pipes) under the existing two-lane alignment
- Inclusion of fauna furniture and monitoring equipment
- Koala grids along existing rural residential access points, existing fire trails and bushland access points
- Amended fence type at Beulah Biobank site (koala exclusion fencing) [southern portion]
- Amended fence type at Noorumba Reserve (koala exclusion fencing) [northern portion]
- Construction fencing.

The objectives of the modifications in the AREF were to:

⁵ [Project documents - Appin Road improvements - Projects - Roads and Waterways – Transport for NSW](#)

- improve koala connectivity between Noorumba Reserve and Beulah Biobank site on the western side of Appin Road with Glen Lorne and Browns Bush Reserves on the eastern side of the road to ensure the long-term stability of the local koala population
- minimise interaction of koalas with risks such as traffic
- minimise social and environmental impacts.

The AREF modifications to the activity have been designed based on criteria provided in the NSW Chief Scientist's advice, and in consultation with a specialist koala consultant, and provides a positive outcome for the local koala population by reducing potential vehicle strikes in the relevant section of Appin Road.

Following exhibition of the AREF and following consideration of submissions, further design refinements have been made and additional environmental safeguards proposed as described below. The key features of the proposal as amended by this submissions report include:

- Glen Lorne Underpass:
 - A single Reinforced Concrete Box Culvert (RCBC) 2.4 metres (h) x three metres (w) x 53 metres long, perpendicularly aligned to Appin Road at the southern edge of Noorumba Reserve (in the same general location as the AREF), is now proposed instead of a round concrete pipe (2.4 metres in diameter)
 - An elevated timber rail (1.5 metres above floor level) will be installed and be directed towards refuge poles at each end.
- Interim Browns Bush Underpass:
 - One RCBC 1.5 metres (h) x 2.4 metres (w) x 30 metres long, is now proposed instead of twin round concrete pipes (each 1.2 metres in diameter)
 - A ledge will be installed to help provide dry, safe passage under the road. The ledge will be placed on one side of the underpass and be approximately 400mm wide and raised 300mm above the ground.
- Batters to underpass openings will be no steeper than a 16% gradient
- Re-aligned koala exclusion fencing designed to better guide koalas to the underpasses and improved 'tie-ins' with existing fencing and proposed noise walls (refer Section 4.4.1)
- Installation of 'to-specification' koala grids (refer Section 4.4.2)
- Addition of timber refuge poles outside RCBC openings to connect the underpass to nearby habitat (refer Section 4.3.2)
- Addition of timber escape poles which aim to enable koalas to escape from the road corridor (for example, should they enter the road corridor from the north through the suburb of Rosemeadow) (refer Section 4.4.3)
- If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then:

- Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700metres south of Beulah Reserve on both sides of Appin Road
- Install the fence within 12 months of substantial completion of Lendlease’s exclusion fencing at Beulah Reserve or at another date as agreed by Transport.
- The preparation and implementation of a Koala Monitoring and Adaptive Management Plan (refer Section 4.4.4)
- Minor realignment of the project boundary to accommodate the design refinements has been required, including:
 - at the eastern exit of the Glen Lorne underpass to accommodate its new perpendicular alignment.
 - at the western exit of the Glen Lorne underpass to accommodate required drainage pipeline
 - along the eastern side of Appin Road to accommodate high voltage connection point
 - at the eastern side of Appin Road, to accommodate a new material storage and compound location for construction purposes.

1.2 AREF display

An AREF was prepared to facilitate the proposed koala crossings, koala exclusion fencing and associated works. The AREF was publicly displayed between 22 November to 13 December 2022. The AREF and community update was placed on the Transport for NSW website and made available for download.⁶ In addition, an invitation to comment and a link to the AREF was sent directly to several identified stakeholders (Appendix A).

There were approximately 1,500 visitors to the website, more than 200 downloads of the AREF documentation and in excess of 180 downloads of the community update. A media release on the proposed koala crossings and community consultation was also published by Transport for NSW on 5 December 2022.⁷

In addition to the above public display, a community event was held during the consultation period to give the community a chance to learn more about the activity as amended, meet the project team and provide feedback. This event took place on 3 December 2022 at Bradbury Markets, Bradbury between 9am and 2pm.

The purpose of the community consultation was to:

- inform community members and stakeholders about the AREF, and

⁶ [Appin Road Upgrade - Mount Gilead to Ambarvale | Your Say Transport for NSW](#)

⁷ [Koala crossings to feature in safety upgrades throughout Sydney's south-west | Transport for NSW](#)

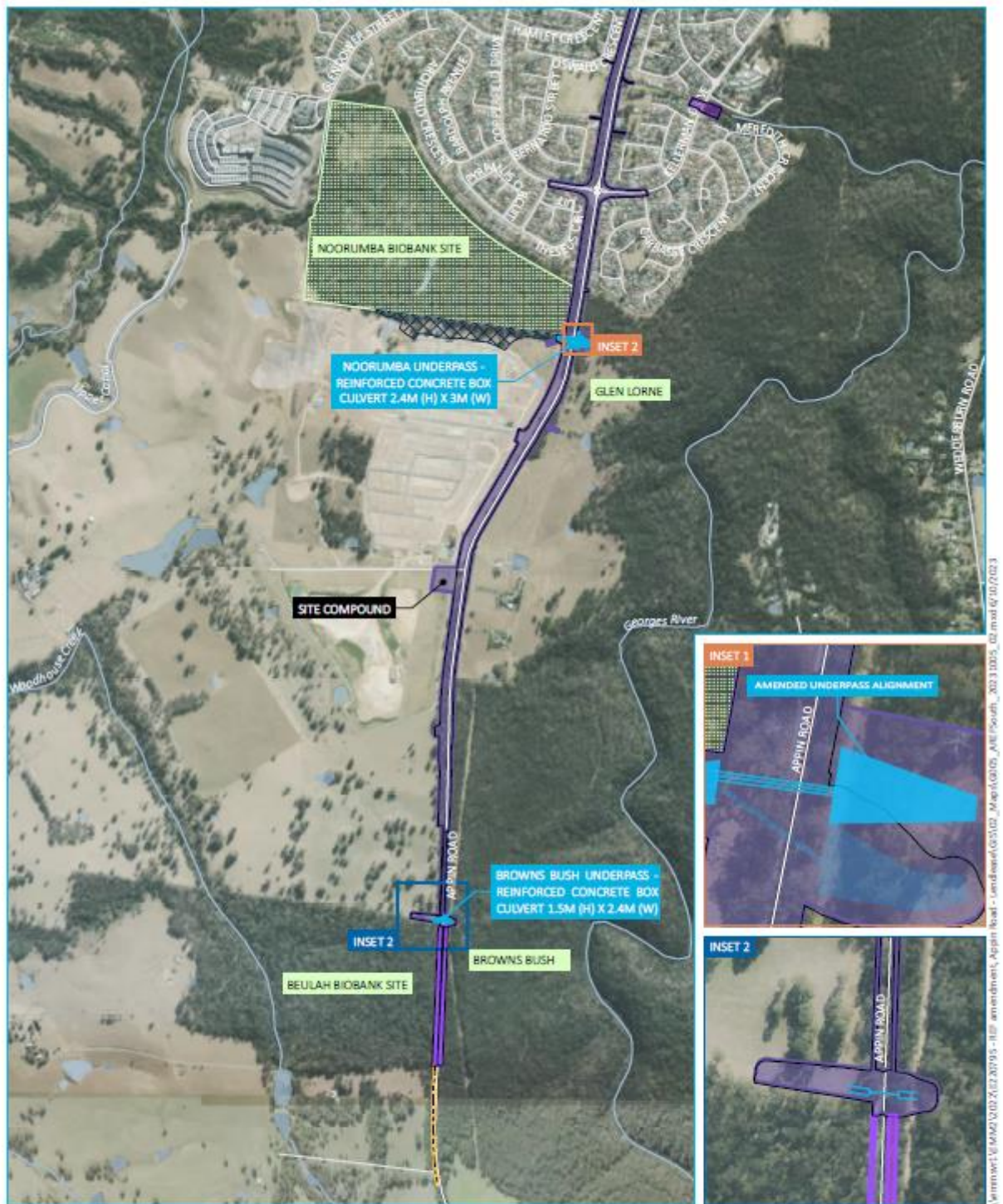
- seek comments and submissions from the community and stakeholders.
- Community members and stakeholders were asked to make submissions via the online form /email / mail or at the community market stall directly to the project team. The community consultation strategy included:
 - email to local council, local community and interested stakeholders
 - letterbox drop to residents and businesses within 400 metres of the project site
 - community information session
 - geo-targeted social media advertisement
 - provision of a copy of the Archaeological Research Design to the Project Registered Aboriginal Parties.

As part of the community consultation strategy, details of the public exhibition were advertised on Facebook reaching around 22,244 users in the local community through geo-targeting. The advertisement generated 152 Facebook comments (from 96 individual users), 28 shares and 975 link clicks to the website.

1.3 Purpose of this report

This Submissions Report relates to the AREF prepared for the Appin Road Upgrade, Mount Gilead to Ambarvale and should be read in conjunction with that document. It is noted that the AREF relates only to the installation of koala underpasses and associated fencing/grids.

This Submissions Report summaries the issues raised (Chapter 2) and provides a response to each issue (Chapter 3). Chapter 4 summarises the refinements to the activity based on submissions received while Chapter 5 provides details of additional assessment required as a result of activity refinements. Chapter 6 identifies updates to the environmental management measures set out in the Project REF and AREF to address relevant submissions.



Source: EMM (2022); Lendlease (2023); ABS (2021); DFSI (2020, 2021); ESW (2022); GIA (2011); Metromap (2022)

- KEY**
- Amended REF Boundary 2023
 - AREF Boundary As Displayed 2022
 - Proposed underpass
 - Appin Road Safety Improvement fencing
 - Approved biobank area
 - Noorumba Reserve

- Existing environment
- Major road
- Minor road
- Waterbody

Appin Road AREF subject area

Lendlease
Appin Road AREF



Figure 1-1 Addendum REF subject area

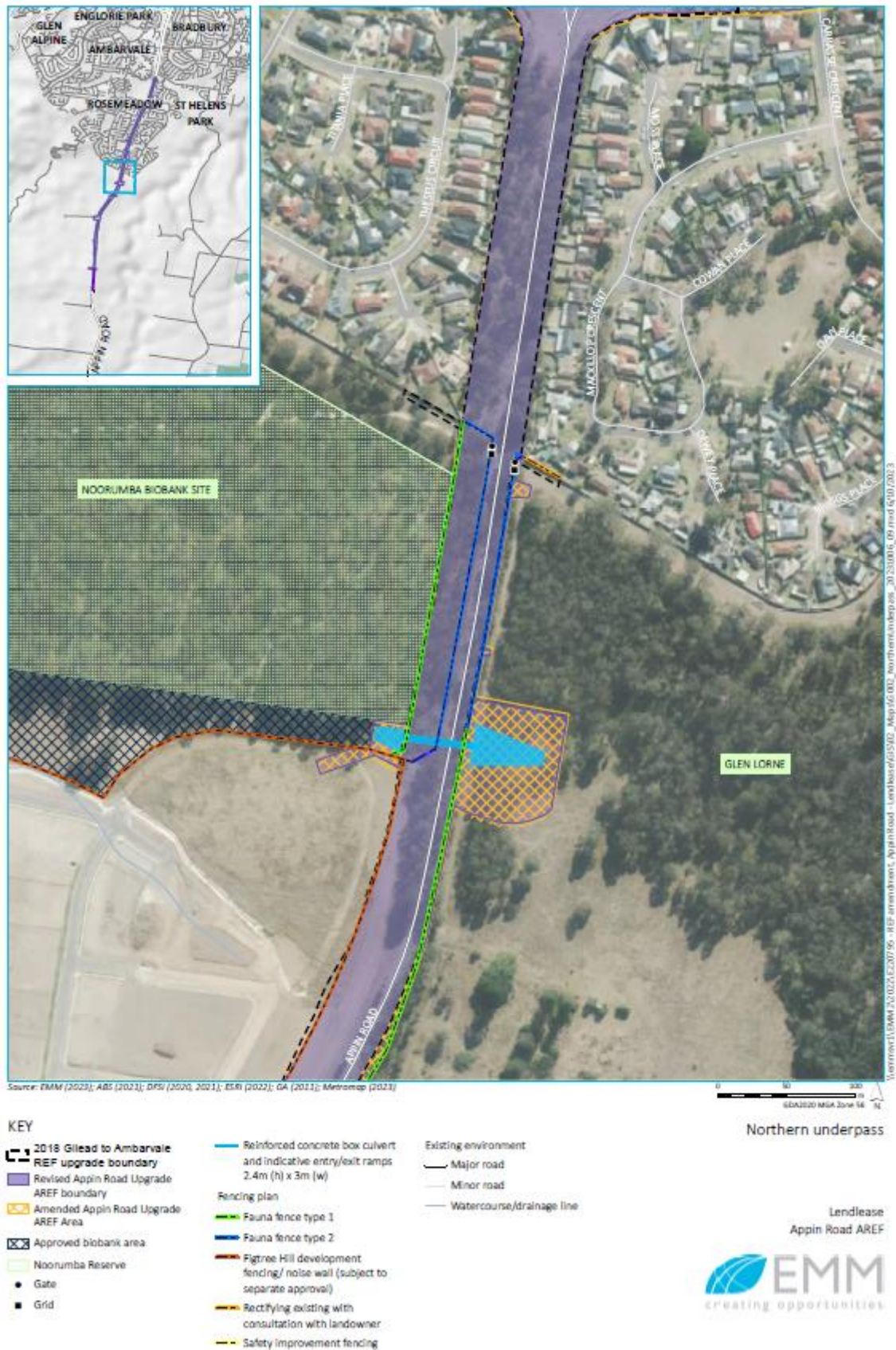


Figure 1-2 Northern underpass



Figure 1-3 Southern underpass

2 Overview of submissions

2.1 Summary of responses

Transport for NSW received a total of 93 submissions, including 88 submissions during the display period until 13 December 2022, and six late submissions. These included:

- 84 from the general community (of which 56 were local, 22 were not local and 6 unspecified).
- six from special interest groups/non-government organisations (NGOs)
- one from Campbelltown City Council
- two from Members of Parliament.

Appendix D lists the respondents (no personal details are shared for privacy reasons) and each respondent's allocated submission number. The table also indicates where the issues from each submission have been addressed in Chapter 2 of this report.

Of the 93 submissions:

- 39% were supportive of the activity as amended
- 19% were supportive but had design concerns
- 22% were neutral (with a number of these submissions identifying out-of-scope)
- 20% were non-supportive due to technical aspects of the activity as amended or were opposed to other matters not directly related to the activity as amended.

In addition, the Facebook site produced the following:

- Reactions: 68
- Comments: 152
- Shares: 28
- Saves: 9
- Link Clicks: 975
- Click rate: 4.4%
- Engagement rate: 5.5%

The Facebook comments focussed generally on the safety upgrade of the road, with limited feedback on the proposed koala underpasses and koala exclusion fencing. Nearly half of the comments were supportive of the road safety upgrades, less than 10% were non-supportive due to habitat loss and development and the remaining were neutral with out-of-scope responses with suggestions for other roads that need upgrading and issues related to driver behaviour.

The main issues raised, and responses, are summarised below.

2.2 Overview of issues raised

Each submission has been examined individually to understand the issues raised and allocated a unique submission identification number/reference. The issues raised in each submission have been extracted and collated, and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and the response to these issues form the basis of the sections below and Chapter 3.

2.2.1 Campbelltown City Council

Campbelltown City Council (CCC) are supportive of the proposed koala crossings and associated koala exclusion fencing, having advocated for fauna crossings on Appin Road for some time. Council referenced the comprehensive submission that they prepared for the Project REF and noted that while the comments in that submission still stand, Council is appreciative of the works undertaken to date to address the previous submission. Notwithstanding, they did note that Council's position remains that the treatment of fauna underpasses should be relatively consistent not just across the region but with those treatments implemented across the State. Council also welcomes any opportunity to work with Transport for NSW during the detailed design process.

2.2.2 Members of Parliament (NSW and Federal)

A response was received from Greg Warren MP (NSW Member for Campbelltown). Mr Warren raised concerns about the number of accidents and fatalities on Appin Road and pointed to a need for an upgrade of Appin Road between Gilead and Bulli Tops. He was supportive of the proposed koala underpasses and identified the need for koala exclusion fencing on both sides of Appin Road.

A response was also received from Dr Mike Freeland MP (Federal Member for Macarthur). Dr Freeland is a long-time advocate of upgrades to Appin Road in the interests of safety for road users and wildlife. He is supportive of the works proposed by the AREF.

2.2.3 Special interest groups

Six detailed submissions were made by organisations, being:

- Action for Public Transport (NSW)
- International Fund for Animal Welfare (IFAW) (including further submission received by Dr Stephen Philips, April 2023, referred to as submission 59B)
- Save Sydney's Koalas
- The Total Environment Centre
- Wilton Action Group
- National Parks Association (Macarthur Branch).

Of these submissions, three were supportive of the underpasses and koala exclusion fencing but with concerns around the design and three were unsupportive. A range of issues were raised by the special interest groups, including:

- broader development in the area, and impacts such as loss of vegetation
- concern around the future of koalas, in general, and both within Western Sydney and more specifically the Appin Road area
- concern there was inconsistency with the objectives of the NSW Chief Scientist's report

- design of the underpasses – specifically that they should be an 'optimal' design to maximise efficacy and also regarding:
 - the number of underpasses
 - the type of structure used
 - the size of the underpass structures
 - structures used should be consistent with underpass design throughout NSW
- the planning approval process, including the outcomes of the Assessment of Significance
- installation of an arboreal rope crossing for gliders and possums
- maintenance of koala exclusion fencing.

2.2.4 Community

Key issues raised by the community regarding the AREF were the same as those listed in section 2.2.3 above as well as:

- adequacy of the existing road network, particularly in regard to increasing housing development in the area
- requests for additional road/network upgrades in the area including road widening of Appin Road and upgrade of intersections
- installation of koala exclusion fencing on both sides of Appin Road
- inclusion of noise barriers along Appin Road
- impacts on vegetation, including the removal of native vegetation for the proposed Appin Road Upgrade works
- maintaining a koala-chlamydia free area around Campbelltown
- conservation of koala habitat corridors
- the need and justification for the activity as amended.

2.3 Additional consultation since display of the AREF

State Environmental Planning Policy (Transport and Infrastructure) consultation with WPCA

Under section 2.15 of SEPP (Transport and Infrastructure), Transport for NSW is required to undertake consultation with the Western Parkland City Authority in relation to development within the Western City operational area specified in the Western Parkland City Authority Act 2018, Schedule 2 with a capital investment value of \$30 million or more.

Transport for NSW undertook additional consultation after the AREF with the Western Parkland City Authority (WPCA) to outline the project proposal and invited their comments for consideration.

The Western Parkland City Authority responded advising that they are:

“supportive of the proposed modifications to facilitate the inclusion of two fauna crossings under Appin Road and fauna fencing on the eastern side of Appin Road. WPCA understand the importance of minimising the interaction between koalas and traffic and supports the proposed modification to facilitate the planned growth in the Appin and Gilead areas.”

Property owner access

Transport for NSW and Lendlease have undertaken discussions with Campbelltown Council about the land zoned for RU2 use under the Campbelltown Local Environmental Plan 2015 which permits without consent extensive agriculture and home occupations. There were no approved DAs for any other use along this section of Appin Road impacted by the project.

An additional traffic and transport assessment has been undertaken as part of this Submission Report to assess the change in vehicle access arrangements along the extent of the Appin Road Upgrade (Appendix E and Chapter 5)

Property access will be maintained during construction. Transport and Lendlease will consult with property owners if any temporary changes to their access arrangements are required.

3 Response to submissions

3.1 Consistency with expert scientific advice

Submission number(s)

49, 50, 52, 53, 57, 58, 59A, 59B, 61, 64, 65, 68, 70, 71, 72, 79, 88, 91

Issue description

- concern that the activity as amended downgrades the objectives of the NSW Chief Scientist's report
- concern that the Project REF and AREF are not consistent with the broader advice of the NSW Chief Scientist
- query as to whether the height and width of the koala underpasses meet the specified requirements in NSW Chief Scientist's advice
- concern that the activity as amended is not consistent with NSW Chief Scientist's recommendations with regard to the Mount Gilead Development, which recommends the provision of:
 - a. land bridge at the Menangle Creek to Noorumba Reserve corridor (corridor A), b. a permanent underpass at Woodhouse Creek to Beulah Reserve corridor (corridor B) and c. close attention should be paid to test the feasibility of the design of the koala connectivity at the confluence of Menangle Creek and Nepean River, near the Hume Highway and possibly under three bridges
- concern that another ecologist has described the underpass design as 'suboptimal'.

Response

Eighteen submissions were related to the NSW Chief Scientist, with six of these concerned that the activity as amended 'downgrades the objectives of the Chief Scientist's report' and one specifically querying if the height and width of the underpasses meet specified requirements in the NSW Chief Scientist's report. The rest were general in nature.

In August 2020 the Office of the NSW Chief Scientist and Engineer (OCSE) released an independent expert report, 'Advice on the protection of the Campbelltown koala population (OCSE 2020)'. This report advised on the adequacy of the protection of koalas in the Greater Macarthur Growth Area through the Cumberland Plain Conservation Plan's (CPCP) conservation program and its consistency with the NSW Koala Strategy 2018-21. The report included several recommendations that were incorporated into the draft CPCP before it was placed on public exhibition.

Following a request from the NSW Government regarding the application of some of these recommendations, the NSW Chief Scientist provided additional advice titled 'Advice regarding the protection of koala populations associated with the Cumberland Plain Conservation Plan (OCSE 2021)'. This report provides 31 principles to be applied in the region

for the protection of the southwest Sydney koala population, and an assessment of the protection measures proposed in the CPCP and how they relate to the principles. It is noted that no design criteria regarding the height and size of koala crossings were provided in the report.

The NSW Chief Scientist's report/advice was prepared by an independent expert panel including Dr Chris Armstrong, Deputy NSW Chief Scientist and Engineer, Associate Professor Mathew Crowther (the University of Sydney), Dr Ben Moore (Western Sydney University) and Dr Martin Predavec (former Principal Scientist, DPIE).

In providing its advice the Panel reviewed several reports and documents. The Panel met with representatives from the Department of Planning, Infrastructure and Environment (DPIE) (now Department of Planning and Environment), as well as Energy, Environment and Science (EES) (now Environment and Heritage Group), Transport for NSW, Associate Professor Damien Higgins (Koala Health Hub, The University of Sydney) was provided additional information from Dr Stephen Phillips (Biolink Ecological Consultants).

Importantly, the Project REF was prepared and exhibited in 2018 (and determined in early 2019), prior to the release of the first and subsequent reports from the OCSE. Following the release of these documents, and the publishing of the CPCP in August 2022, the AREF was prepared to facilitate relevant requirements in relation to the protection and management of koalas set out in the NSW Chief Scientist's reports and CPCP.

The OCSE reports emphasised the importance of separating koalas from vehicles and dogs through installation of koala exclusion fencing and underpasses and they noted the detrimental impact koala vehicle strike on Appin Road could have on the local population in the long-term.

The Project REF and AREF include the provision of koala exclusion fencing on both sides of Appin Road between Noorumba Biobank Site and Beulah Biobank site. The other section of Appin Road, between Beulah Biobank site and the northern limit of residential development in Appin, does not form part of the AREF scope. That section is subject to separate environmental planning approvals by Transport for NSW. The CPCP, which is an outcome of the NSW Chief Scientist's report, outlines that koala exclusion fencing will be installed along the "section of Appin Road where it passes through koala habitat". The AREF is consistent with current NSW Government policies and recommendations outlined in the NSW Chief Scientist's report.

Regarding the connectivity structure, Lendlease had publicly raised the idea of a tree-top bridge as a connectivity structure at Glen Lorne Reserve as part of their Koala Management Plan, however it is noted that this was not included in the Project REF or AREF. The NSW Chief Scientist responded stating *"the Menangle Creek to Noorumba Reserve corridor (A) should be used for koala movement if a connectivity structure can feasibly be constructed on Appin Road. The proposed tree-top bridge is not likely to be adequate and would not be used by koalas. A land bridge should be considered to allow koalas and other fauna to cross Appin Road, an example of this is being developed for wallabies at Mona Vale"*. A tree-top bridge was therefore not included in the Project REF or AREF.

A land bridge (a normal bridge but built over land (not water), with sufficient clearance for animals to cross underneath) or an overpass (a structure for animals built over the road) were considered but not deemed to be viable options at Glen Lorne as the area required would have detrimentally impacted on the biobank site (refer section 3.4.2 for further discussion). The AREF activity (as amended in this report) is consistent with the NSW Chief Scientist's advice by providing 'a connectivity structure that can feasibly be constructed on Appin Road (Corridor A)'. It is noted that the NSW Chief Scientist's report does not prescribe design criteria for koala crossings. The proposed koala underpasses are considered optimal given the size of the culverts, width of road and that the designs have been demonstrated to work in similar locations (refer Table 3-2).

Lendlease has committed to the delivery of a permanent koala crossing that is currently part of an offer under consideration by the NSW Government. An elevated roadway, as shown in Figure 4-1, may be considered for the permanent crossing which would be provided in association with the Appin Road widening of the Beulah section and would be subject to separate approval. In the interim, the proposed temporary RCBC underpass at Browns Bush, which will be constructed under the existing two-lane road, is being sought so that proposed upgrades to improve vehicle and wildlife safety can be undertaken as soon as possible and while the design and approval of the permanent structure is progressed.

The AREF does not address koala connectivity at the confluence of Menangle Creek and Nepean River as this location is some 3.6 km from the land subject to the AREF and is therefore out of scope and not a relevant environmental matter for this project.

It is also noted that the AREF gave consideration to previous Transport for NSW road projects to determine suitable underpass structures at Appin Road based on the experience in other parts of NSW (See Appendix I of the AREF) and Transport for NSW, Koala connectivity report (7 July 2023).



Figure 3-1 Examples of elevated roadway, such as at Pine Creek.⁸

⁸ <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/koala-vehicle-strike-fact-sheet-2-how-to-keep-koalas-off-roads-200230.pdf>

3.2 Planning and statutory requirements

3.2.1 Planning approval process

Submission number(s)

7, 43, 49, 59, 59B, 60, 64, 68, 71, 76

Issue description

- concern that Dr Stephen Phillips advised that an EIS should have been required instead of the Project REF and that it was Dr Phillips opinion that the proposed activities were likely to significantly impact koalas
- Suggestion a flora and fauna study needs to be done for the eastern side of Appin Road.

Response

Section 5.5(1) of the EP&A Act requires Transport for NSW as the determining authority to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. An assessment of the environmental impacts in relation to the design refinements is provided in Chapter 5 of this report. It concludes that there are no likely detrimental impacts as a result of the activity and therefore the need for an EIS is not triggered.

A significant impact to a threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* does not specifically trigger the Division 5.2 state significant infrastructure/EIS planning pathway under the *Environmental Planning and Assessment Act 1979*. Rather, if a biodiversity assessment report concluded that an activity is likely to have a significant impact on a threatened species or ecological communities or their habitats, then a BDAR or SIS would need to be required under section 7.8 of the BC Act. Section 7.8(4) of the BC Act provides that if the likely significant effect on threatened species is the only likely significant effect on the environment, an EIS may be dispensed with and Part 5 (div 5.1) of the *Environmental Planning and Assessment Act 1979* applies as if references to an EIS were references to a species impact statement (SIS) or biodiversity development assessment report (BDAR).

It is also noted that the proposed amended activity design and management measures have been updated to address concerns noted by Dr Phillips which led, in part, to his conclusion that the proposed amended activity has the potential to have a significant impact on koalas. The proposed underpasses as amended by Submission Report have been enlarged and replaced with RCBCs, better enabling the movement and colonisation of koalas of habitat areas west of Appin Road between Gilead and Appin.

Koala-specific grids and appropriate fence tie-ins have been provided at relevant gates, driveways and road (refer Figure 3-10), with additional koala exclusion fencing measures (including detailed treatments at fence ends within the road corridor) also incorporated in the revised design, effectively sealing the road corridor.

As part of this Submissions Report, *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act) assessments of significance for impacts to the koala and other NSW and Commonwealth listed species have been reviewed and updated (refer Chapter 5 and Appendix B) to ensure that the likelihood of significant impacts from the works proposed by the Project REF, the AREF, additional refinements made in response to submissions and other minor boundary adjustments to accommodate detailed design have been comprehensively assessed. This additional assessment has confirmed that the overall project, including the proposed amendments to improve the functionality of the koala underpasses and exclusion fencing, is unlikely to have a significant impact on the koala or any other NSW or Commonwealth listed species.

The amended activity, following the refinements made since exhibition, of the AREF will impact 10.96 ha of Cumberland Plain Woodland (CPW) and Shale Sandstone Transition Forest (SSTF) (3.85 ha of which has already been certified) and 10.05 ha of direct impacts to Koala habitat (2.91 ha of which is already certified) and 7.83 ha of direct impacts to Cumberland Plains Land Snail (CPLS) habitat (2.75 ha of which is already certified). The area of habitat impacted is small in a local context with substantial areas of equivalent vegetation in Noorumba Biobank site, Beulah Biobank site, Figtree Hill project and along the Georges River. A biodiversity offset strategy will be prepared during the detailed design phase for the areas of moderate condition vegetation that are not already being offset under the approved biodiversity certification for the Figtree Hill development (Mount Gilead Stage 1). Areas impacted by the construction of the underpasses will be revegetated with native vegetation.

Additional monitoring and adaptive management requirements will also address the risk that the mitigation measures do not perform as expected (fence breaches, failure to use the underpass), or fence end effects occurring due to unexpected delays in the construction of the Appin Road Safety Improvements project or dispersal of koalas from habitat corridors into Rosemeadow (due to fence installation) and potential entrapment on the wrong side of the fence on Appin Road.

3.2.2 Independent assessment requirements

Submission number(s)

46, 58, 61, 64, 65, 68, 70, 71, 72, 88

Issue description

- Suggestion that habitat underpasses and corridors be clearly defined and independently assessed to ensure they are in-line with NSW Chief Scientist's approach

Response

The proposed underpasses coincide with the priority east-west koala movement corridors (Menangle Creek Corridor A and Woodhouse Creek Corridor B) connecting the Georges and Nepean Rivers identified by the NSW Chief Scientist and Engineer (OCSE February 2021). Mapping of koala habitat corridors is outside the scope of this project.

3.2.3 Other approvals and agreements

Submission number(s)

90, 91

Issue description

- Concern about the validity and contents of the Voluntary Planning Agreement prepared by Lendlease

Response

Lendlease is currently in discussions with the Department of Planning and Environment regarding a variation to the Voluntary Planning Agreement (VPA) relating to the Mount Gilead development, which includes a commitment to ensure koala protections are in place. The validity and contents of the Voluntary Planning Agreement is outside the scope of this submissions report.

3.3 Community and stakeholder consultation

3.3.1 Length and timing of consultation period

Submission number(s)

90

Issue description

- Concerns about timing of exhibition period prior to Christmas and that length of exhibition period should have been extended.

Response

Transport for NSW informed the community of the consultation period for the AREF by letterbox drop, a media release, community information event, social media and the distribution of email updates to a number of key community organisations. The AREF was published on the project website and displayed for a 21-day consultation period between 22 November 2022 and 13 December 2022. The community event was held on 3 December 2022 between 9am and 2pm at Bradbury Markets, Bradbury.

Transport for NSW considers that the timing and duration of the display of the AREF to be sufficient for the public to comment on the proposed amended activity and it is noted that six submissions were still accepted following the close of exhibition. A detailed overview of consultation activities carried out by Transport for NSW are provided in Chapter 5 of the AREF. The Transport for NSW Appin Road Improvement Projects website [<https://www.transport.nsw.gov.au/projects/current-projects/appin-road-improvements>] provides information on projects currently in planning along Appin Road.

3.3.2 Request for public meeting to present AREF

Submission number(s)

60

Issue description

- Suggestion for a public meeting to go through works proposed by the AREF

Response

In addition to the public exhibition of the AREF, a community event was held during the consultation period to give the community a chance to learn more about the proposed amended activity, meet the project team and provide feedback. This event took place on 3 December 2022 at Bradbury Markets, Bradbury between 9am and 2pm.

3.4 Proposed amended activity alternatives and suggestions

3.4.1 Requests for a permanent underpass at Browns Bush

Submission number(s)

53, 63, 64

Issue description

- Queries as to why the Browns Bush underpass is being provided on an interim basis

Response

The inclusion of an interim underpass at Brown Bush, which would be constructed under the current two lanes of Appin Road, is proposed in addition to the NSW Chief Scientist's recommendations for a permanent underpass at Browns Bush. The works proposed by the AREF provide an interim measure to help reduce koala vehicle strike, while allowing for the detailed design, environmental assessments, and complex construction of a permanent underpass at Browns Bush under the eventual wider road configuration. Lendlease has commenced strategic planning for the longer underpass and is committed to funding and delivering it as part of their Mount Gilead Voluntary Planning Agreement with the Minister for Planning/DPE. A permanent underpass at Browns Bush will be part of a future upgrade to Appin Road which will include road widening.

3.4.2 Request for an alternative location for the Glen Lorne underpass

Submission number(s)

59B, 66, 78

Issue description

- Suggestion to centrally locate the Glen Lorne underpass within Noorumba Reserve
- Suggestion for the use of koala crossings based on those that have been established elsewhere in NSW, including a dedicated fauna overpass or bebo arch design (refer to Figure 3-4 and Figure 3-5) at Glen Lorne
- Underpass design is different from the crossing design previously shown by Lendlease

Response

There are several engineering and design factors, referred to in the AREF, that have informed the location of the underpasses including:

- designing around biobank sites (ensuring they are not located within biobank sites or nature reserves), avoiding existing utilities along either side of Appin Road and protecting locally listed heritage items
- limiting the extent of construction areas and underpass openings to minimise the clearing of additional vegetation while ensuring a well-drained structure

- using construction methodologies which reduce construction footprints as well as construction impacts on koalas/fauna, the local community and road users.
- approval from utility providers to relocate and protect existing infrastructure.

A number of locations for the Glen Lorne underpass were assessed for suitability. In response to submissions the location of the Glen Lorne koala underpass has been adjusted to reduce the length of the underpass to be perpendicular to Appin Road.

The Glen Lorne koala underpass is located at the southern end of Noorumba Reserve, approximately 110 metres from the centre of the Reserve, well within the ‘normal’ movement capability of local koalas according to the project’s koala ecologist (Dr Steven Ward, *pers comm*). Furthermore, there are monitoring reports to show that koalas will use underpasses in similar edge locations, as detailed in Table 3-1.

Table 3-1 Examples of underpasses in similar edge locations

Location	Relevant Records	References
<p>Pacific Highway, Taree.</p> <p>The T1 underpass is situated on the southern edge of a vegetated block of land within Kiwarra State Forest. The eastern and western entrance has been largely cleared of trees and is largely grassland within 25m of the entrance.</p>	<p>Record of a koala using a 2.8m x 2.8m arch steel culvert 47.8m in length.</p>	<p>AMBS (2002) Fauna Underpass Monitoring Final Report Stage Two, Episode Five, Taree.</p>
<p>Pacific Highway, south of Broadwater.</p> <p>The M42/K29 underpass adjoins cleared land, near the forest end on the southern side and a narrow section of vegetation on the northern side.</p>	<p>Record of koalas using a 2.4m x 2.4m box culvert 39m in length.</p>	<p>An email (S. Wilson, Transport for NSW personal communication, June 18, 2023) confirming that results are accurate.</p>
<p>Skyline Road, Lismore</p> <p>Six underpasses of varying sizes, under the road which is located within a fragmented agricultural landscape.</p> <p>The koala underpasses adjoin private properties comprised scattered koala food trees through cleared grazing land.</p>	<p>Record of koalas using several box culverts of varying sizes and lengths.</p>	<p>Miller, A. (June 2021) ‘Investigating the spatial movements of koalas in relation to an exclusion fence on Skyline Road, Monaltrie’ Unpublished report prepared for NSW Department of Planning and Environment (NSW Koala Strategy)</p>



Figure 3-2 Example of a koala underpass, Skyline Road, Lismore



Figure 3-3 Koala in T1 underpass, Pacific Highway Taree, (2001).

The monitoring data can be assessed using the Transport for NSW, [Koala connectivity report \(7 July 2023\)](#).

The location of the Glen Lorne underpass is on Lendlease owned land which provides the most favourable location to accelerate the delivery of the koala exclusion fencing and koala underpasses. Given the existing road configuration is the primary risk to the local koala population, the timing of the works needs to be prioritised.

The time it would take to gain approvals (between two and three years) for a Glen Lorne underpass centrally located in Noorumba Reserve, may lead to koalas currently located in Noorumba Reserve and potentially in other vegetation to the northwest of this reserve becoming isolated from habitats to the east during this period, due to the fencing proposed along Appin Road. This could potentially force these animals, or future offspring, to disperse into the adjoining urban landscape to the north of Noorumba Reserve, where they would be vulnerable to vehicle strikes and dog attacks. There is also the potential risk of inbreeding of these animals, as the total number of koalas anticipated to be present within Noorumba Reserve is low, at around 4 koalas (Lendlease drone monitoring, unpublished (refer to Appendix A – Letter from koala expert Steve Ward (12 October 2023)).

Furthermore, to construct a dedicated fauna overpass across Appin Road in a central location within Noorumba Reserve, as referred to by Dr Stephen Phillips, would result in an impact of approximately 8.1 hectares of vegetation, which is listed as either one of two Critically Endangered vegetation communities, depending on the specific location; vegetation listed as the *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest Cumberland Plain Woodland* under the EPBC Act and as *Cumberland Plain Woodland in the Sydney Basin Bioregion* under the BC Act (Cumberland Plain Woodland; CPW), or *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (Shale Sandstone Transition Forest; SSTF) both of which also constitute Koala habitat. This assessment was based on the footprint for a concrete arch (bebo) structure, using a similar footprint as Illaweenah Street, Brisbane Fauna Crossing (refer Figure 3-5). It is noted that the amount of koala habitat within Noorumba Reserve is estimated at 44ha and that the functionality of the Noorumba koala habitat corridor to the west of the Mt Gilead estate is currently potentially compromised by fencing of the Water NSW Upper Canal, though koalas may move to the northwest of Noorumba Reserve to the north of the fenced portion of the canal (Dr Steven Ward *pers comm*). Removing 8.1ha in total, or approximately 4.05ha from each side, to build a 'bebo arch' style koala overpass represents a sizable proportion (approximately 9.2%) of the koala habitat present and would reduce the remaining habitat to about 40ha. While the precise local extinction point for small koala habitat remnants cannot be readily determined, what is known is that any further reduction in habitat availability within this small remnant will place further downward pressure on the viability of the remaining koala habitat.

In addition, Noorumba Reserve has environmental values in addition to koala habitat value. The reserve contains the Endangered Cumberland Plain Land Snail (*Meridolum corneovirens*) and 39 plant species of regional significance⁹.

The impact to Noorumba Reserve, which is a registered biobank site and owned by Campbelltown City Council, would require additional environmental assessments and approvals. Under s5.16 of the BC Act, it would be necessary to vary or terminate the biobank site, which would require discussions with Campbelltown City Council and approval by the NSW Environment Minister. Were this to delay the introduction of koala exclusion fencing the impacts upon the koala would be high, as review of the Bionet Koala mortality records over the last 10 years (2014 – 2023) indicates that at least 33 koala mortalities, or approximately 3.3 mortalities per year, have occurred along Appin Road including to 700 metres south of the Beulah Biobank site, noting that this is likely to be an underestimate as wildlife carer group data has not been added to Bionet since approximately mid-2019 (Dr Steven Ward *pers comm*). Furthermore, koala mortalities along Appin Road appear to be increasing with wildlife rescue organisation WIRES reporting 30 koala deaths in the past year.¹⁰ This level of mortality is detrimental to the local koala population, and installing measures to control this mortality as soon as possible are considered highly desirable.

Construction impacts could include up to 30 days of part road closure and 15 days of full road closure which is not viable for a main road such as Appin Road. Transport for NSW has confirmed that, due to the extensive detour required (greater than 50 minutes for light vehicles, and 60 minutes for heavy vehicles) as well as Appin Road providing a main emergency vehicle route to Campbelltown Hospital, a road closure of this length would not be an acceptable construction methodology.

On balance, the potential benefits of the overpass in the centre of Noorumba Reserve suggested by Dr Phillips do not outweigh the environmental impacts associated with that option. The design refinements and amended management measures and safeguards will facilitate koala connectivity while affording greater protection from vehicle strike which is positive for local koala populations.

⁹ Campbelltown Council (2023), Biodiversity Stewardship, webpage: <https://www.campbelltown.nsw.gov.au/Local-Environment/Biodiversity-Stewardship>

¹⁰ ABC News (2023), NSW Roads Minister urged to lower Appin Road speed limits to address rising koala fatalities, <https://www.abc.net.au/news/2023-10-03/minister-asked-to-intervene-to-stop-koala-deaths/102923724>



Figure 3-4 Fauna overpass (comprising two concrete arches) across the Pacific Highway, Yelgun to Chinderah, NSW.¹¹



Figure 3-5 Example of a fauna overpass detailing the construction impacts at Illaween Street, Brisbane Fauna Crossing (Source Transurban Group)

¹¹ Dr Stephen Phillips Advice (April 2023), provided as part of the International Fund for Animal Welfare submission.

3.4.3 Concerns around increased residential development in the vicinity of the project and the need for additional road/network upgrade options

Submission number(s)

6, 9, 10, 13, 22, 23, 30, 33, 35, 42, 60, 80

Issue description

- Suggestion that a more holistic approach to development in the general area, including a bypass around Appin township, is needed
- Concerns with timing around provision of general infrastructure to support increased housing development in the area
- Suggestion that the Appin Road Upgrade would not be required if the Southern Orbital Road is developed and that this should be a government priority
- Suggestion that improvement works continue through to Appin township
- Concerns about road safety in Western Sydney.

Response

Appin Road is a busy state road which caters to thousands of vehicles each day, including many trucks carrying freight between Wollongong and Sydney's south-western suburbs. The AREF and REF are intended to improve the safety of Appin Road and increase the road capacity to allow for future growth in the Greater Macarthur Growth Area. Population growth in the area is forecast to increase, with the release and rezoning of land at Gilead providing additional housing in the area. Combined with new land releases at Menangle Park and Wilton Junction, up to 35,000 new homes and new infrastructure (i.e. schools, public transport, road upgrades and green space) are planned for the Greater Macarthur Priority Growth Area (DPE, 2018 and Greater Macarthur 2040 Update 2021).

Transport for NSW has other projects in planning and delivery in Western Sydney to help meet increased demand however, these are outside the scope of the Appin Road Upgrade, as modified in this Submission Report.

Road widening

Submission number(s)

9, 10, 13, 22, 35

Issue description

- Suggestion that Appin Road (particularly between Campbelltown and Appin township) should be made wider to a minimum of dual carriageway.

Response

The Appin Road Upgrade proposed amended activity has been designed to future proof for a six-lane arrangement. The REF includes widening part of the road from two to four lanes and

is based on a proposal footprint that allows for an ultimate six-lane carriageway which is appropriate given the future growth of the Greater Macarthur Growth Area. Provisions have been made on the location of the utilities, traffic signals, retaining walls, noise walls, koala underpasses and koala exclusion fencing to future proof this infrastructure for a potential six lane carriageway.

The Project REF undertakes road safety upgrades between Mount Gilead and Ambarvale which includes intersection upgrades, and construction of new intersections to provide access to the approved Figtree Hill community project. Upgrades and road widening to other sections of Appin Road are outside the scope of this project. For more information on safety improvements to other sections of Appin Road go to www.transport.nsw.gov.au/projects/current-projects/appin-road-improvements .

Intersections

Submission number(s)

33, 42

Issue description

- Suggestion that further road upgrades in the area should occur, specifically suggestion regarding intersection of Appin Rd, Kellerman Drive and Copperfield Dr.

Response

The upgrade of the roundabout at Appin Road, Kellerman Drive and Copperfield Drive to a signalised intersection will be completed as part of the latter stages of this upgrade of Appin Road. The following points are noted:

- Upgrades to the St Johns / Appin Road intersection form part of the Appin Road Upgrade, and is planned to be undertaken by Transport for NSW
- The upgrading of Appin Road will not include a right turn into the service station opposite Oswald Reserve, there are multiple service stations off Appin Road at Fitzgibbon Lane and St Johns Road
- Parking along Appin Road is a matter to be addressed by Council.

Speed limits

Submission number(s)

9

Issue description

- Suggestion that speed limits should not restrict traffic flow.

Response

The Project REF posted speed limit for Appin Road is consistent with relevant Transport for NSW road design standards.

3.4.4 Requests for arboreal mammal crossing structures

Submission number(s)

35, 40, 49, 58, 60, 61, 64, 65, 68, 70, 71, 72, 88

Issue description

- Suggestion that overhead crossings for arboreal animals should be included as part of the project delivery.

Response

This AREF and this Submissions Report are to be read in conjunction with the Project REF, Appin Road Upgrade, Mount Gilead to Ambarvale, November 2018 and the submission report for the Project REF. The inclusion of crossing structures for arboreal mammals and gliders has been proposed as part of the Appin Road Upgrade, Mount Gilead to Ambarvale REF. The proposed amended activity allows for the provision of an arboreal crossing structure at Noorumba Reserve to support the crossing of Squirrel Gliders and other arboreal species, across Appin Road. See Submission Report March 2019 - www.transport.nsw.gov.au/sites/default/files/media/documents/rww//projects/01documents/appin-road-improvements/appin-road-submissions-report-march-2019.pdf

Figure 3-7 shows the koala exclusion fencing and rope fauna crossing located at Noorumba Reserve which was detailed in the REF Submission Report.¹² Figure 3-7 and Figure 3-8 provide examples of arboreal crossing structures similar to what will be implemented at Noorumba Reserve.

¹² Appin Road Upgrade, Mount Gilead to Ambarvale - Submissions report (nsw.gov.au)

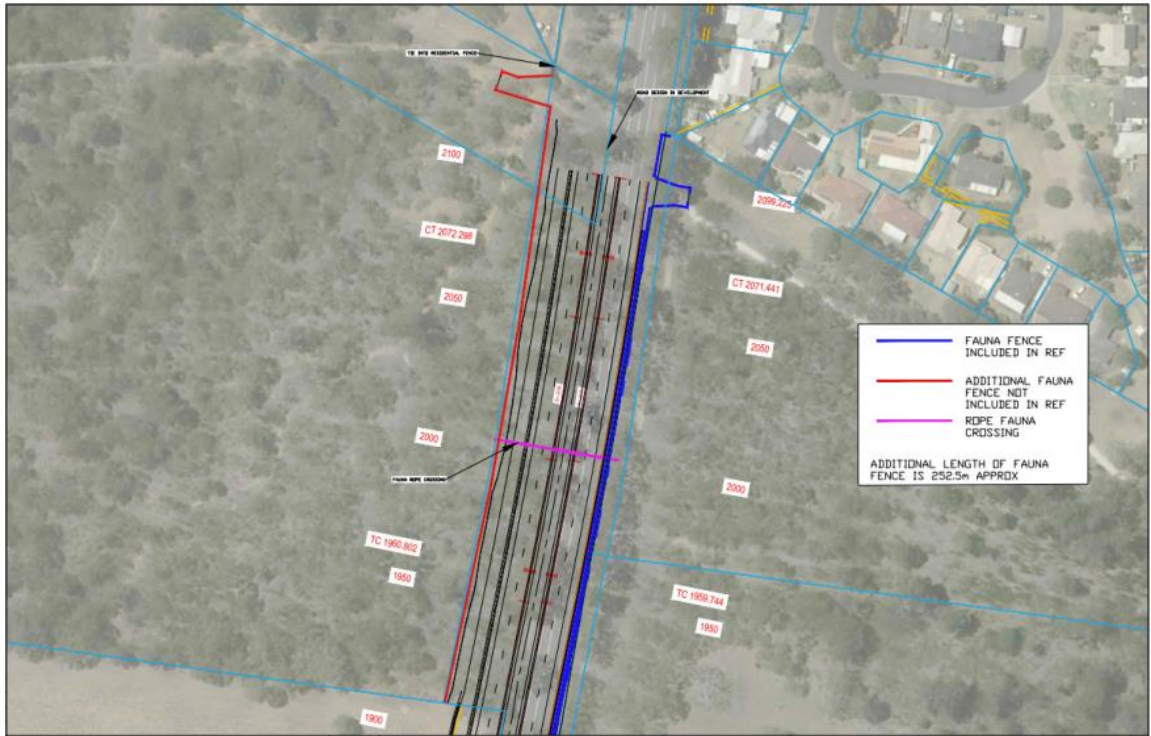


Figure 3-6 Proposed location of rope fauna crossing



Figure 3-7 Example of rope arboreal mammal crossing



Figure 3-8 Example of aerial rope crossing across the Pacific Highway Upgrade.¹³

3.5 Proposed amended activity design and operation

3.5.1 Koala crossing design

Submission number(s)

9, 12, 17, 18, 20, 21, 28, 47, 48, 49, 50, 52, 54, 56, 57, 58, 59A, 59B, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 88, 89, 93

Issue description

- Concerns with size of proposed underpasses - varying suggestions that underpasses should be between 1.8 metres by three metres to 2.4 metres by 6 metres
- Concerns with shape of proposed underpasses – suggested use of box culvert rather than a round pipe

¹³ Sandpiper Ecological 2017, Pacific Highway Upgrade – Glenugie: Operational phase fauna crossing monitoring program years 1–3. Report prepared for NSW Roads and Maritime Services.

- Suggestion Browns Bush underpass pipes are too small and will prevent use by koalas and larger native animals, such as wallaroos. They should be replaced with a single 1.8 (h) x 2.4 (w) metres reinforced concrete box culvert.
- Concern that underpasses are sub-optimal
- Based on Dr Phillips advice on the Project REF, suggestion that a minimum of three crossings are implemented in the relevant section of Appin Road
- Suggestion for more than two underpasses, including that they should be placed every 500 metres as per other Transport for NSW projects.

Response

Forty percent of responses proposed alternatives and suggestions to various design elements of the proposed underpasses. The submissions included 18% with feedback on the size, 15% relating to the shape and 5% with suggestions on the number of underpasses. Most of these submissions suggested larger box culverts should be used, with specific reference to their suitability for larger fauna. The use of koala exclusion fencing, fauna furniture and fauna grids were also raised.

The submissions suggested several alternatives to the proposed underpass structures. A review of various options for crossing structures was undertaken to determine what could feasibly be implemented. This involved looking at other Transport for NSW road projects which had installed fauna crossings and the evidence of those structures being used by koalas and other wildlife. This considered evidence of koala use, design, engineering, and construction constraints, as well as environmental impacts and approvals. Table 3-2 outlines the proposed changes to the koala underpass design and the relevant examples from other roads within NSW.

In response to submissions raised, and following additional expert advice from koala ecologists, refinements and additional features have been incorporated into the final design of the Glen Lorne and interim Browns Bush koala underpasses, refer to Chapter 4, specifically Table 4-1.

Table 3-2 Evidence of koala use of similar underpass structures in NSW

Updated Design	Relevant records	Reference
1.5m (h) x 2.4m (w), 30m long reinforced concrete box culvert at Browns Bush / Beulah Reserve under Appin Road (2 lanes)	Confirmed using a 1m diameter pipe under Wardell Road (2 lane)	Transport for NSW Woolgoolga to Ballina Pacific Highway Upgrade, Koala and Threatened Mammals Connectivity Structure Monitoring 2021/22 <i>in prep</i>
	Confirmed using a combined underpass 1.8m x 2.4m box culvert under	Oxley Highway upgrade Port Macquarie monitoring of wildlife road crossing structures June 2013 to

	Oxley Highway near Port Macquarie	September 2016 (nsw.gov.au) Combined underpass
2.4m (h) x 3.0m (w), 53m long reinforced concrete box culvert at Glen Lorne / Noorumba Reserve under widened Appin Road (4 lanes)	Confirmed using a 2.4m x 3m box culvert 38m length under Oxley Highway near Kempsey	Oxley Highway to Kempsey Fauna Underpass Monitoring (2018-2019) Annual Ecological Monitoring Report Roads and Maritime Services Sept 2019 Appendix A: Koala
	Confirmed using a 3m x 3m box culvert box 100m length under Pacific Highway near Bonville	AMBS 2011 Investigation of the Impact of Roads on Koalas. Report prepared for the NSW Roads and Traffic Authority by Australian Museum Business Services, Sydney
	Confirmed using a 2.1m x 3m box culvert 27m length under Pacific Highway near Tyson's Flat	Nambucca Heads to Urunga Operational Phase - Biodiversity Monitoring – Year 3 (2019)
	Confirmed using a 1.8m x 3m box culvert under Oxley Highway near Port Macquarie	Oxley Highway upgrade Port Macquarie monitoring of wildlife road crossing structures June 2013 to September 2016 (nsw.gov.au) – Underpass West
	Confirmed using 2.4m x 3m box culverts near Nambucca Heads.	Warrell Creek to Nambucca Heads Interim Underpass Monitoring - Spring-Summer Year 1 (2019)
	Confirmed using three separate 2.4m x 2.4m box culverts near Nambucca Heads.	Warrell Creek to Nambucca Heads Annual (Ecological) Underpass Monitoring Report - Year 2 (2019-2020)

	<p>Confirmed using a 2.4m x 2.4m box culvert 15m length under Wardell Road (2 land road).</p> <p>Confirmed using a 2.4m x 2.4m box culvert 66m in length under the existing Pacific Highway.</p>	<p><u>Woolgoolga to Ballina Koala Monitoring Program - Year 3 (2019-2020)^[1]</u></p>
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To reduce impact to the road network and road closures, dispensation has been granted by Transport for NSW for the use of pre-cast footings which has enabled the underpasses to be amended from pipes to RCBC's. The advantages of the precast culvert footing design include:

- a significant reduction in traffic impacts and construction timing due to not needing to construct a base slab
- reduction in vegetation clearing due to reduced excavation and drainage impacts
- The final Glen Lorne underpass design requires additional refinements to the project boundary to incorporate the increased dimensions of the RCBC culvert. The project boundary has been expanded to include a drainage line to ensure Glen Lorne underpass remains free draining (refer Figure 4-2).
- In conjunction with additional engineering designs the Glen Lorne underpass has been realigned to reduce the overall length by 4 metres and to convert the proposed underpass from a 2.4 metre diameter pipe to a 2.4 metre x 3.0 metre reinforced concrete box culvert.
- The underpass at Browns Bush and Beuleah is proposed to be a 1.5 metre (h) x 2.4 metre (w) box culvert. A permanent larger structure, more suitable to a 4-lane road alignment (in the vicinity of the Browns Bush underpass: Corridor B – Woodhouse Creek to Beulah Biobank site) will be constructed in the future. Lendlease has committed to constructing a permanent koala crossing in the vicinity of Beulah biobank site as part of their Voluntary Planning Agreement with the Minister for Planning. This would occur when Appin Road is widened adjacent to Beulah biobank site to support the development of Stage 2 of the Figtree Hill Estate. Future road widening, including the proposed koala crossing, would require approval by Transport for NSW based on detailed design and environmental assessment. This work does not form part of the proposed modification in the AREF and is not included in the refinements made since the exhibition of the AREF.

The locations of the two underpasses are consistent with the NSW Chief Scientist's advice relating to the road areas that the AREF covers. It is noted that koala crossings can only be located where there is habitat/vegetation connectivity and therefore it is not feasible to construct underpasses every 500 metres.

The size of the proposed underpasses (as refined in this submissions report) has been designed specifically for koalas. Notwithstanding, experience in other areas of NSW show

that macropods such as Eastern Grey Kangaroos and Wallaroos are likely to be able to navigate the underpasses, particularly with the increase in aperture size in the refined underpass design. They do this by adopting a “head-down” gait (often observed when the animals are feeding), as demonstrated in Figure 3-9 below.



Figure 3-9 Monitoring record showing an Eastern Grey Kangaroo using a piped underpass in northern NSW

This project is providing two underpasses under Appin Road. A separate Transport for NSW project, the Brian Road Intersection Upgrade, would provide a third permanent underpass just north of Appin township, refer www.transport.nsw.gov.au/projects/current-projects/brian-road-intersection-upgrade-appin-road-improvements . The community were invited to have their say on the Brian Road Intersection Upgrade REF between 25 January and 24 February 2023.

3.5.2 Fencing design / koala grids

Submission number(s)

5, 17, 59A, 59B, 69, 74, 92

Issue description

- Suggestion that reinforcement of overpass utility will be improved by use of wildlife exclusion fencing along both sides of Appin Road between the southern limits of residential development at Campbelltown and the northern limit of residential development at Appin
- Suggestion for the installation of koala-grids on all residual driveways and road intersections entering the area of the Appin Road Upgrade
- Dr Phillips’ advice that koala grids should be provided ‘to-specification’ (50mm round pipes at 100mm over a grid width of 1000mm)
- Suggestion to use virtual fencing along Appin Road.

Response

Koala exclusion fencing is to be provided to both sides of Appin Road between the northern extent of Noorumba Reserve and the southern extent of Beulah biobank site, where it will tie-in with koala exclusion fencing provided as part of Transport for NSW’s Appin Road Safety Improvements project. It is noted that acoustic walls will be located, at least 20 metres from the koala underpasses, and only where there are dwellings on or near Appin Road that require noise mitigation measures.

The koala exclusion fencing design is based on Transport for NSW design requirements which consists of chain link fencing and steel posts to a height of 1.5 metres above the ground level. The chain link is wrapped and pinned to the ground surface on the habitat side of the fencing to prevent fauna burrowing under the structure. A 600 mm galvanised anti-climb steel sheet is secured to the outside of the fencing to prevent any animals climbing the structure.

The koala exclusion fencing was designed to help guide koalas and other fauna to the new underpasses, preventing them from accessing the road corridor and enabling their safe crossing under Appin Road. The detail provides measures to prevent egress over, through and under fencing structures. Signage and line marking designs have been developed in accordance with Transport for NSW guidelines and specifications.

The type of koala exclusion fencing, including anti-climb sheeting, was outlined in the NSW Chief Scientist's advice (Advice on the protection of the Campbelltown Koala population, Koala Independent Expert Panel, 20 April 2020), to separate koalas from threats and hazards.

The proposed fencing would include installation of koala grids at all feasible access points to Appin Road between the northern extent of Noorumba Reserve and the southern extent of Beulah Biobank site. A koala grid is installed in combination with koala exclusion fencing to minimise the potential for koala strikes on Appin Road and surrounding road network. The fencing will be tied in at these grids to incorporate a fenced return.

The specifications of the koala grids have been reviewed and outlined in the refinements to the proposed amended activity (refer to Section 4.4.2) to ensure that koalas are unable to cross the grids as they have been monitored crossing standard cattle grids (refer to Figure 3-10). In addition, koala grids have been included beneath gates that provide vehicle access to Noorumba Reserve, Glen Lorne, and Beulah biobank site (Figure 3-11).

Virtual fencing was not recommended or considered by Transport for NSW for this project as there is no demonstrated evidence that it works.

In addition to koala exclusion fencing, escape poles will be installed near fence ends and underpass structures.



Plate 5: Camera review images of Koalas crossing grid during monitoring of 10 sites in spring 2022. (Left) Positive interaction with grid, movement across bars and support beam. (Right) Hesitant interaction with grid, individual continued across grid after 10 seconds of NDM.

Figure 3-10 Evidence of koala crossing a cattle grid



Source: EMM (2023); Lendlease (2023); ABS (2021); DFSI (2020, 2021); GA (2021); MetroMap (2023)

- KEY**
- Amended REF Boundary 2023
 - AREF Boundary As Displayed 2022
 - Proposed koala grid
 - Appin Road Safety Improvements fencing
 - Proposed underpass
 - Approved biobank area
 - Noorumba Reserve
 - Existing environment
 - Major road
 - Minor road
 - Waterbody

Koala grid locations

Lendlease
Appin Road AREF



Figure 3-11 Location of 'to-specification' koala grids

3.5.3 Fauna furniture

Submission number(s)

54, 59B, 62, 64

Issue description

- Suggestion for use of fauna furniture to improve efficacy of underpasses
- Dr Phillips' advice that the inclusions of lightwells and fauna furniture lack any data to provide evidence of use by koalas

Response

Fauna furniture can generally be described as specific features (e.g. logs, branches, rocks, ropes, pipes) that are added to wildlife crossing structures to make them more attractive to wildlife (refer to Figure 3-12 below). In addition to horizontal tree logs placed on the batters at the culvert opening of the underpasses, refuge poles and internal crossing structures will be provided (refer to Section 804.3 for further details).



Figure 3-12 Example of koala using fauna furniture

While it is acknowledged that there is limited data to show that fauna furniture and refuge poles improve underpass function, they have been included to provide a safe and dry alternative for fauna near or inside the underpass. The revised fauna furniture has been designed to provide koalas with an alternative to walking along the ground and safe refuge for species should a predator be encountered near or inside the underpass.

In addition, revegetation around the underpasses will consider:

- the use of primary and secondary food trees in those areas that will not cause a road safety traffic hazard
- primary, secondary and supplementary koala food trees are shown to be effective in restoring habitat for koalas

- native vegetation at ingress/egress to pipes, including koala feed tree and shrub species will be undertaken as early as possible following completion of the works (Environmental safeguard B22)
- areas where specific revegetation is to occur would include approaches to fauna connectivity structures
- methods for topsoiling, seeding and planting will be in accordance with the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (RTA 2011).

3.6 Noise

3.6.1 Inclusion of noise barriers

Submission number(s)

6, 29, 45

Issue description

- Suggestion for an acoustic barrier for houses that back onto Appin Road
- General suggestion for a noise barrier along Appin Road due to increased traffic

Response

Noise and vibration impacts have been assessed as part of the environmental assessments undertaken for the Project REF and AREF. The inclusion of noise walls has been considered in the design of the project REF Appin Road Upgrade, Mount Gilead to Ambarvale. They form part of the Urban Design Plan which will be prepared to support the final detailed project design. In addition to the noise walls, a Noise and Vibration Management Plan (NVMP) during the construction phase of the project will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP).

See Submission Report March 2019 -

<https://www.transport.nsw.gov.au/sites/default/files/media/documents/rww/projects/01documents/appin-road-improvements/appin-road-submissions-report-march-2019.pdf>

3.7 Ground and surface water

3.7.1 Flooding

Submission number(s)

64, 89

Issue description

- Suggestion that advice from ground and surface water technical expert is followed
- Suggestion that underpasses should be designed to ensure they do not flood

Response

Consideration has been given to the detailed design of the underpasses to ensure that the levels will not result in localised flooding in and around the tunnel, which would impact the useability of them by koalas during rain events. The proposed underpasses are not located within flood prone land.

Each of the western points of the Glen Lorne underpasses will discharge into the stormwater system designed for the new residential development at Mount Gilead, along with the

stormwater network for the new intersection. It will mitigate any flooding inundation within the underpasses.

The Browns Bush underpass is designed with a grade towards lower ground levels on the western side of Appin Road to ensure the structure is free draining (refer Figure 4-2 showing additional area required to ensure appropriate drainage).

3.8 Heritage

3.8.1 Aboriginal and cultural heritage impacts – construction

Submission number(s)

60, 64

Issue description

- Concerned about heritage impacts including Aboriginal heritage and historic heritage (Appin Road is a former Cobb & Co route)

Response

An Aboriginal cultural heritage assessment was undertaken by GML Heritage (GML) to support the AREF (refer Appendix E of AREF), with three previous studies having been undertaken in support of the Project REF. This assessment determined that, as determined in the three previous heritage investigations, the Appin Road corridor holds low Aboriginal archaeological potential for Aboriginal objects.

Notwithstanding, prior to construction further assessment of the impact areas of the Glen Lorne and Browns Bush koala underpasses would be completed to confirm the statutory pathway for these works. A program for archaeological test excavation will be completed as guided by the Archaeological Research Design developed by GML (2022) for the koala underpass works.

A non-Aboriginal heritage assessment was undertaken by Artefact Pty Ltd for the Project REF (Appendix H of the Project REF). While there are a small number of Listed Heritage Items in the vicinity of the proposed amended activity, the Project and works associated with the AREF have been designed to avoid any impacts on these items.

An addendum assessment was undertaken to assess the impact of the design refinements outlined in this Submissions Report. The findings of that assessment are summarised in Chapter 5 of this Submission Report and provided in Appendix C – Amended REF – Aboriginal and Historic Heritage Constraints and Recommendations, GML Heritage, October 2023.

3.9 Biodiversity

3.9.1 Biodiversity impact assessment approach

Submission number(s)

49, 59B, 60, 68, 71

Issue description

- Concern about the assessment of significance outcomes of the AREF proposal
- Suggestion a flora and fauna study needs to be done for the eastern side of Appin Road
- Suggestion that an Environmental Impact Statement (EIS) is required and must be accompanied by either a SIS or a BDAR.

Response

All aspects of the environment potentially impacted upon by the proposed modification have been considered in the AREF document.

As part of this Submissions Report, EPBC Act and BC Act assessments of significance for impacts to the koala and other NSW and Commonwealth listed species have been reviewed and updated (refer Chapter 5 and Appendix B) to ensure that the likelihood of significant impacts from the works proposed by the Project REF, the AREF, additional refinements made in response to submissions and other minor boundary adjustments to accommodate detailed design have been comprehensively assessed. This additional assessment has confirmed that the overall project, including the proposed amendments to improve the functionality of the koala underpasses and exclusion fencing, is unlikely to have a significant impact on the koala or any other NSW or Commonwealth listed species.

A biodiversity offset strategy will be prepared during the detailed design phase for the area of moderate condition vegetation that is not already being offset, under the approved biodiversity certification for the Figtree Hill development (Mount Gilead Stage 1).

Areas impacted by the construction of the underpasses will be revegetated with native vegetation.

3.9.2 Biodiversity impacts – koalas, native vegetation loss and habitat loss

Submission number(s)

3, 4, 9, 11, 14, 16, 18, 19, 24, 32, 49, 50, 51, 56, 58, 59A, 59B 60, 61, 64, 65, 66, 67, 68, 69, 70, 71, 72, 77, 79, 88, 89, 91

Issue description

- Concern with decline of koala population in Sydney and generally
- Concern around vehicle strike impacting the local koala population
- Concern that the measures will result in an increase in koala mortality
- Concern with decrease in genetic diversity of local koala population as habitat areas become more isolated
- Concerns about habitat loss leading to loss of koala chlamydia free area

- Concern over the general decline of koala populations, particularly following the 2019-2020 bushfire season
- Concern about vegetation loss (and therefore loss of koala habitat) in Sydney Basin and about the impact of broader development in NSW on koala populations, specifically the Campbelltown koala population
- Concern about loss of habitat due to residential development and Appin Road Upgrade
- Concerns about indicative transport corridors and residential development resulting in additional roads leading to habitat loss
- Concern with loss of native vegetation along Appin Road edges
- Suggestion for a revegetation plan.

Response

It is acknowledged that the NSW koala population has been detrimentally impacted by vehicle strikes. Data shows at least 31 koala vehicle strikes on the section of road between Rosemeadow and Appin township between 2010 and 2021.¹⁴ A report by Biolink shows that there has been an increasing rate of koalas killed along Appin Road in recent years, and that the number of animals known to have been killed along this road is likely to represent less than half of the real number.¹⁵ The AREF seeks to reduce further decline in koala numbers by reducing the ability of koala to access the road corridor. The AREF and REF include the provision of exclusion fencing to both sides of Appin Road and koala grids. These inclusions will minimise interaction of koalas with traffic to reduce the risk of vehicle strike.

The activity seeks to reduce further decline in koala numbers through the underpasses which improve koala connectivity between Noorumba and Beulah Biobank sites on the western side of Appin Road with Glen Lorne and Browns Bush Reserves on the eastern side of the road to support the long-term stability of the local koala population. This will be tracked through the implementation of a Monitoring and Adaptive Management Plan, included as additional safeguard B29 (see Section 4.4.4) added in response to submissions raised, to monitor the performance of koala mitigation measures.

Partial vegetation removal will be required along sections of Appin Road due to the road widening and new intersections proposed. Areas impacted by the construction of the road upgrades are detailed in the Project REF. These areas will be regenerated with appropriate landscaping treatment and native plantings. It is noted that the opportunity for tree planting is restricted along some sections of Appin Road. Where tree planting within the road corridor is not possible, there may be opportunities to negotiate plantings within adjacent properties

¹⁴ Bionet data (August 2021)

¹⁵ Biolink. (2023). Sydney Basin Bioregion: Koala habitat and population assessment. Report for Total Environment Centre by Biolink Ecological Consultants, Pottsville, NSW.

to mitigate impacts. For details of the urban design strategy and plan refer to Appendix I of the Project REF.

Any revegetation works will consider:

- the use of primary and secondary food trees in those areas that will not cause a road safety traffic hazard
- primary, secondary and/or supplementary koala food trees are shown to be effective in restoring habitat for koalas
- the use of hollows and branches to be reused from vegetation being cleared
- revegetation near crossing structures will commence immediately on completion of the construction activity or may commence earlier in the construction period if possible
- areas where specific revegetation is to occur would include approaches to fauna connectivity structures, and
- methods for topsoiling, seeding and planting will be in accordance with the Biodiversity Guidelines: Protecting and managing biodiversity on RTA Projects (RTA 2011).

It is noted that broader residential development and transport routes in the area sit outside the scope of the Project REF and AREF but would be subject to relevant strategic planning documents such as the Greater Macarthur 2040 plan and the Cumberland Plain Conservation Plan, which include strategies to minimise loss of native vegetation. The ability to control bushfire impacts also sits outside the scope of the project.

It is not expected that the provision of the two underpasses under Appin Road would materially increase the likelihood of currently Chlamydia free koalas interacting with Chlamydia impacted koalas. Interaction pathways are probably more likely to occur along the major primary north south habitat corridor down the Georges River from Campbelltown into Wollondilly Shire. It is also noted that this risk is being managed by DPE under the NSW Koala Strategy with a major chlamydia vaccine trial underway in southwest Sydney. Refer www.koala.nsw.gov.au/news/securing-future-koalas-chlamydia-vaccine-trial-begins-south-west-sydney

Data indicates that there is, on average, at least 3.3 koala deaths per year along Appin Road from Mansfield Creek to around Beulah Reserve (Steven Ward Appendix A. The number of deaths may be higher due to underreporting of wildlife carer data. Given the ongoing koala mortality due to vehicle strike, the activity as now proposed should result in better protection for the koala.

3.9.3 Biodiversity impacts – construction

Submission number(s)

44, 64

Issue description

- Concern for koalas in regard to construction impacts and increased traffic (vehicle strike)

- Suggestion that revegetation be undertaken as early as possible following construction
- Suggests implementation of a project-worker training program like 'Zero Harm to Koalas' that was used for the Woolgoolga to Ballina Pacific Highway upgrade

Response

Construction environmental management plans (CEMP) will be developed and implemented during the construction of the works. The CEMP and sub-plans will take steps to minimise impacts on the environment and local wildlife during the construction of the works. Safety in design workshops will ensure adequate safety measures are incorporated into the final design of the works. Site-specific safeguards and management measures are provided to minimise the identified potential impacts. An additional safeguard will be introduced during construction to ensure that every person working on the construction site will be inducted and trained to identify koala habitat, key threats, mitigation strategies and strict protocols to follow when a koala is spotted.

The Project REF for the Appin Road Upgrade, Mount Gilead to Ambarvale, identified a range of environmental outcomes and management measures that would be required to avoid or reduce the environmental impacts. After consideration of the issues raised in the public submissions, the environmental management measures for the proposed amended activity (refer to section 6.2) have been reviewed and revised following exhibition of the AREF and consideration of submissions.

The current program may mean that some clearing may now be programmed to occur in the breeding season (September through to December). It is not recommended to delay the start of the project until February due to the importance of installing koala exclusion fencing as quickly as possible in order to reduce the risk of vehicle strike.

To minimise risk to koalas and other fauna during clearing (both in breeding season and at any other time) the prohibition of clearing during the breeding season has been replaced with an additional protection measures (refer Table 6-1 Summary of environmental safeguards and management measures, specifically environmental safeguards B18 and B19) and monitoring controls have been introduced as safeguards which include:

- Where possible, all clearing for construction will be scheduled outside of the koala breeding season (September to December).
 - When clearing occurs during the koala breeding season, additional management measures including pre-clearance surveys and presence of a qualified fauna management team will be implemented, including
 - Additional pre-clearance surveys to confirm that vegetation is free of koalas prior to clearing on a daily basis, including thermal drone imaging of all trees on the morning of clearing.
 - Should koala be present, then work will cease in the vicinity of the koala until the koala has moved on
 - Fencing installation as soon as practical to prevent further vehicle strikes.

- Pre-clearance surveys for native fauna will be undertaken by a qualified ecologist in the month prior to clearing. Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following:
 - Clearly marking (using paint or flagging tape) all habitat trees prior to the commencement of clearing operations by an ecologist
 - On-site, full-time supervision by trained handlers to inspect habitat trees 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, as necessary
- Fencing in and around construction areas will be installed as soon as practical and prior to any other construction works.

3.9.4 Biodiversity impacts – operation

Ongoing maintenance of koala exclusion fencing

Submission number(s)

4, 64, 79, 90

Issue description

- Suggestion that koala exclusion fencing should be properly maintained, or it won't be effective

Response

Following completion of construction, maintenance of the koala exclusion fencing will be undertaken by Lendlease for a 12-month period prior to it being transferred to Transport for NSW who will manage the ongoing asset management and maintenance program.

Monitoring of underpasses

Submission number(s)

4, 79

Issue description

- Concern around adequacy of monitoring
- Suggestion that monitoring of underpasses will allow tracking of efficacy

Response

Koala use of the underpasses will be subject to a monitoring program using cameras. The cameras will be located at each underpass entry/egress point to identify what animals are using the underpasses and when. Monitoring data will be provided to Transport for NSW and Campbelltown City Council on an annual basis once construction of the underpasses and

installation of the cameras has been undertaken. Data from the monitoring program will be used to inform adaptive management and potential research opportunities.

The monitoring program will be undertaken for a minimum period of two years.

Koala interest group

Submission number(s)

64

Issue description

- Suggestion for creation of a koala interest group comprising representatives from key stakeholders

Response

Prior to commencement of construction a Koala Interest Group will be formed by Lendlease, consisting of representatives from various stakeholders to help manage the research and adaptive management of the project's conservation activities. Terms of Reference will be provided, and key stakeholders invited such as Campbelltown City Council staff, local wildlife organisations, Landcare, and DPE.

3.9.5 Conservation of koala habitat corridors

Submission number(s)

49, 58, 59B, 61, 64, 65, 68, 70, 71, 72, 88

Issue description

- Concerns that the koala underpasses will create a movement bottleneck which will further exacerbate fragmentation of koala habitat
- Suggests mapping out the koala habitat corridors on the Nepean River side of Appin Road in line with the recommendations of the NSW Chief Scientist
- Suggests conserving all the koala habitat corridors on the Mt Gilead estate and neighbouring properties along the 5.2 km stretch of Appin work
- Suggests that habitat underpasses and corridors be clearly defined and independently assessed to ensure they are in-line with NSW Chief Scientist's approach
- Suggests that corridor widths are modified by Lendlease to conform with the NSW Chief Scientist's advice on corridor width.

Response

The AREF addresses the relevant requirements of the NSW Chief Scientist's report. The proposed amended activity has been designed to minimise habitat fragmentation. Underpasses and exclusion fencing are proven mitigation measures. The intent of underpasses is to provide safe passage for koalas across a known barrier, in this case Appin Road, and they are known to be used by koalas. The proposed underpasses at Noorumba

Reserve and Beulah biobank site have been designed and sited to maximise their suitability for koalas. While it's impossible to say how many koalas would use the underpasses each year, the koala monitoring will provide insights to their effectiveness.

The wider strategy around conservation of koala habitat corridors is not a relevant environmental matter of the project. The proposed underpasses coincide with the priority east-west koala movement corridors (Menangle Creek Corridor A and Woodhouse Creek Corridor B) connecting the Georges and Nepean Rivers identified by the NSW Chief Scientist and Engineer (OCSE February 2021). Mapping and definition of koala habitat corridors as suggested sits outside the scope of the project.

The NSW Department of Planning and Environment has assessed the proposed conservation corridors and confirmed that they apply the recommendations and subsequent expert advice of the Office of the NSW Chief Scientist and Engineer. The Department has published an indicative map outlining the koala corridors at Gilead. View the map on their website <https://www.planning.nsw.gov.au/sites/default/files/2023-03/indicative-koala-corridors-gilead-map.pdf>.

The proposed amended activity does not address koala corridors relating to the proposed Mt Gilead (Stage 2) and this is part of a separate planning and approvals process. It is also noted that the Mount Gilead development is subject to a separate planning approval and includes provision of biobank sites and a Biodiversity Offset Strategy as part of the process of biodiversity certification under the BC Act, as outlined under Section 6.1 of the Project REF.

3.10 Climate change

Submission number(s)

3, 50, 79

Issue description

- Concern about impact of project on climate crisis
- Concern that tree removal will impact climate change

Response

The AREF assesses impacts of the project associated with climate change and greenhouse gas emissions. The underpass would increase connectivity and allow koalas and other fauna to access refuge in times of stress, drought or other threats. The design of the underpasses will ensure resilience against extreme temperatures and intense and more frequent rainfall events. The use of climate tolerant vegetation will be considered as part of the landscaping works for the overall project. Sustainable materials will be used where possible during construction of the underpasses, koala exclusion fencing and road upgrades.

3.11 Other General comments

3.11.1 Appin Road Upgrades

Submission number(s)

1, 2, 8, 15, 23, 25, 26, 27, 28, 31, 34, 36, 37, 38, 39, 41, 42, 80, 81, 82, 83, 84, 85, 86, 87, 92, 93

Issue description

- Suggestion that a more holistic approach to development in the general area, including a bypass around Appin township
- Suggestion that improvement works continue through to Appin township
- Query as to why Briars Road roundabout was not included in the works set out in the Project REF
- Concern about heavy vehicles turning right into Mount Gilead from Appin Road

Response

The current AREF and REF covers the section of Appin Road between Ambarvale and Mount Gilead. The Appin Road Upgrade design considers the need for heavy vehicles to turn right into Mount Gilead from Appin Road and provides appropriate traffic controls to do this. The measures include a dedicated turning lane.

Lendlease will deliver the upgrade under a voluntary planning agreement with the NSW Government as part of the Figtree Hill residential development. The NSW Government will also provide part funding for the road works under the Housing Acceleration Fund program.

Transport for NSW is also finalising an addendum REF and public display for the Appin Road Safety Improvements between Mount Gilead and north of Brian Road. The safety works would include installing koala exclusion fencing along this section of Appin Road. As part of the fencing strategy, grids would be installed at driveways to maintain access for property owners. A bypass around Appin township is out of scope of the Project REF and AREF.

For more information on upgrades to other sections of Appin Road, including the Brian Road Intersection Upgrade, go to www.transport.nsw.gov.au/projects/current-projects/appin-road-improvements.

3.11.2 Provision of public transport in the local area

Submission number(s)

55

Issue description

- Suggests a need for improved public transport in the area

Response

Public transport is being considered as a key action within the Greater Macarthur 2040: An interim plan for the Greater Macarthur Growth Area and includes collaboration with Transport for NSW and Department of Planning and Environment on business cases for public transport and road improvements.

The Greater Macarthur Structure Plan (November 2022) provides an overview of the future public transport plans in this area - www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Greater-Macarthur-Growth-Area .

The Future Transport Strategy will guide transport investment over the longer term. More information on the Future Transport Strategy is available on the Future Transport website at www.future.transport.nsw.gov.au .

3.11.3 Driver behaviour

Submission number(s)

5, 91

Issue description

- Concerns about road safety in Western Sydney
- Suggestion of chevron assisted markers to guide driver behaviour.

Response

The Project has been designed to achieve all relevant design standards and requirements. Chevron markers are signs that indicate the location of the edge of the road. Typically, this type of sign is required where there are dangerous curves and other hazards. This section of Appin Road is relatively straight so does not require the installation of chevron markers.

3.11.4 Bushfire and emergency evacuation

Submission number(s)

90

Issue description

- Concerns about bushfire evacuation times on local road network with increased traffic from new housing developments.

Response

The proposed amended activity does not address road evacuation times as it is outside of the activity scope. The objective is to improve koala connectivity and minimise interaction of koalas with traffic on Appin Road and to ensure that there is sufficient capacity in the road network to accommodate the increased traffic in the Greater Macarthur Growth Area.

4 Changes to activity

In response to submissions received following the display of the AREF, and the preparation of additional advice by koala expert, Dr Steven Ward, a number of design refinements have been made to the AREF activity. These refinements are detailed in Sections 4.1 to 4.5 and summarised in Table 4-1. An updated assessment of the impacts of the amended activity on environmental factors is provided in Chapter 5. Overall, it is considered that the proposed amendments to the activity will result in a positive outcome for the local koala population by providing safe passage across Appin Road and reducing the likelihood of vehicle strike.

4.1 Glen Lorne koala underpass

To address feedback around the efficacy of the proposed round concrete pipe underpass (2.4 metres in diameter and 57 metres in length), the underpass at Glen Lorne has been redesigned to incorporate a RCBC, with a height of 2.4 metres, width of three metres and a length of 53 metres. In addition, the underpass will have a flat concrete floor lined with a natural substrate, similar to that shown in Figure 4-1. Substantial redesign, particularly regarding existing and proposed services, has been undertaken to achieve this outcome. The underpass is now as large as feasibly possible taking account of engineering constraints including existing fibre optic cabling, sewer, high-voltage overhead powerlines and construction constraints of the site, including inability for significant road closures and impacts on the Noorumba Biobank site.

The length of underpass has been reduced by four metres, to 53 metres in length and the location of the underpass has been slightly modified to encourage koala use, whilst remaining on Lendlease land, and is now perpendicular to Appin Road to encourage access by koalas (refer to Figure 4-2). It is noted that Dr Stephen Phillips suggests that the Glen Lorne underpass should be replaced with a dedicated fauna overpass (bebo arch) or 3 metre by 3 metre RCBC that is centrally located within Noorumba biobank site. Further discussion on why this recommendation is not considered feasible is provided in Section 3.4.2.

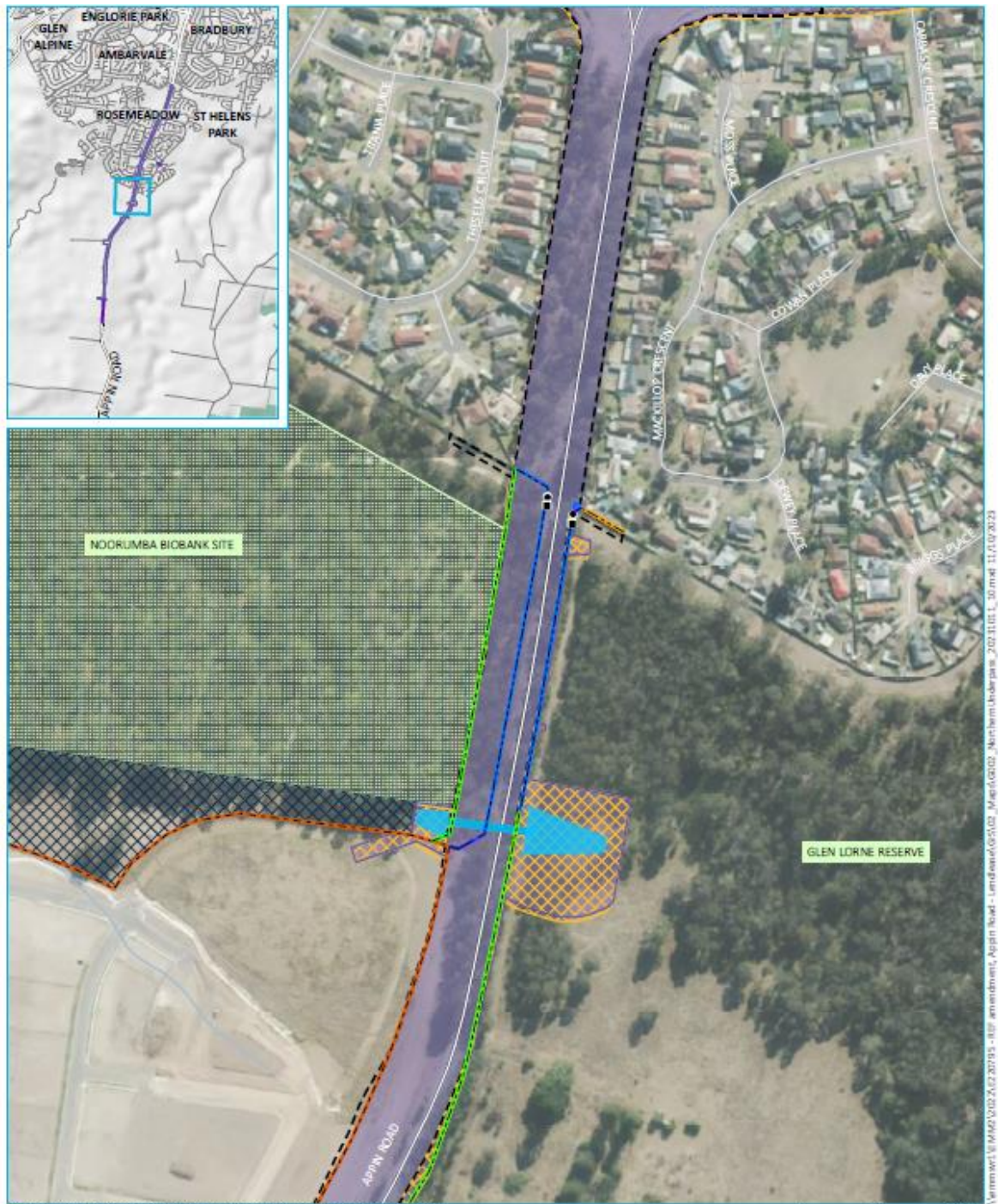
Transport for NSW monitoring data has recorded 84 successful crossings at 22 culvert structures across NSW.¹⁶ These comparative koala underpasses range from 1.05 to three meters (width), 1.05m to three metres (height) and 15 metres to 100 metres (length). This indicates that the refined design of the Glen Lorne koala underpass is expected to be successful.

¹⁶ Transport for NSW (2023) Koala connectivity report, assessed September 2023.



Figure 4-1 Example of a 2.4 metres x 2.4 metres Reinforced Concrete Box Culvert (RCBC).¹⁷

¹⁷ [Woolgoolga to Ballina koala monitoring program year 3 2019-2020 - 15 September 2020 \(nsw.gov.au\)](#)



Source: EMM (2023); ABS (2021); DPSI (2020, 2021); ESRU (2022); GA (2013); Metromap (2023)

KEY

- 2018 Gilead to Ambarvale REF upgrade boundary
- Appin Road Upgrade AREF boundary
- Amended Appin Road Upgrade AREF
- Approved biobank area
- Noorumba Reserve
- Reinforced concrete box culvert and indicative entry/exit ramps 2.4m (h) x 3m (w)
- Fencing plan**
- Fauna fence type 1
- Fauna fence type 2
- Figtree Hill development fencing/ noise wall (subject to separate approval)
- Rectifying existing with consultation with landowner
- Safety improvement fencing
- Gate
- Grid
- Existing environment**
- Major road
- Minor road
- Watercourse/drainage line

Northern underpass

Lendlease
Appin Road AREF

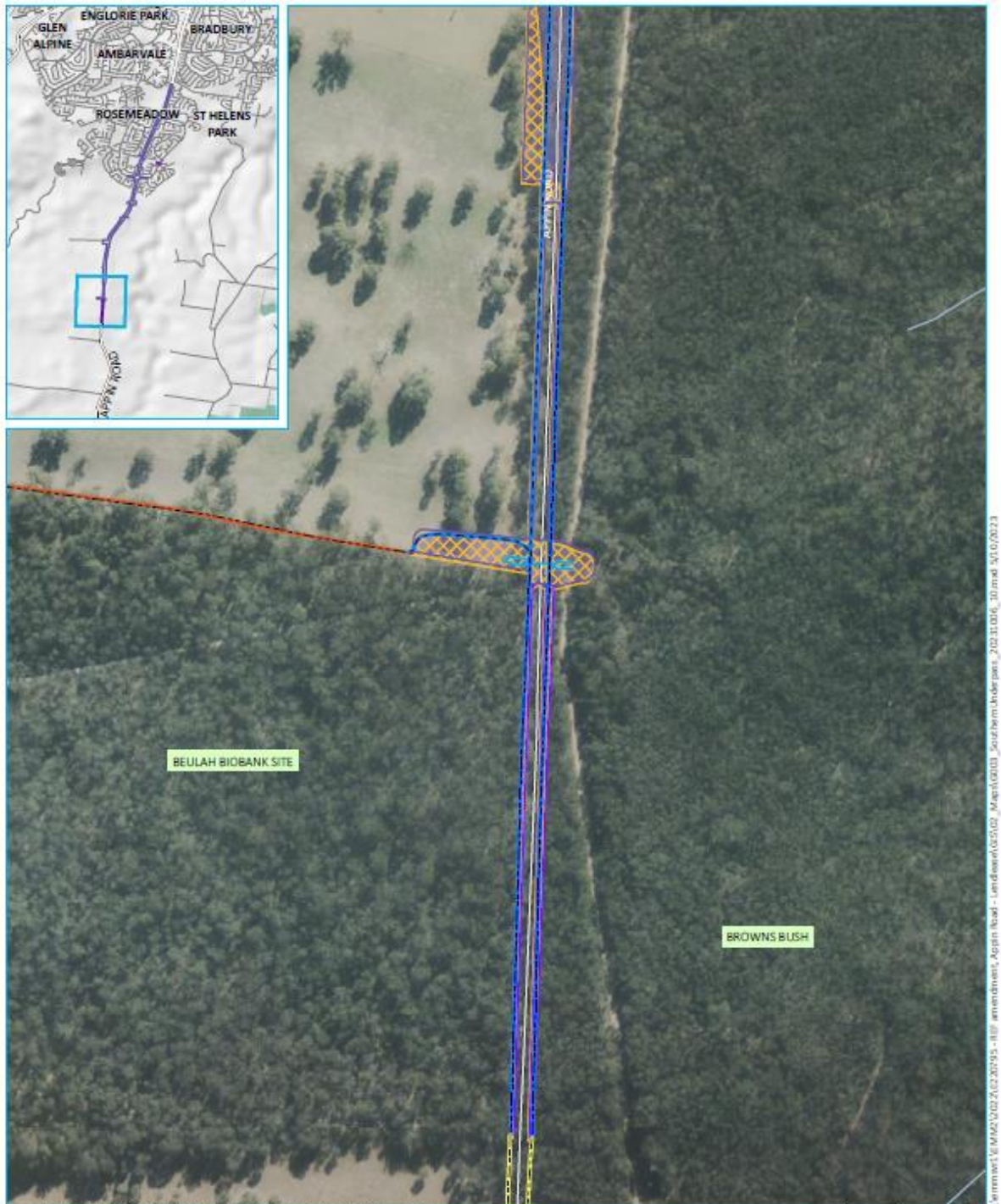


Figure 4-2 Glen Lorne Koala Underpass

4.2 Interim Browns Bush koala underpass

The interim Browns Bush koala underpass has been redesigned to address submissions and provide effective connectivity for koalas while design and approval for the permanent Browns Bush underpass is progressed. Design refinements include swapping twin 1.2 metres diameter concrete pipes proposed with a single RCBC, 1.5 (h) x 2.4 (w) metres and 30 metres in length with a concrete floor, lined with a natural substrate similar to that shown in Figure 3-1. It is noted that the length of the underpass has been increased by three metres to facilitate the installation of the RCBC (more room is required due to the increase in size of the aperture and different installation method). As per Section 3.1, underpasses of this type and size are known to be successfully used by koalas.

Design of the interim underpass is constrained by limited vertical height as it needs to be constructed under the existing two-lane road and around existing utilities. The height of the underpass cannot be raised as this would set the base lower, which increases the amount of regrading required at entrances, reduces entrance visibility, impacts existing sewer, and creates issues with drainage. Notwithstanding, it is considered that the revised design is consistent with best practice, as it provides a 2.4 metres wide underpass with a level surface of 2.4 metres and is of sufficient size not to impede use by koalas. The final boundary of the interim Browns Bush koala underpass is outlined in Figure 4-3 below.



Source: EMM (2023); ABS (2022); DFSI (2020, 2021); ESRU (2022); GA (2011); Metromap (2023)

0 50 100
GDA 2020 MGA Zone 56 N

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> Appin Road Upgrade AREF boundary Amended Appin Road Upgrade AREF boundary Gate Grid | <ul style="list-style-type: none"> Reinforced concrete box culvert 1.5m (h) x 2.4m (w) Fauna type 1 Fauna type 2 Figtree Hill Development Fencing/ Noise Wall (subject to separate approval) Safety improvement fencing | <ul style="list-style-type: none"> Existing environment Major road Watercourse/drainage line |
|---|---|--|

Southern underpass

Lendlease
Appin Road AREF



Figure 4-3 Browns Bush Koala Underpass

4.3 Fauna furniture and refuge poles

Additional fauna furniture and refuge poles have been designed to address submissions. While there is limited data to show that fauna refuge poles improve underpass function, they have been included in order to provide koalas with a means of escape until replanted vegetation close to underpass openings is mature enough to be used by koalas. The revised fauna furniture has been designed to provide koalas with an alternative to walking along the ground and to provide safe refuge should a predator be encountered near or inside the underpass.

4.3.1 Fauna furniture

The following fauna furniture will be provided:

- Glen Lorne Underpass: An elevated timber rail will be installed to help provide koalas with a dry and safe alternative to walking on the ground. The timber rail will be placed 1.5 metres above ground and be directed towards refuge poles at each end.
- Interim Browns Bush Underpass: A ledge will be installed to help funnel koalas to the crossing and provide dry, safe passage under the road. The ledge will be placed on one side of the underpass and be approximately 400mm wide and raised 300mm above the ground. The material of the ledge will be developed further during the detailed design phase in consultation with koala ecologists and wildlife experts.



Figure 4-4 Examples of underpasses with fauna ledges, fiberglass ledge at Deadman's Creek Bridge, Heathcote Road (NSW) and natural log ledge under Pine Mountain Road, Salvin Creek (QLD).¹⁸

¹⁸ Transport for NSW, Heathcote Road Bridge and Salvin Creek Corridor Success – wildlife moving safely – Bulimba Creek Catchment Coordinating Committee.

Monitoring reports have recorded fauna using both the culvert floor and fauna furniture to traverse underpasses (refer to Figure 4-5 and Figure 4-6).¹⁹ Although the use of the floor was substantially higher than furniture, koalas have been recorded using both elevated timber rails and ledges similar to those proposed. In one two-year study koalas used a ledge more than 17 times to traverse an underpass.²⁰



Figure 4-5 Example of koala using fauna furniture to cross under the highway at Tysons south-west underpass.²¹



Figure 4-6 Example of koalas using ledges.²²

4.3.2 Refuge poles

The addition of timber refuge poles, adjacent to the fauna furniture at Glen Lorne Underpass and interim Brown Bush underpass, has been included since the display of the AREF. This has been provided as a safety measure to help koalas escape predators.

¹⁹ Warrell Creek to Nambucca Heads Interim Underpass Monitoring - Spring-Summer Year 1 (2019)

²⁰ Dexter C, et al. 2016, Using complementary remote detection methods for retrofitted eco-passages: a case study for monitoring individual koalas in south-east Queensland. *Wildlife Research* 45(5): 369–379.

²¹ Nambucca Heads to Urunga Pacific Highway upgrade operational phase year three 2019 November 2020 (nsw.gov.au)

²² Ballina Shire Council (2019) Koala Toolkit for Roadwork Activities

The following specifications will be developed further during the detailed design phase.

- Each refuge pole will have minimum diameter of 200mm and extend at least four metres above ground.
- They will have a fork at three metres above ground level and be supplemented with existing trees and planting of koala feed trees, at a spacing of 8-10 metres and extend to the nearest reserves and biobank sites.

Similar refuge poles are shown in Figure 4-7 and Figure 4-8 below and while one of the submissions suggested that management measures such as fauna furniture such as refuge poles and escape poles are ‘ancillary’ and should be discounted given the lack of data to support them, these measures have been used in many other road projects to date. The proposed monitoring of the activity (Section 4.4.4) may assist in providing greater understanding of the use of fauna furniture by koalas.



Figure 4-7 Example of fauna furniture and refuge pole used in the Pacific Highway Upgrade.²³

²³ Sapphire to Woolgoolga Pacific Highway Upgrade – Operational Phase Fauna Crossing Monitoring – Year 1



Figure 4-8 Example of refuge poles used at Pine Mountain Rd on Salvin Creek (Brisbane City Council).²⁴

²⁴ Bulimba Creek Catchment Coordinating Committee.

4.4 Koala exclusion measures

4.4.1 Koala Exclusion Fencing

Koala exclusion fencing, as depicted in Figure 4-9, plays a key role in guiding wildlife to underpasses²⁵ and reducing vehicle strike.²⁶ The location of the koala exclusion fencing around the underpasses has been adjusted to help guide koalas towards their entrance, specifically by reducing or avoiding acute angles in the fence line. In addition, koala exclusion fencing has been realigned to ensure tie-ins to underpass entrances and internal angles are, where possible, not less than 140 degrees.

Further assessment has been undertaken of the koala exclusion fencing 'ends' at the northern and southern boundaries of the project site in response to submissions and concerns about the staged approach to construction and koala exclusion fencing being delivered along Appin Road. A review of fencing staging will be undertaken during construction to minimise any temporary fence end effects which might occur during construction as much as practicable.

A review of fencing along the southern boundary of the suburb of Rosemeadow will be undertaken prior to construction to confirm that existing fencing at the rear of residential properties will exclude koalas 600 metres west of Appin Road (to Gabun Gajaaja Reserve) and 300 metres east of Appin Road. If existing fencing doesn't suffice as koala exclusion fencing, Lendlease will provide exclusion fencing in consultation with Campbelltown City Council and relevant property owners. This review will also identify any gaps in the fencing that need to be addressed to ensure continuity of koala exclusion fencing.

Coordination with the Appin Road Safety Improvements project has been captured as an additional safeguard. If ARSI has not commenced construction within 6 months of the substantial completion of the Lend Lease koala exclusion fencing at Beulah Reserve, then Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700 metres south of Beulah Reserve on both sides of Appin Road; and, install the fence within 12 months of substantial completion of Lendlease's exclusion fencing at Beulah Reserve or at another date as agreed by Transport. An example of koala exclusion fencing is shown in Figure 4-9, while temporary fauna exclusion fencing (shown in Figure 4-10 and Figure 4-11) includes an additional bar at the bottom to reduce the space under the fence, as well as a smaller mesh fence to further deter access into construction areas by smaller animals such as frogs.

²⁵ McCollister, Matthew & Manen, Frank. (2010). Effectiveness of Wildlife Underpasses and Fencing to Reduce Wildlife-Vehicle Collisions. *The Journal of Wildlife Management*. 74. 1722-1731.

²⁶ Bond A. R. & Jones D. N. (2008) Temporal trends in use of fauna-friendly underpasses and overpasses. *Wildlife Research* 35, 103-12.

Ongoing consultation with Campbelltown City Council and local wildlife rescue organisations will be included in the Koala Monitoring and Adaptive Management Plan to help respond to koala sightings and vehicle strike along Appin Road and surrounding areas, including the Mansfield Creek vicinity. A monitoring program (minimum of two years) will also be undertaken.

During construction temporary koala exclusion fencing may be required at certain locations to facilitate utility relocations and earthworks prior to the construction of the permanent Type 1 fencing and the Type 2 fencing as described. Figure 4-10 and Figure 4-11 are examples of the type of temporary koala exclusion fencing likely to be used during construction. These fences have a horizontal bar at the base to prevent koalas from manoeuvring under them and a flat smooth panel at the top to prevent koala from climbing over them.



Figure 4-9 Koala Exclusion Fencing on section of the Pacific Highway upgrade, NSW.²⁷

²⁷ Sandpiper Ecological 2019, Pacific Highway Upgrade – Warrell Creek to Nambucca Heads: Interim Underpass Monitoring Report – Spring Year 1 Operational Phase. Report prepared for NSW Roads and Maritime Services.



Figure 4-10 Temporary fauna exclusion fencing.²⁸



Figure 4-11 Temporary fauna exclusion fencing.²⁹

²⁸ Temporary fauna fencing by The Advanced Group. Image found at <https://www.advancedns.com.au/temporary-fencing/fauna-fencing> (note: the black mesh fence in the foreground of this image is a sedimentation fence and is not part of the temporary koala exclusion fence)

²⁹ Temporary fauna fencing by The Advanced Group. Image found at <https://www.advancedns.com.au/temporary-fencing/fauna-fencing>

4.4.2 Koala Grids

Additional review of the koala exclusion fence-end treatments and koala grid specifications has been undertaken to address submissions and concerns about koalas entering the road corridor. In response, koala grids will be installed at all property access points within the project area as well as gates to reduce potential access points (refer Figure 4-12). These refinements are designed to minimise koala vehicle strike by restricting koala access to Appin Road.

The koala grids will restrict access into the road corridor even if gates are inadvertently left open within these locations. The specifically designed koala grids have been shown to be successful in preventing koalas from entering the road corridor and preventing koala deaths.³⁰

The koala grid is based on a standard cattle grid but modified by mounting vertical metal bars to the flat bearers to minimise the likelihood of koalas using the flat bears to traverse the grid. The following proposed specifications will be developed further during the detailed design phase.

- Depression in the road covered by a grid of round pipes of a steel construction
- Utilise 50 mm round pipes spaced in a range of 100mm to 125mm apart over a 1,000mm grid width
- Vertically mounted flat bar fixed to bearer to reduce likelihood of koalas navigating across the bearer
- Fence ends of grids to prevent koala movement around the grids
- Escape structures to ensure native animals that fall through the grid are able to escape on the habitat side of the grid
- Tie-in to exclusion fencing to ensure koalas are not able to navigate around the fence ends.

Koala grids and gates will be installed at the locations shown in Figure 3-11.

³⁰ [Biolink 2018, Road works koala management toolbox. Report prepared for Ballina Shire Council. Biolink Ecological Consultants, Uki, NSW.](#)



Figure 4-12 Examples of specifically designed koala grid (Biolink 2018)

4.4.3 Escape Poles

Escape poles have been included as an additional safeguard to address submissions and concerns about koalas being trapped and unable to escape from the road corridor (refer Figure 4-13). When koalas become trapped inside a fenced road corridor escape poles may provide a one-way escape route over the fence.

The escape poles are timber poles placed vertically near the koala exclusion fencing on the roadside of the fence and allow koalas to ascend the pole and manoeuvre over the fence and out of the road corridor. There is no reported monitoring of these structures and their use on road upgrades is limited. Despite this, the inclusion of escape poles will complement the wing-wall drop-down (although monitoring of the use of wing wall drop downs is also limited), which are being included at both underpasses, which prevent wildlife entering the road corridor from the culvert entrance side, but low enough that an animal in the road corridor could drop down into the culvert without injury.

The escape poles will be installed near underpasses and fence ends at the following locations:

- Within 50 metres of the southern and northern fence ends on both sides of Appin Road
- within 100 metres south of the Glen Lorne underpass on both sides of Appin Road
- within 100 metres north of the interim Browns Bush underpass on both sides of Appin Road.

The escape poles will include the following design specifications and will be developed further during the detailed design phase.

- Constructed from 200-300mm timber poles, with the centre of the outer (roadside) pole 300mm from the fence and the inner (bush side) pole ending 1200mm above ground level. The post on the bush side of the fence will be high enough off the ground to prevent koalas gaining access to the road but allows koalas to jump down.

- Both the outer and inner pole will 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 will be installed on the fence adjacent to the inner pole.



Figure 4-13 Example of escape poles install by Brisbane City Council.³¹

³¹ [Brisbane City Council, Wildlife Movement Solutions. Accessed September 2023.](#)

4.4.4 Monitoring and adaptive management

The intent of koala underpasses is to provide safe passage for koalas across a known barrier, in this case Appin Road, and evidence identifies that they are known to be used by koalas. The proposed underpasses at Browns Bush and Glen Lorne have been designed and sited to be utilised by koalas, while minimising impacts on Noorumba biobank site and taking account of other constraints. While it is not known, and cannot be known prior to construction, how many koalas would use the underpasses each year, koala monitoring will provide insights into their effectiveness.

Methods used to monitor underpasses were outlined in the AREF and will be further refined during the construction phase as part of the preparation and implementation of a Koala Monitoring and Adaptive Management Plan (KMAMP) for the project (refer Additional Safeguard B29 in Table 6-1 Summary of environmental safeguards and management measures). The KMAMP will determine the level of use by koalas of the underpasses and whether any unintended negative impacts are occurring (e.g. entrapment of koalas on the roadside of the exclusion fence) and will identify measures required to improve underpass effectiveness and address any negative impacts (e.g fence maintenance).

The KMAMP will include a requirement for further survey to determine the extent to which koalas access Appin Road from the Mansfield Creek area and determine the most suitable location for exclusion fence, if required. This will include liaison with wildlife carer groups on any vehicle strikes or reports of koala presence along Appin Road within the suburb of Rosemeadow, and drone survey of the Appin Road corridor to seek to identify any koala presence.

4.5 Minor amendment to project boundary

The project boundary as shown in the AREF requires some minor adjustments to accommodate the construction of the redesigned koala underpasses and other design refinements (Refer to [Figure 4-6](#)). The additional areas are around 4 ha and have been assessed in Chapter 5 of this Submission Report.



Figure 4-14 Amended REF boundary.

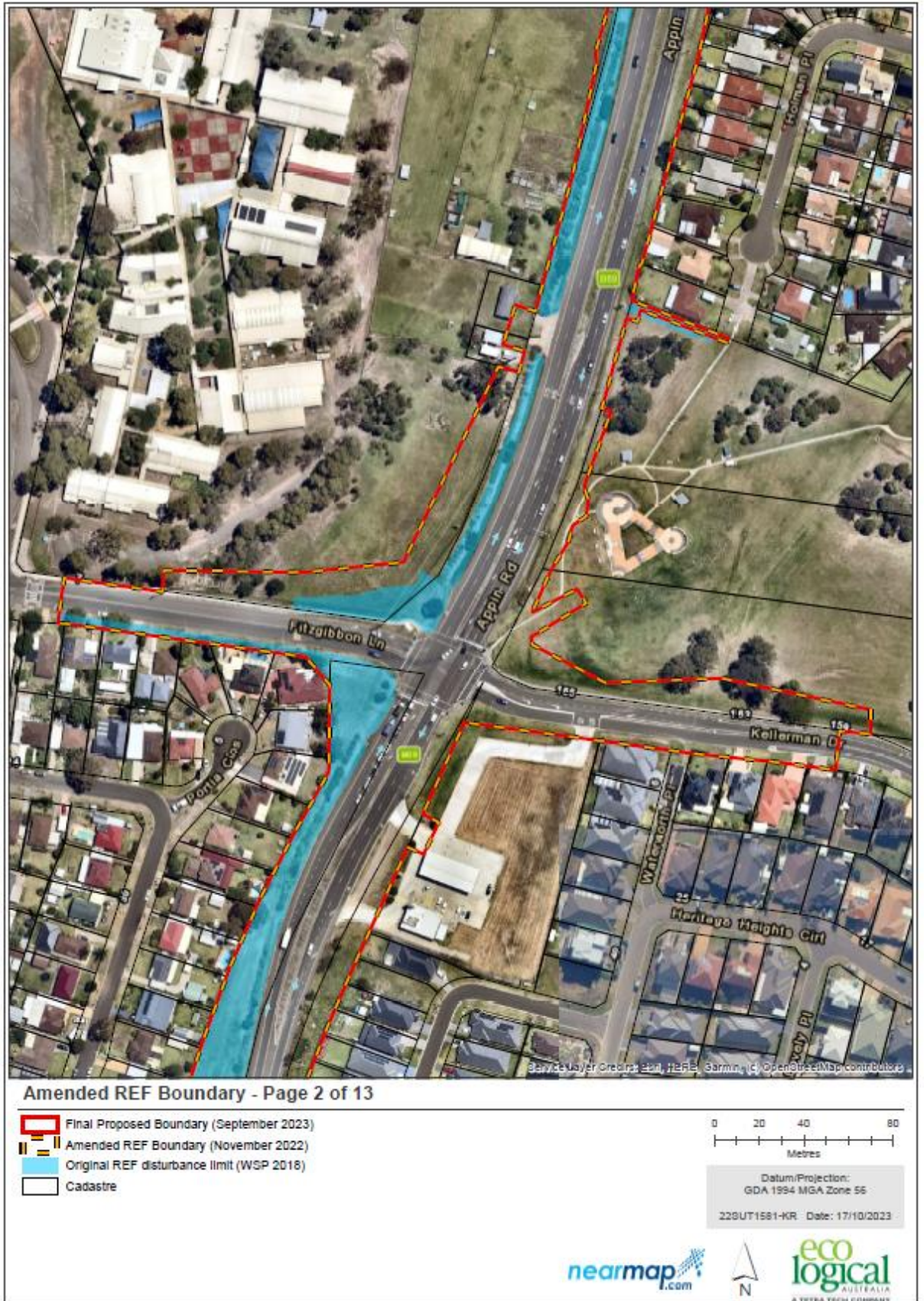


Figure 4-15 Amended REF boundary







Figure 4-16 Amended REF boundary.

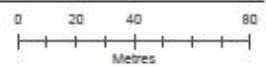


Figure 4-17 Amended REF boundary.



Amended REF Boundary - Page 5 of 13

-  Final Proposed Boundary (September 2023)
-  Amended REF Boundary (November 2022)
-  Original REF disturbance limit (WSP 2018)
-  Cadastre



Datum/Projection:
GDA 1994 MGA Zone 56
22BUT1581-KR Date: 17/10/2023



Figure 4-18 Amended REF boundary.



Figure 4-19 Amended REF boundary.

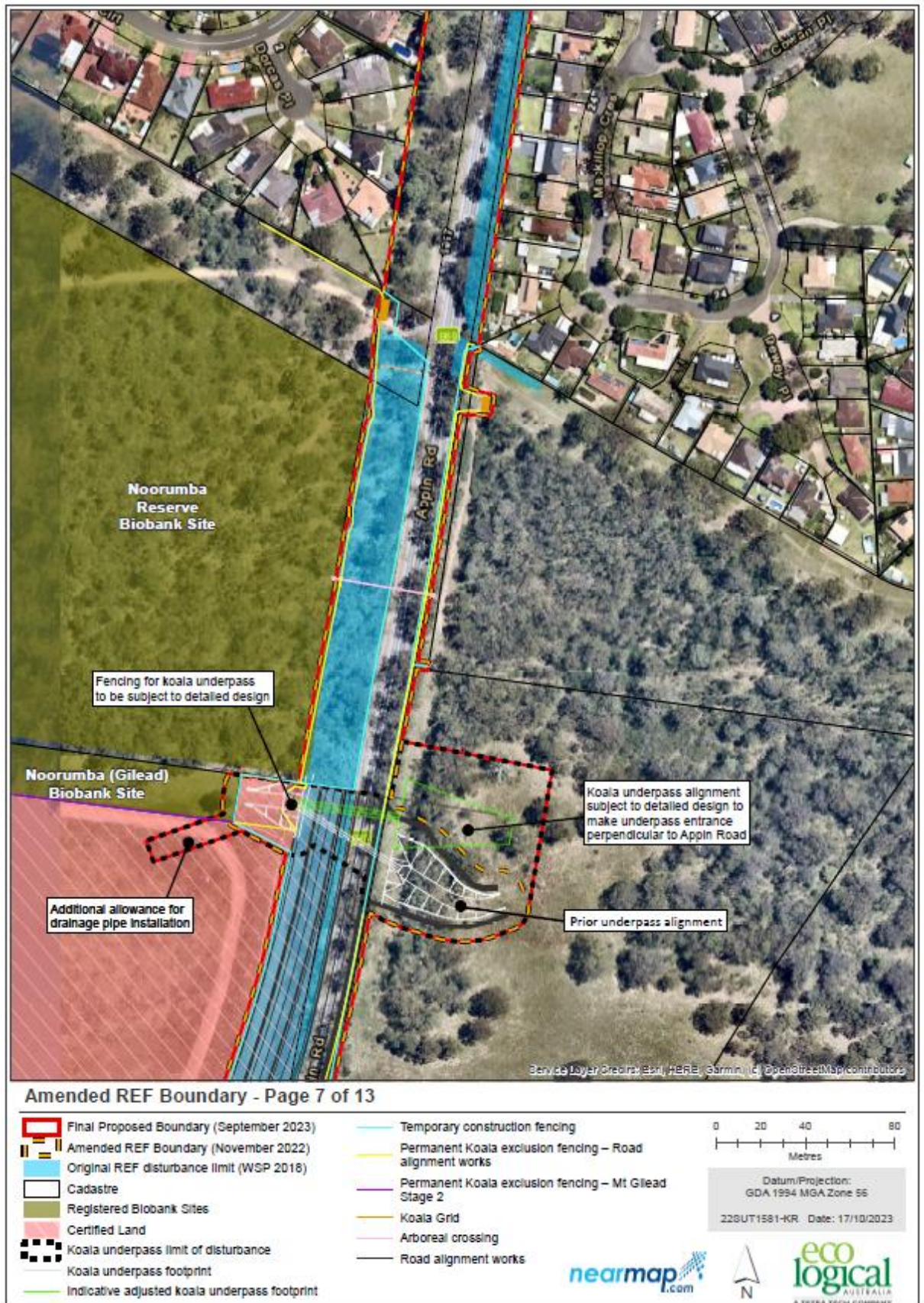


Figure 4-20 Amended REF boundary.



Figure 4-21 Amended REF boundary.



Figure 4-22 Amended REF boundary.

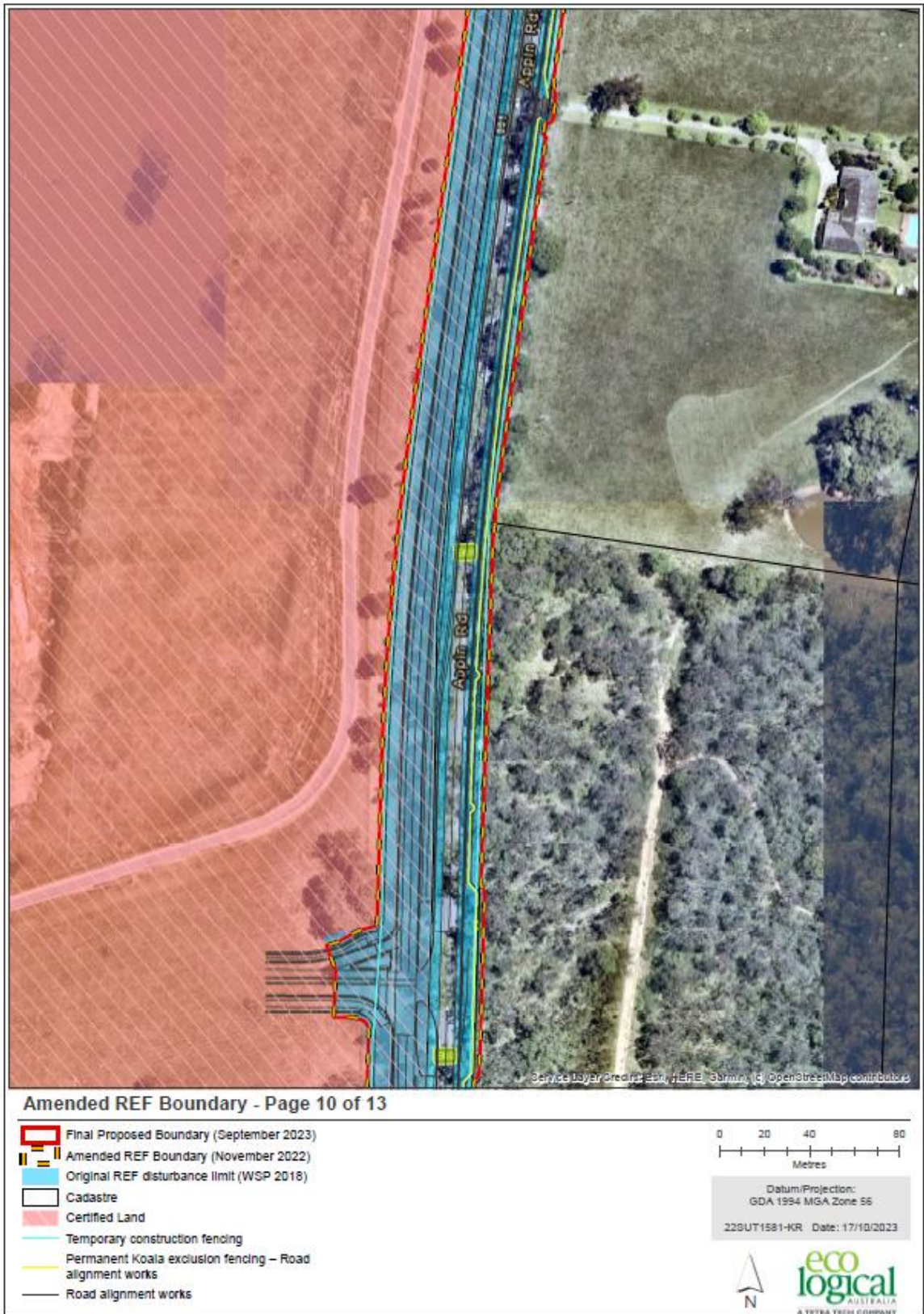


Figure 4-23 Amended REF boundary.

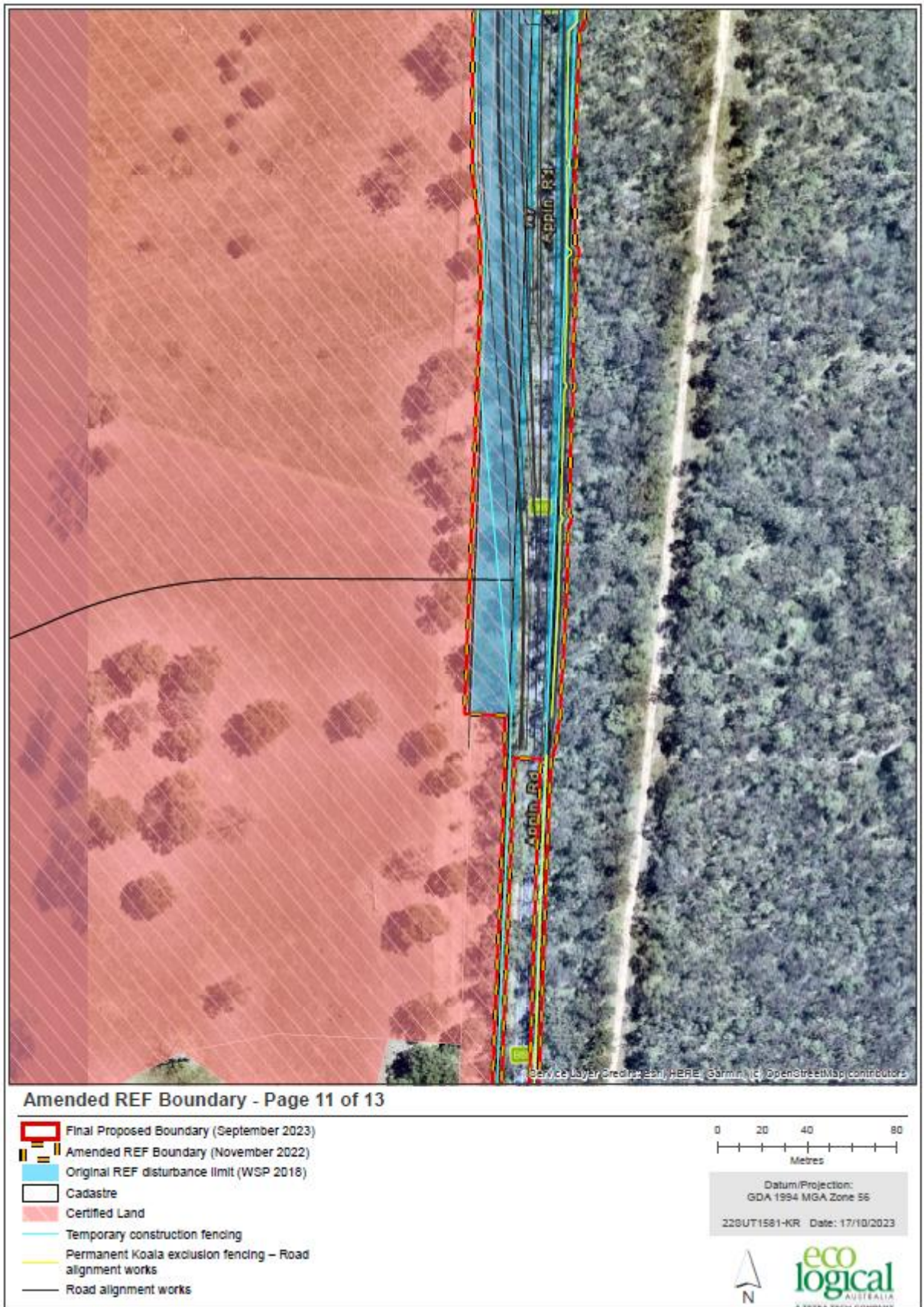


Figure 4-24 Amended REF boundary.



Figure 4-25 Amended REF boundary.



Figure 4-26 Amended REF boundary.

4.6 Summary of design refinements

A summary of design refinements is provided below in Table 4-1 Summary of design refinements.

If Transport for NSW, on consideration of the information in the AREF and this Submissions Report, makes a decision to proceed with the activity, the activity approved under the REF will have been amended by the Addendum REF and the amendments to the activity as described in this Submissions Report.

The environmental assessments undertaken as part of the REF and AREF should be considered in concert with the environmental assessments undertaken and annexed to this Submissions Report. Considered together, these documents demonstrate that the requirement of the EP&A Act for an activity to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity has occurred and is continuing to occur.

Table 4-1 Summary of design refinements

STRUCTURE		ADDENDUM REVIEW OF ENVIRONMENTAL FACTORS – EXHIBITED ACTIVITY	RESPONSE TO SUBMISSION - CHANGES TO THE PROPOSAL
GLEN LORNE UNDERPASS			
Structure and size	Type	2.4m diameter concrete pipe	2.4m (h) x 3m (w) reinforced concrete box culvert
Length		57m	53m
Alignment		Angled to avoid existing infrastructure	Perpendicular and with entry points graded to be no steeper than 16 % grade
Refuge poles		N/A	Refuge poles (200mm (d) x 4m (h) with a fork at 3m above ground, extending to closest forest at 8-10m spacing
Escape poles		N/A	Installed within 100m of the underpass on both sides of Appin Road. Placed with the centre of the outer (roadside) pole 300mm from the fence, and the inner pole ending 1200mm above ground level.
Fauna furniture			-Install within culvert, elevated timber rail minimum 1.5m above ground, extending length of structure and connected to refuge poles at apron edge (culvert entry and exit). -Install from apron edge, refuge poles (200mmD, 4m above ground, fork at 3m above ground level) extending to closest forest at 8-10m spacing.
BROWNS BUSH UNDERPASS			
Structure and size	Type	2 x Concrete pipe, each 1.2m in diameter	1.5m (h) x 2.4m (w) reinforced concrete box culvert
Length		27m	30m (subject to detailed design). The additional length is required to accommodate larger RCBC structure.

Fauna furniture through koala underpass	150mm to 300mm diameter logs placed through the tunnels Use of fauna furniture where necessary to allow access between top of batters and the underpass entry/exit points. Fauna furniture would consist of logs placed on ramps.	Raised fauna ledge installed through underpass with a minimum width of 400mm and a minimum non-furniture clearance of 1200mm (between ledge and roof). Use of fauna furniture where necessary to allow access between top of batters and the underpass entry/exit points. Fauna would consist of logs placed on ramps.
Refuge poles	N/A	Refuge poles (200mm (d) x 4m (h) with a fork at 3m above ground, extending to closest forest at 8-10m spacing.
Escape poles	N/A	Installed within 100m of the underpass on both sides of Appin Road. Placed with the centre of the outer (roadside) pole 300mm from the fence, and the inner pole ending 1200mm above ground level.
KOALA EXCLUSION MEASURES		
Alignment of fencing tie-ins	Fauna exclusion fencing along underpass headwalls	Realign fencing to ensure tie-ins to underpass entrances and internal angles are not less than 140 degrees.
Additional review of fencing along the southern boundary of the suburb of Rosemeadow, to confirm that rear property fencing will exclude koalas 600m west of Appin Road (to Gabun Gajaaja Reserve) and 300m east of Appin Road.	N/A	If existing fencing will not serve as koala exclusion fencing, additional koala exclusion fencing will be provided in consultation with Campbelltown City Council and relevant property owners.

Koala grids	Standard cattle grids	Cattle grids modified with vertical weldments to prevent koalas using rectangular joists to cross grids (50 mm round pipes spaced between 100mm and 125mm apart over a 1,000mm grid width).
MONITORING AND ADAPTIVE MANAGEMENT		
Monitoring along Appin Road	N/A	Monitoring along Appin Road, including the Mansfield Creek area, for koala vehicle strike. The monitoring plan will outline the additional mitigation measures should koalas be detected within the road reserve.
Monitoring in Mansfield Creek area	N/A	Monitoring in the Mansfield Creek area for koala activity. Should medium/high activity levels be identified, additional mitigation measures, as outlined in the monitoring plan, will be implemented to restrict access. These measures will be developed in consultation with Campbelltown City Council and surrounding residents.
Additional fencing and escape poles required at southern boundary.	N/A	Additional fencing is required should Mount Gilead to Ambarvale be constructed as a standalone project, or prior to the Appin Road Safety Improvement Project. Exclusion fence (Type 2) should be installed for 700m south of the Beulah Biobank site on both sides of Appin Road with additional escape poles. This would need to be the subject of further assessment, where the fencing is not determined and delivered as part of the safety improvement works. If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700metres south of Beulah Reserve on both sides of Appin Road; and, install the fence within 12 months of substantial completion of Lendlease's exclusion fencing at Beulah Reserve or at another date as agreed by Transport.

		<p>The escape poles will be installed near underpasses and fence ends at the following locations:</p> <ul style="list-style-type: none"> • within 50m of the southern and northern fence ends on both sides of Appin Road • within 100m south of the Glen Lorne underpass on both sides of Appin Road • within 100m north of the interim Browns Bush underpass on both sides of Appin Road <p>The escape poles will include the following design specifications and will be developed further during the detailed design phase.</p>
PROJECT BOUNDARY		
Project boundary adjustment to accommodate perpendicular Glen Lorne underpass	Project boundary offset from angled underpass footprint	Project boundary expanded to surround perpendicular underpass
Project boundary adjustment to accommodate drainage pipeline	NA	Project boundary expanded to include drainage line to ensure underpass remains free-draining.
Project boundary adjustment to accommodate high voltage connection point	NA	Project boundary expanded to include revised high voltage connection point on eastern side of Appin Road to existing overhead electrical infrastructure.
Project boundary adjustment to accommodate material storage and compound location	NA	Project boundary expanded to include compound and material storage area during construction to minimise safety risk associated with limited storage areas along Appin Road corridor.

5 Additional assessment

An updated biodiversity impact assessment has been undertaken to provide an assessment of the likely impacts to threatened species and ecological communities together with revised assessment of significance to address design refinements that have been proposed in response to submissions received and additional ecological advice. This report is summarised in Section 5.1. Section 5.2 summarises the heritage assessment undertaken for the additional disturbed areas within the updated project boundary. An additional Traffic and Transport assessment has been undertaken to better understand the impacts to property access as a result of the proposal. This assessment is summarised in Section 5.3. Table 5-1 provides an updated assessment of amended activity impacts on other environmental factors.

5.1 Biodiversity

The revision of the final proposed boundary to allow the Glen Lorne underpass to be made perpendicular to Appin Road has increased the final impact footprint.

The addendum REF identified that the overall project would result in impacts to:

- 8.97 ha of impacts to Cumberland Plain Woodland and Shale Sandstone Transition Forest (2.65 ha of which has already been certified)
- 8.04 ha of direct impacts to koala habitat (1.71 ha of which is already certified)
- 4.25 ha of direct impacts to Cumberland Plain Land Snail habitat (1.25 ha of which is already certified)

The revised proposal footprint based on design refinements in response to issues raised and other minor boundary refinements would result in overall impacts to:

- 10.96 ha of impacts to Cumberland Plain Woodland and Shale Sandstone Transition Forest (3.85 ha of which has already been certified)
- 10.05 ha of direct impacts to koala habitat (2.91 ha of which is already certified)
- 7.83 ha of direct impacts to Cumberland Plain Land Snail habitat (2.75 ha of which is already certified)

EPBC Act and BC Act assessments of significance for impacts to the koala and threatened communities and likely threatened species have also been considered under section 7.3 of the BC Act, and an assessment of impacts to Matters of National Environmental Significance (MNES) listed under the EPBC Act (refer Appendix B). The revised assessment was undertaken to ensure that the likelihood of significant impacts to threatened species and communities arising from overall the works proposed by the Project REF, the AREF and changes as described in this Response to Submissions report have been comprehensively assessed. The updated report (Appendix B) concluded the following:

The 2018 REF for the Appin Road Upgrade assessed the likely significance of impact of the Project on threatened species and ecological communities under both NSW and

Commonwealth legislation and found no significant impacts were likely. The AREF (EMM 2022) has materially (and positively) changed the potential impact to the local Koala population by maintaining koala connectivity under Appin Rd by the provision of two fauna underpasses at strategic locations, now includes Koala exclusion fencing on both sides of Appin Road to guide Koala's to areas where safe crossings can be made and includes specially designed and constructed Koala-grids across driveways and fence-ends. The fencing of Appin Road on both sides addresses koala mortality due to road kill which will have a positive impact on the koala given the number of koala vehicle strikes along Appin Road. The 2018 REF, while addressing koala vehicle strike through a fencing strategy, did not support the ongoing efficacy of the koala habitat corridors through Beulah / Woodhouse Creek and Noorumba / Menangle Creek by providing koala underpasses under Appin Road. The importance of these corridors for the ongoing viability of the local koala population has since been confirmed by the Office of the NSW Chief Scientist and the DPE have announced their intention to protect them through future precinct planning processes (DPE 2021 and DPE 2022). By addressing connectivity, the conclusion is that neither the impacts anticipated by the original REF (as now amended by the addendum REF and following public exhibition of the AREF and consideration of submissions) are likely to have a significant impact on the koala or any other NSW or Commonwealth listed species including the koala. All residual impacts will be offset in accordance with the RMS Offset Guidelines (RMS 2016) and a Biodiversity Offset Strategy will be prepared prior to the commencement of the action.

5.2 Heritage assessment

5.2.1 Cultural Heritage

GML previously prepared Aboriginal heritage documentation for Mount Gilead Stage 1, which led to the issuing of Aboriginal Heritage Impact Permit C0005248 (AHIP). This AHIP covers the additional area of impact of the material compound and storage location and portions of the koala underpass (additional drainage). All works within these areas must be conducted in accordance with conditions of AHIP C0005248.

Previous investigations undertaken as part of the AREF studies conformed to GML Heritage Mt Gilead Stage 2, Appin Road Koala Crossing Archaeological Research Design (ARD). The findings of these investigations are presented in the Mt Gilead Stage 2, Appin Road Koala Crossings, Archaeological Technical Report (ATR). This report concluded that, based on findings, the koala underpass impacts were assessed as having a low likelihood to impact Aboriginal Objects and could proceed subject to caution.

An assessment of the additional impacted areas (Appendix C) found that proposed material compound and storage location, as well as some of the additional works around the underpasses are within the boundary of the existing AHIP C0005248, therefore will be undertaken in accordance with the conditions of the AHIP.

Some of the proposed changes to the koala underpasses fall outside the existing AHIP. These areas are directly adjacent to the previous archaeological investigation study area, which confirmed there is low to nil potential for any further subsurface Aboriginal objects within the Glen Lorne study area. Therefore, no further assessment is required at that location. An aboriginal unexpected finds protocol will apply if Aboriginal sites or objects are suspected or identified during construction.

The location of the proposed HV connection requires additional Aboriginal archaeological investigations to assess if the work is likely to impact Aboriginal objects of cultural heritage values. This will be assessed in accordance with the methodology provided in the ARD (see Appendix F of the AREF, 2022). Construction at this location will not commence until this assessment has been completed. An additional safeguard has been included in Table 6-1 to ensure this work is completed and if necessary, any further approval is in place prior to work being undertaken at that location.

5.2.2 Historic Heritage

GML Heritage undertook a review of additional impact areas and concluded that the previous archaeological testing within the vicinity of the koala underpasses suggests there is limited potential for historical archaeological remain, therefore no further historical archaeological assessment is required at those locations.

There is potential for archaeological remains associated with the former Glen Lorne estate within the location of the proposed HV connection. Potential remains would likely be limited to fencing and evidence of agricultural use. All subsurface work at this location will be subject to an unexpected finds protocol during construction.

There is potential for archaeological remain at the location of the proposed material compound and storage site, which is located in the area of the former Mount Gilead carriageway. Any subsurface excavation would be subject to an archaeological monitoring program. Archaeological monitoring of locally significant historical archaeology qualifies for a self-assessment excavation permit exemption s 139(4) under clause 2 (e). This exemption does not apply to relics of state heritage significance. If relics are discovered a notification under section 146 of the *NSW Heritage Act 1977* is required and additional assessment and approval may be necessary before work can recommence at that affected area. Any salvage work would require a section 140 permit.

Prior to the commencement of construction, a heritage induction would be provided to all contractors to ensure they are aware of the requirement under the protect approval, and the procedure for notification of unexpected finds.

5.3 Traffic and Transport

Additional assessment was undertaken to assess the change in vehicle access arrangements along the extent of the Appin Road Upgrade (Appendix E - Traffic and transport advice regarding change in vehicle access arrangements).

The results of the modelling indicate that by 2026, without the upgrade works, both left and right turns out of a driveway will reach a Level of Service of “F” during the PM peak hour. Generally, this indicates that the turning movement will be unsafe as drivers will accept lower than acceptable gaps between traffic. This would be worse for a heavy vehicle, which requires a much larger gap in traffic to turn into. The safety of these driveways will be further reduced as traffic volumes increase along Appin Road.

The southern section of the upgrade of Appin Road includes the installation of a raised concrete median to form a divided carriageway. This would prevent right turn access to properties at that location. However, the upgrade to provide two southbound lanes will significantly reduce delays for the left turn movements from driveway onto Appin Road.

Vehicle access to and from the land to the west of Appin Road will be facilitated by the new signalised intersections. This land to the west of Appin Road will be subdivided into residential lots with access provided by new local roads. The intended road structure of the partially approved Figtree Hill estate has been examined, with the view to determining whether the internal roads could be used to facilitate turning movements for drivers approaching or departing the land to the east of Appin Road from the south to the north respectively. Both roads internal to the subdivision which extend to the west from signalised intersections with Appin Road have road reserve widths of 26m, facilitating divided carriageways with 7m widths. Internal intersections along both of these roads with other collector roads within the subdivision will accommodate roundabouts with a circulating radius of approximately 17 to 19m.

Therefore, subject to appropriate approval under the NHVR heavy vehicle routes scheme, these roads will provide adequate facilities for vehicles up to 26m in length to undertake turning movements to achieve a displaced u-turn and travel in the opposite direction along Appin Road. It is expected that the number of heavy vehicles undertaking these manoeuvres will be low, though the conversion of the Copperfield Drive / Appin Road roundabout to traffic signals may result in use by some heavy vehicles other than those related to the land to the east of Appin Road.

Access to properties would be maintained during construction. The use of detours during construction may be required at some locations to facilitate certain movements. These would be temporary in nature and would be minimised as far as practicable.

5.4 Other environmental factors

Table 5-1 Assessment of impacts of amended activity on other environmental factors.

Environmental Factor	Existing environment	Potential impacts
Soil and geology	<p>Soils</p> <p>A review of the 1:100,000 Soil Landscapes of Wollongong-Port Hacking Sheet (9029-9129) indicates the study area is underlain by the Blacktown soil landscape comprising gently undulating rises, with local relief to 30 metres and slopes usually less than 5 per cent.</p> <p>Soils range from shallow (<1 metre) red brown podzolic soils – comprising mostly clayey soils on crests and upper slopes – to deep (1.5–3 metres) yellow-brown clay soils on lower slopes and areas of poor drainage. These soils are typically moderately reactive with low fertility, poor soil drainage and highly plastic subsoil.</p> <p>Geology</p> <p>A review of the 1:100,000 Wollongong Map (NSW Department of Minerals, 1985) indicates the proposal area is underlain by Ashfield shale from the Wianamatta group, comprising laminate and dark grey siltstone. Weathered Bringelly Shale is known to</p>	<p>There is a negligible increase in the potential of encountering, disturbing and mobilising contaminants within the proposal location during construction and operation.</p> <p>Construction activities with the potential to expose soils may lead to erosion and sedimentation. These activities could potentially lead to:</p> <ul style="list-style-type: none"> • Washout, erosion and sediment discharge of exposed soils • Erosion, leaching and dust generation from stockpiled materials • Loss of soil quality and condition from material stockpiling • Associated soil quality impacts through accidental spills caused by: <ul style="list-style-type: none"> – Use of chemicals outside of the contained areas – Loading and unloading risks – Leaks and drips from poorly maintained vehicles, machinery, and equipment – The temporary storage and management of spoil and waste (leading to leaching).

	<p>contain a high proportion of smectite clays which are typically expansive.</p> <p>Geotechnical investigations undertaken in this area identified silty clay extending to depths between 0.9–1.2 metres. From these depths at around 1.5 metres, the material turned to bedrock consisting of extremely low strength shale. This generally increased with strength and decreased in weathering with depth. The shale and sandstone bedrock encountered was generally thinly bedded and often exhibited clay seams along the bedding boundaries (WSP, 2017a).</p>	<p>A review of the Australian Soil Resource Information System (ASRIS) indicates that there is an ‘extremely low’ probability of acid sulfate soils occurring within the additional proposal area. There is also potential for encountering, disturbing and mobilising contaminants within the additional proposal area during construction.</p> <p>Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>
<p>Hydrogeology, Hydrology and Flooding</p>	<p>Flooding</p> <p>The proposed changes are located along a ridgeline bordering the Nepean River and Georges River catchments.</p> <p>Surface Water</p> <p>Glen Lorne: Surface water is collected in swales, crossing the road from the southbound side via the culvert and discharging to a farm dam to the west of Appin Road. Surface water then drains through Noorumba Reserve and towards Menangle Creek, eventually discharging to the Nepean River.</p> <p>Browns Bush: The location of the proposed changes is located between two crests. Surface water from Appin</p>	<p>The proposed changes are not anticipated to result in any additional flooding impacts. Consideration has been given to the detailed design of the underpasses to ensure that the levels will not result in localised flooding in and around the tunnel, which would impact the useability during rain events. The proposed underpasses are not located within flood prone land.</p> <p>Each of the western points of the Glen Lorne underpasses will discharge into the stormwater system designed for the new residential development at Mount Gilead, along with the stormwater network for the new intersection. It is anticipated that this will mitigate any flooding inundation within the underpasses.</p>

	<p>Road travels to an existing floodway on the eastern side of the road, draining via a culvert beneath Kellerman Drive to Mansfield Creek. Oswald Reserve, to the west of Appin Road, acts as a detention basin for stormwater collected from the surrounding residential area.</p>	<p>The Browns Bush underpass is designed with a grade towards lower ground levels on the western side of Appin Road to ensure the structure is free draining (Figure 4-2 showing additional area required to ensure appropriate drainage).</p> <p>Potential construction impacts to water quality could arise if activities are not appropriately managed. No major surface waters intersect the overall proposal area, including the additional areas. Any potential risk would be limited to periods of rainfall.</p> <p>Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>
<p>Groundwater</p>	<p>The proposal is located on a ridgeline and crosses the catchments for the Nepean and Georges Rivers. Within the southern area of the project regional groundwater is anticipated to flow west toward to the Nepean River. The groundwater within the northern section of the proposal is anticipated to flow east toward the Georges River. The proposed changes are located in the southern section of the overall proposal area.</p>	<p>As assessed in the AREF, there is a low potential for groundwater interaction and ingress into the koala underpasses. The permanent groundwater table is below the culvert levels based on drilling observations but would be confirmed with follow-up groundwater measurements at the project bores.</p> <p>The culvert structures will be constructed using solid concrete structures, which are not susceptible to groundwater ingress. Potential interaction of throughflow, which is not regarded as groundwater, at the koala underpasses can be negated using hard material such as shotcrete, or soft material in combination with vegetation plantings. Evapotranspiration</p>

		via plantings will presumably prevent throughflow accumulation, however this could be confirmed with field measurements of throughflow inflow rates, especially following high and sustained rainfall events.
Noise and Vibration	Both Glen Lorne and Browns Bush are within noise catchment area NCA01 and consists of 39 residential receivers. The closest residential receiver is over 200m away from the Glen Lorne koala underpass site.	<p>The construction and operational impacts associated with the proposed changes are not considered to result an additional noise and vibration impacts from those already assessed in the Project REF and AREF.</p> <p>Environmental safeguards to mitigate impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>
Waste management and resource use	Excavation will be required for the installation of the underpasses, generating spoil and construction waste.	<p>The proposed changes would have a negligible additional impacts to those assessed in the Project REF and AREF.</p> <p>Waste management and resource use would be managed by the safeguards mitigation measures outlined in Section 6 and would be included in the Project Construction Environmental Management Plan (CEMP).</p>
Hazards and Risks – Bushfire, Greenhouse gas emissions and Climate change	<p>Bushfire</p> <p>The proposed modification is adjacent to bushland. Therefore, the area may be prone to bushfires.</p> <p>Greenhouse gas emissions</p>	<p>The proposed changes would not result in any additional impacts regarding bushfire or greenhouse gas emissions to those already assessed in the Project REF and AREF.</p> <p>The AREF assesses impacts of the project associated with climate refinements and greenhouse gas emissions. The</p>

	<p>Transport emissions are currently the second largest component of NSW greenhouse gas emissions. Since 1990, transport emissions have increased from 19Mt to 28 Mt, with 2019 emissions 48% higher than 1990 levels. This is an average increase in transport emissions of 1.65% per year (EPA, 2021). Road transport includes private passenger vehicles (cars and motorcycles), light commercial vehicles, rigid trucks, articulated trucks and buses.</p>	<p>underpass would increase connectivity and allow koalas and other fauna to access refuge in times of stress, drought or other threats. The design of the underpasses will ensure resilience against extreme temperatures and intense and more frequent rainfall events. The use of climate tolerant vegetation will be considered as part of the landscaping works for the overall project.</p> <p>Sustainable materials will be used where possible during construction of the underpasses, koala exclusion fencing and road upgrades.</p> <p>Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>
Air Quality	<p>Existing ambient air quality at the proposal area based on Campbelltown regional data indicates relatively consistent and 'good' air quality (DPE, 2023). Likely contributions to poorer air quality in the region are road traffic emissions evident through peak-hour air quality reductions, the surrounding industry in Campbelltown and natural effects such as bushfires throughout summer.</p>	<p>Minor impacts due to the small number of additional construction plant and vehicles associated with the works and there is potential for a small amount of additional dust produced by the works. The additional site compound may result in additional dust at and surrounding that location if not managed appropriately.</p> <p>Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>

<p>Cumulative Impacts</p>	<p>Cumulative impacts occur when two or more projects are carried out concurrently and in close proximity to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was undertaken in isolation. Multiple projects undertaken at a similar time/similar location may also lead to construction fatigue, particularly around noise, traffic and air quality impacts, if not appropriately managed.</p>	<p>The proposed changes will be minor in terms of cumulative construction impacts from those already assessed in the Project REF and AREF. Other future projects within the area include:</p> <ul style="list-style-type: none"> • Appin Road Safety Improvements – Approved • Appin Road Safety Improvements Addendum REF - In Progress • Brian Road Intersection Upgrade – In progress • Appin (part) precinct Appin Road, Brooks Point Road, Elladale Road, Macquariedale Road, Northamptondale Road, Wilton Road - In Progress • Figtree Hill Estate – Approved <p>Biodiversity</p> <p>Construction impact to biodiversity as a result of all three projects would be temporary in nature.</p> <p>The operational impacts would cumulatively result in a reduction in the amount of vehicle strikes along Appin Road, while still providing connectivity for koalas. The additional koala exclusion fauna fencing associated with Transport for NSW’s Appin Road Safety Improvement project and Brian Road intersection Upgrade would cumulatively reduce the amount of koala vehicle strikes along Appin Road, which would be beneficial for the local koala population. The three Appin Road projects would provide three koala underpasses</p>
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		<p>to facilitate connectivity, which is expected to have a positive impact on the local koala population.</p> <p>A provision to extend the koala exclusion fencing for an additional 700 metres from the southern edge of Beulah Reserve within 12 months should the delivery of koala exclusion fencing as part of Transport for NSW's proposed Appin Road Safety Improvements project be delayed more than 12 months.</p> <p>Noise and Vibration</p> <p>The cumulative impact of construction of all three project is likely to result in construction fatigue to some residents living along or near Appin Road. Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p> <p>Traffic and Transport</p> <p>There will likely be periods of increased travel time during construction which prolonged by all three projects either occurring at the same time or subsequent to each other, depending on the timing of construction. Once construction is complete, the three Appin Road projects would result in improved travel times and would result in a safer journey along Appin Road for the community.</p>
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		<p>Environmental safeguards to mitigate these impacts are provided in Table 6-1. Appropriate mitigation measures would be included in the Project Construction Environmental Management Plan (CEMP).</p>
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6 Environmental management

The AREF identifies the framework for environmental management, including safeguards and management measures that would be adopted to avoid or reduce environmental impacts (Section 7 of the REF). After consideration of the issues raised in the public submissions and refinements to the proposed amended activity, the safeguard and management measures have been revised.

Should the proposed amended activity proceed, environmental management will be guided by the framework and measures outlined below.

6.1 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 proposed amended activity. Should the proposed amended activity proceed, these management measures would be incorporated into the detailed design and applied during the construction and operation of the proposed amended activity.

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

The CEMP will be prepared prior to construction of the proposed amended activity and must be reviewed and certified by environment staff prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the: QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing and QA Specification G10 – Traffic Management.

6.2 Summary of safeguards and management measures

The AREF for the Appin Road Upgrade, Mount Gilead to Ambarvale, identified a range of environmental outcomes and management measures that would be required to avoid or reduce the environmental impacts.

After consideration of the issues raised in the public submissions, the environmental management measures for the proposed amended activity (refer to Section 7.2 of the AREF) have been reviewed and revised where necessary. Should the proposed amended activity proceed, the environmental management measures from Table 5-1 will guide the subsequent phases of the proposed amended activity. Additional/amended environmental safeguards and management measures to those presented in the AREF have been highlighted **bold** for new text and ~~strike through~~ for deletion. No safeguards have been removed following the AREF.

Table 6-1 Summary of environmental safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	<p>A Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011c) and implemented as part of the CEMP. It will include, but not be limited to:</p> <ul style="list-style-type: none"> • 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 Landscape Guideline (RMS, 2008) • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling • Procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013) • Protocols to manage weeds and pathogens. 	Contractor	Pre-construction / detailed design	Core standard safeguard B1 Section 4.8 of QA G36 Environment Protection
Biodiversity	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.	Contractor	Pre-construction / detailed design	Core standard safeguard B2
Native vegetation removal	A Biodiversity Offset Strategy would be prepared during the detailed design phase for areas impacted by the Project REF,	Contractor	Detailed design	Additional safeguard B3

	<p>Addendum REF, and Submissions Report excluding those areas already offset under the Figtree Hill biodiversity certification.</p> <p>This strategy would be prepared in accordance with the Guidelines for Biodiversity Offsets (Roads and Maritime, 2016).</p>			
General ecological mitigation	<p>Ensure any fauna encountered onsite would be managed in accordance with Biodiversity Guidelines, Guide 9 (fauna handling) (Roads and Maritime, 2011).</p>	Contractor	Pre-construction	Additional safeguard B4
General ecological mitigation	<p>In addition to the requirements of Core standard safeguard B1, the Flora and Fauna Management Plan would also include:</p> <ul style="list-style-type: none"> • A site walkover to confirm clearing boundaries and sensitive locations before starting work • Identify, in toolbox talks, where biodiversity controls would be included. 	Contractor	Pre-construction	Additional safeguard B5
Invasive and noxious weed management	<p>Develop a weed management plan (WMP) in accordance with Biodiversity Guidelines, Guide 6 (Roads and Maritime, 2011) to include:</p> <ul style="list-style-type: none"> • Identification of the weeds on site (confirm during ecologist pre-clearing inspection) • Weed management priorities and objectives • Sensitive environmental areas within or adjacent 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 	Contractor	Pre-construction	Additional safeguard B6

	<ul style="list-style-type: none"> • Communication with local Council noxious weed representative. 			
Risk of pathogen and pest species	If hygiene procedures are required onsite, ensure the Flora and Fauna Management Plan includes hygiene protocols to prevent the introduction and spread of such pathogens as specified in Biodiversity Guidelines: (Roads and Maritime, 2011). Manage all pathogens (eg Chytrid, myrtle rust and phytophthora) in accordance with the Biodiversity Guidelines, Guide 7 (Roads and Maritime, 2016b).	Contractor	Pre-construction	Additional safeguard B7
Unexpected discovery of threatened species	If unexpected flora or fauna are discovered stop work immediately and implement the Roads and Maritime Unexpected Threatened Species Find Procedure in the Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2016b).	Contractor	Construction	Additional safeguard B8
Injury and mortality impacts while building the proposed amended activity	Implement the following controls under the Flora and Fauna Management Plan: <ul style="list-style-type: none"> • Manage fauna in accordance with Biodiversity Guidelines, Guide 9 (Roads and Maritime, 2016b) • Remove any habitat in accordance with Biodiversity Guidelines, Guide 4 (Roads and Maritime, 2016b). 	Contractor	Construction	Additional safeguard B9
Native vegetation removal and re-establishment of Threatened species habitat and habitat features	Implement the following controls under the Flora and Fauna Management Plan: <ul style="list-style-type: none"> • Undertake pre-clearance checks in accordance with Biodiversity Guidelines, Guide 1 (Roads and Maritime, 2011) • Create exclusions zones in accordance with Biodiversity Guidelines, Guide 2 (Roads and Maritime, 2016b) 	Contractor	Construction	Additional safeguard B10

	<ul style="list-style-type: none"> • Re-establish native vegetation in accordance with Biodiversity Guidelines, Guide 3 (Roads and Maritime, 2016b) • Reinstate habitat in accordance with Biodiversity Guidelines, Guide 5 and Guide 8 (Roads and Maritime, 2016b). 			
Koala habitat/glider connectivity	<p>Koala exclusion fencing and arboreal rope bridges would be implemented in accordance with the details described within the REF, AREF and Submissions Report to the southern extent of Beulah Reserve to align with the northern limit of works for the Appin Road Safety Improvements Project. The final location of arboreal rope bridges will be developed in consultation with Transport for NSW in the detailed design phase.</p>	Contractor	Pre-construction	Additional safeguard B11
Wildlife connectivity impacts	<p>Implement connectivity controls in accordance with the Wildlife Connectivity Guidelines for Road Projects (Roads and Maritime, 2016c). This would include providing connectivity structures for arboreal animals, such as glider crossings.</p>	Contractor	Construction	Additional safeguard B14
Consultation with RFS	<p>Future consultation with the RFS regarding the fauna fence and access requirements will be undertaken during detailed design.</p>	Contractor and Transport for NSW	Detailed design/ Pre-construction	Additional safeguard B15
Koala underpasses	<p>The following design features will be included as part of any koala underpass:</p> <ul style="list-style-type: none"> • Fauna furniture will be included in/near each of the underpasses, and should include (but not be limited to) <ul style="list-style-type: none"> – Escape poles (x8) installed within 100m of the underpass on both sides of Appin Road. Placed with the centre of the outer (roadside) pole 300mm from 	Contractor	Pre-construction / detailed design	Additional safeguard B16

	<p>the fence, and the inner pole ending 1200mm above ground level</p> <ul style="list-style-type: none"> - Refuge poles (200mm (d) x 4m (h)) with a fork at 3m above ground, extending to the closest forest at 8-10m spacing - Install within culvert, elevated timber rail minimum 1.5m above ground, extending length of structure and connected to refuge poles at apron edge. - Install from apron edge, refuge poles (200mmD, 4m above ground, fork at 3m above ground level) extending to closest forest at 8-10m spacing - Place logs on batters to assist koalas accessing the underpasses. <ul style="list-style-type: none"> • A natural light source will be provided to the middle of the Glen Lorne underpass • Native revegetation at ingress/egress to culverts including koala feed tree and shrub species <p>Monitoring (for a minimum period of two years) of underpasses via the use of devices such as infrared sensor cameras, will occur at each underpass entry/egress point to identify what animals are using the underpasses and when.</p> <p>Monitoring data will be provided to Transport for NSW on an annual basis once construction of the underpasses and installation of the cameras has been undertaken.</p>			
<p>Koala exclusion fence design features</p>	<p>The following design features will be included as part of any koala exclusion fence:</p> <ul style="list-style-type: none"> • Installation of koala grids at all feasible access points to Appin Road in the relevant section. Tie in fencing at 	<p>Contractor</p>	<p>Pre-construction / detailed design</p>	<p>Additional safeguard B17</p>

	<p>these grids will incorporate a fenced return in accordance with the detailed design</p> <ul style="list-style-type: none"> • All tie-ins with existing fencing and the proposed noise walls will be designed to avoid gaps that could allow koala access to Appin Road • Fencing alignments will be designed to guide koalas to underpass entrances and avoid sharp angles that may impede koala movement <p>Fencing will occur sequentially to (and prior to) each section of works, to ensure full coverage during construction.</p> <p>If ARSI has not commenced construction within 6 months of the substantial completion of the Lendlease koala exclusion fencing at Beulah Reserve, then:</p> <ul style="list-style-type: none"> • Lendlease is to commence the process of obtaining any necessary environmental approvals to install koala exclusion fencing for 700metres south of Beulah Reserve on both sides of Appin Road • Install the fence within 12 months of substantial completion of Lendlease’s exclusion fencing at Beulah Reserve or at another date as agreed by Transport. 			
<p>Scheduling of construction activities for underpasses</p>	<p>Where possible, all clearing for construction will be scheduled to occur during periods outside of the koala breeding season (September to December).</p> <p>When clearing occurs during the koala breeding season, additional management measures including pre-clearance surveys and presence of a qualified fauna management team will be implemented, including</p>	<p>Contractor</p>	<p>Construction</p>	<p>Additional safeguard B18</p>

	<ul style="list-style-type: none"> • Two stage clearing in accordance with Transport for NSW guidelines • Additional pre-clearance surveys to confirm that vegetation is free of koalas prior to clearing on a daily basis, including thermal drone imaging of all trees on the morning of clearing • Should koala be present, then work will cease in the vicinity of the koala until the koala has moved on. • Fencing installation as soon as practical to prevent further vehicle strikes. 			
Pre-clearance surveys prior to clearing	<p>Pre-clearance surveys for native fauna will be undertaken by a qualified ecologist in the month prior to clearing. Clearing will be undertaken in a way to reduce direct impacts on native fauna and will include the following:</p> <ul style="list-style-type: none"> • Clearly marking (using paint or flagging tape) all habitat trees prior to the commencement of clearing operations by an ecologist • On-site, full-time supervision by trained handlers to inspect habitat trees 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, as necessary <p>Fencing in and around construction areas will be installed as soon as practical and prior to any other construction works.</p>	Contractor	Pre-construction / detailed design	Additional safeguard B19
Maintenance of fencing during	During construction, the overall fencing strategy will be regularly reviewed by the Contractor's Environment Manager and Project Control Group to ensure continuity between sections of fencing	Contractor	During construction	Additional safeguard B20

construction	and monitoring of efficacy. The fencing strategy will prescribe monitoring requirements for koala exclusion fencing to ensure continuous efficacy. Transport for NSW will undertake inspections as required.			
Maintenance of koala exclusion fencing during operation	After completion and handover to the Asset Owner, inspection and maintenance of fencing along designated roads will be undertaken in line with the relevant asset (Transport for NSW) and maintenance plan and standards.	Asset owner	Following construction	Additional safeguard B21
Planting of vegetation near underpasses	Native vegetation at ingress/egress to underpasses, including koala feed tree and shrub species will be undertaken as early as possible following completion of the underpass installation.	Contractor	Following construction	Additional safeguard B22
'Protection of koalas' program during construction	Every person working on the construction site will be inducted and trained in the protection of koalas. This program will train workers to identify koala habitat, key threats, mitigation strategies and strict stop work protocols to follow when a koala is spotted. (Koala Management Plan Progress Update May 2020 Transport for NSW)	Contractor	During construction	Additional safeguard B23
Formation of a Koala Interest Group	Prior to commencement of construction a Koala Interest Group will be formed by Lendlease, and open to representatives from various stakeholders, such as Campbelltown City Council, local wildlife organisations, koala rescue and carers, Landcare, and Department of Planning and Environment (DPE). Details of Koala Interest Group scope should be included in the Construction Environmental Management Plan. Terms of	Contractor	Prior to construction	Additional safeguard B24

	Reference for the group will be prepared by Lendlease prior to the first meeting.			
Koala Furniture – Refuge Poles	Installation of timber koala refuge poles, extending from the underpasses to nearby bushland, to help koalas escape potential attacks from predators including dogs until suitable vegetation has regrown in these locations.	Contractor	During construction	Additional safeguard B25
Koala Furniture – Escape Poles	Installation of timber koala escape poles, within the road corridor close to where fencing ends, to enable koalas to escape from the road corridor.	Contractor	During construction	Additional safeguard B26
Pre-clearance Inspection	Prior to commencement of construction, pre-clearance surveys and monitoring of the surrounding area where vegetation is to be removed to identify fauna, patterns of activity, and hollow-bearing trees.	Lendlease	Prior to construction	Additional safeguard B27
Koala Adaptive Management Plan	Monitor koala presence and any koala road injury/mortality along Appin Road, to trigger adaptive management of the koala exclusion fencing and review of fencing design, location or extent depending on the presence of koalas and their location and the location of mortalities. This includes engagement with wildlife carer groups to identify early any issues with koala presence or injury/mortality.	Lendlease	During construction	Additional safeguard B29
Additional monitoring Mansfield Creek	Monitor koala habitat within and adjacent to Mansfield Field Creek Reserve for two years to determine the likelihood of koalas accessing the fenced section of Appin Road via this location. Additional exclusion measures to be agreed with Campbelltown Council.	Lendlease	During construction	Additional safeguard B30
Contaminated land	A Contaminated Land Management Plan will be prepared in accordance with the Guideline for the Management of	Contractor	Pre-construction	Core standard safeguard C1

	Contamination (Roads and Maritime, 2013b) and implemented as part of the CEMP. The plan will include, but not be limited to: <ul style="list-style-type: none"> • Capture and management of any surface runoff contaminated by exposure to the contaminated land • Measures to ensure the safety of site personnel and local communities during construction. 		/ detailed design	Section 4.2 of QA G36 Environment Protection
Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW's Environment Manager and/or EPA.	Contractor	Construction	Core standard safeguard C2 Section 4.2 of QA G36 Environment Protection
Contaminated land	Areas identified to contain surface lying wastes, including the areas of ACM and SMF would be remediated prior to construction. All waste should be disposed of to a suitably licenced landfill facility.	Contractor	Pre-construction / detailed design	Core standard safeguard C3 Section 4.2 of QA G36 Environment Protection
Accidental spills	A site-specific emergency spill plan will be developed and include spill management measures in accordance with the Transport for NSW Code of Practice for Water Management (RTA, 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 for NSW and EPA officers).	Contractor	Pre-construction / detailed design	Core standard safeguard C4 Section 4.3 of QA G36 Environment Protection
Hydrology and flooding	A contingency and evacuation plan will be prepared for a potential flood event while the proposed amended activity is being built. The plan will: <ul style="list-style-type: none"> • Evaluate what flood event would trigger the plan 	Contractor	Pre-construction Construction	Additional safeguard: HF1

Transport
for NSW

	<ul style="list-style-type: none"> • Include evacuation procedures • Include a map indicating the area that is flood prone and the locations where to evacuate. 			
Hydrology and flooding	The layout and detail of the drainage system including water quality treatments, discharge points, swale design and scour protection will be refined during detailed design in consultation with the Transport for NSW Environment Branch.	Contractor	Detailed design	Additional safeguard: HF2
Hydrology and flooding	Drainage line crossing points will be designed in accordance with Guidelines for Watercourse Crossings (DPI Water, 2012).	Contractor	Detailed design	Additional safeguard: HF3
Hydrology and flooding	Desktop groundwater assessment will be undertaken during detailed design to confirm risk of groundwater seepage into the underpasses. If required, provision should be made to ensure the underpasses are waterproofed.	Contractor	Detailed design	Additional safeguard: HF4
Traffic and transport	<p>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 for NSW Traffic Control at Work Sites Manual (Roads and Maritime, 2010) and QA Specification G10 Control of Traffic (Roads and Maritime, 2018). The TMP will include:</p> <ul style="list-style-type: none"> • 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 	Contractor	Pre-construction / detailed design	<p>Core standard safeguard TT1</p> <p>Section 4.8 of QA G36 Environment Protection</p>

	<ul style="list-style-type: none"> • 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. 			
Property access	<ul style="list-style-type: none"> • Property access will be maintained where feasible and reasonable and property owners will be consulted before starting any work that may temporarily restrict or control access • (Side) road and lane closures will be minimised where feasible and reasonable. 	Contractor	Construction	Additional safeguard: TT2
Traffic management at ancillary sites	<p>The following traffic management provisions will be provided at each ancillary facility:</p> <ul style="list-style-type: none"> • 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 safe entry and exit. 	Contractor	Construction	Additional safeguard: TT3
Staged crossing	A communications plan for the operation and use of the new staged pedestrian crossing will be prepared.	Contractor	Post-construction / operation	Additional safeguard: TT4

Kellerman Drive interface	During detailed design, consultation on the design of the Kellerman Drive access to the 7-Eleven site will continue in conjunction with Transport for NSW, Campbelltown City Council and landowners.	Contractor	Detailed design	Additional safeguard TT5
Noise and vibration	<p>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:</p> <ul style="list-style-type: none"> • 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 (Roads and Maritime, 2014b). • 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 to be implemented in the event of non-compliance with noise and vibration criteria. 	Contractor	Pre-construction / detailed design	<p>Core standard safeguard NV1</p> <p>Section 4.6 of QA G36 Environment Protection</p>
Construction noise and vibration	<p>All sensitive receivers (e.g., schools, local residents) likely to be affected will be notified at least five days prior to commencement of any work associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> • The proposed amended activity 	Contractor	Construction	Additional Safeguard NV2

	<ul style="list-style-type: none"> • The construction period and construction hours • Contact information for proposed amended activity management staff • Complaint and incident reporting • How to obtain further information. 			
Construction noise	<ul style="list-style-type: none"> • Work will be undertaken in accordance with the Construction Noise and Vibration Guideline (Roads and Maritime, 2011) • Stationary and directional noise sources will be orientated away from sensitive receivers • Vehicles, obstacles and stockpiles will be utilised on site to provide shielding to receivers, especially for static noise sources • Equipment that has noise levels equal to or less than the sound power levels in Table 12.1 of Appendix F will be used • The simultaneous use of high noise generating equipment will be limited. The use will also be limited to standard hours where possible • Plant will be switched off when not in use • Plant, tools and equipment will be used such that noise is reduced to the minimum required. 	Contractor	Construction	Additional Safeguard NV3
Construction traffic noise	<p>The NVMP would include provisions to reduce the potential impact of construction traffic noise including:</p> <ul style="list-style-type: none"> • Restricting travel routes to and from the project site to using the main roads (e.g. arterial roads) and to avoid local roads 	Contractor	Construction	Additional Safeguard NV4

	<p>and roads where residential receivers are potentially impacted</p> <ul style="list-style-type: none"> • Prohibiting the use of engine/compression brakes in or near residential areas • Promoting driving behaviour that reduces potential noise impacts • Prohibiting idling of plant and equipment engines near residential receivers when not in use • Strategic positioning of site accesses to minimise the chance of trucks passing by residential receivers, especially at night. 			
Construction vibration	<ul style="list-style-type: none"> • Lower powered equipment should be used when working in close proximity to vibration sensitive receivers where possible • Building condition /dilapidation surveys should be completed both before and after the works and attended vibration monitoring undertaken when works are proposed within the specified safe working distances • Where work is required within the nominated safe working, additional vibration mitigation measures detailed in Table 12.2 of Appendix F should be considered. 	Contractor	Construction	Additional Safeguard NV5
Noise and vibration complaints	<p>Attended noise and/or vibration monitoring will be undertaken following a complaint. Report the monitoring results as soon as possible. In the case that exceedances of the management levels are recorded, review the situation and identify means to reduce the impacts to noise and vibration sensitive receivers. This is to include revision to the CNVMP where required.</p>	Contractor	Construction	Additional Safeguard NV6

Operational noise mitigation	Mitigation measures to minimise operational noise will be investigated, including: <ul style="list-style-type: none"> Quieter pavement surfaces and suitability of such pavement types for through lanes and areas of acceleration, deceleration and turning movements Noise barriers Property treatments for residually affected receivers where feasible and reasonable. 	Contractor	Detailed design	Additional Safeguard NV7
Property treatments	Where at property treatments are identified, consider implementing these at the commencement of construction. These treatments would alleviate any noise concerns/ complaints during the construction period.	Contractor	Construction	Additional Safeguard NV8
Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015d) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Pre-construction / detailed design	Core standard safeguard AH1 Section 4.9 of QA G36 Environment Protection
Aboriginal heritage	Further assessment of Aboriginal cultural heritage would be completed for the proposed amended activity for areas previously identified as of high archaeological potential (Virtus, 2017), in accordance with the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (Roads and Maritime, 2011).	Contractor	Pre-construction	Additional safeguard AH2
Aboriginal heritage	Further assessment of the impact areas of the Glen Lorne and Browns Bush koala underpasses would be completed to confirm the statutory pathway for these works. A program for	Contractor	Pre-construction	Additional safeguard AH3

	archaeological test excavation will be completed as guided by the Archaeological Research Design developed by GML (2022) for the koala underpass works.			
Aboriginal Heritage	The HV connection works cannot commence until the additional archaeological investigations have been undertaken at that location. This will be undertaken in accordance with the methodology presented in the ARD. A report indicating the assessment has been undertaken will be provided to Transport for NSW prior to construction at that location.	Contractor	Pre-construction	Additional safeguard AH4
Non-Aboriginal heritage	A Non-Aboriginal Heritage Management Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage. The NAHMP will be prepared in consultation with the Office of Environment and Heritage	Contractor	Pre-construction / detailed design	Core standard safeguard H1 Section 4.10 of QA G36 Environment Protection
Non-Aboriginal heritage	The Standard Management Procedure - Unexpected Heritage Items (Roads and Maritime, 2015d) 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	Pre-construction / detailed design	Core standard safeguard H2 Section 4.10 of QA G36 Environment Protection
Non-Aboriginal heritage	A heritage induction would be provided for all workers prior to works commencing and include the values of the sites, avoidance procedure, and contacts (site manager, Transport for NSW heritage officer) for reporting unexpected archaeological finds, or inadvertent impacts to heritage items.	Contractor	Pre-construction / detailed design	Additional safeguard H3

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Loss of screening	Retention of natural vegetation screening will be retained wherever possible throughout the design and construction. Where impact to vegetation cannot be avoided, planting of new vegetation would be carried out.	Contractor	Pre-construction/ construction	Additional safeguard H4
Vibration impact on Silos	There is the potential risk for impacts to this heritage item from vibration during construction, depending on the nature of equipment utilised. Construction vibration damage to heritage items would be managed during the Project, and careful ongoing monitoring would be required. The construction methodology for works adjacent to the Silos is subject to approval by Transport for NSW prior to the commencement of works in this area. Low vibration construction tools and alternatives will be considered wherever possible for works adjacent to the Silos and outlined in the CEMP.	Contractor	Detailed design/ pre-construction/ post-construction	Additional safeguard H5
Construction of noise walls on Denfield homestead	Construction of retaining walls close to Denfield homestead would not occur within two metres of the property boundary, nor would they impact upon the root systems of vegetation that runs along the property boundary. The construction of the noise wall at Denfield homestead would incorporate interpretive design elements that express elements of the place's history and integrate into the design as it develops. This expression can take many forms on the panels of the noise wall but will keep with the recognised State significant values of Denfield homestead.	Contractor	Detailed design/ pre-construction / post-construction	Additional safeguard H6
Non-Aboriginal Heritage	The Material Compound and Storage location is subject to archaeological monitoring in accordance with the requirements provided in the GML Heritage Assessment (October 2023). A report of the monitoring program would be provided to	Contractor	Pre-construction	Additional safeguard H7

	<p>Transport for NSW prior to use of the site as a material compound or storage location.</p> <p>If relics are discovered a notification under section 146 of the NSW <i>Heritage Act 1977</i> is required and additional assessment and approval may be necessary before work can recommence at that affected area. Any salvage work would require a section 140 permit.</p>			
<p>Landscape character and visual impact</p>	<p>An Urban Design Plan will be prepared to support the final detailed project design and implemented as part of the CEMP. The Urban Design Plan will present an integrated urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan will include design treatments for:</p> <ul style="list-style-type: none"> • Location and identification of existing vegetation and proposed landscaped areas, including species to be used • Built elements including retaining walls and noise walls • Fixtures such as seating, lighting, fencing and signs • Details of the staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • Procedures for monitoring and maintaining landscaped areas • Details on the proposed fauna fence. • The Urban Design Plan will be prepared in accordance with relevant guidelines, including: <ul style="list-style-type: none"> – Beyond the Pavement urban design policy, process and principles (Roads and Maritime, 2014b) – Landscape Guideline (RMS, 2018) 	<p>Contractor</p>	<p>Pre-construction / detailed design</p>	<p>Core standard safeguard UD1</p>

	<ul style="list-style-type: none"> – Noise Wall Design Guidelines (RTA, 2006) <p>Shotcrete Design Guideline (RTA, 2005).</p>			
Operational light spill impacts	The lighting design specification will be developed minimise light spill and light glare in accordance with the provisions of AS4282-1997 Control of the Obtrusive Effect of Outdoor Lighting (Standards Australia, 1997). This may require the use of directional lighting, cut-offs or filters.	Contractor	Detailed design	Additional safeguard: UD2
Operational visual and amenity impacts	Opportunity to improve planting, including within medians and verges, and adjoining private property should be investigated, and implemented where feasible.	Contractor	Detailed design	Additional safeguard: UD3
Operational visual and amenity impacts	Where feasible and reasonable, opportunities to reduce the visual impact of built structures such as retaining and noise walls, would be implemented through design, and selection of materials and colours.	Contractor	Detailed design	Additional safeguard: UD4
Construction light spill impacts	Measures to minimise the use and spill from temporary and construction lighting will be introduced onsite	Contractor	Construction	Additional safeguard: UD5
Socio-economic	<p>A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum):</p> <ul style="list-style-type: none"> • Mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • Contact name and number for complaints. 	Contractor	Detailed design/ pre-construction	Core standard safeguard SE1

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	The CP will be prepared in accordance with Transport for NSW's' Community Involvement and Communications Resource Manual (Roads and Maritime, 2008b).			
Property acquisition	All property acquisition will be carried out in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2012a) and the Land Acquisition (Just Terms Compensation) Act 1991.	Transport for NSW/ Project Manager	Pre- construction and construction	Core standard safeguard SE2
Impacts on business and the community during construction	Road users, including freight companies will be informed of changed conditions, including likely disruptions to access during construction.	Contractor	Pre- construction and construction	Additional safeguard SE3
Community impacts during construction across the proposed amended activity footprint	Consultation will be undertaken with potentially affected residences prior to the commencement of and during works in accordance with Transport for NSW's Community Involvement and Communications Resource Manual (Roads and Maritime, 2008b). Consultation will include but not limited to door knocks, newsletters or letter box drops providing information on the proposed works, working hours and a contact name and number for more information or to register complaints.	Contractor	Pre- construction and construction	Additional safeguard SE4
Community impacts during construction across the proposed amended activity footprint	A complaint handling procedure and register will be included in the CEMP. The complaints register will be maintained throughout construction.	Contractor	Pre- construction and construction	Additional safeguard SE5
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	Additional safeguard SE6

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Impacts to properties	Consultation will be undertaken with all affected property owners during detailed design and construction to develop and implement measures to mitigate impacts on land use viability, infrastructure and severance.	Contractor/Transport for NSW	Detailed design	Additional safeguard SE7
Temporary utility service interruption	Residents and businesses will be notified before any utility interruption	Contractor	Pre-construction	Additional safeguard SE8
Utility relocation and adjustment	A utility management plan will be prepared to include: <ul style="list-style-type: none"> • Utility company consultation • Maintenance and emergency access requirements Construction staging and programming conflicts.	/ Contractor	Detailed design, pre-construction and construction	Additional safeguard SE9
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: <ul style="list-style-type: none"> • Measures to avoid and minimise waste associated with the project • 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 Roads and Maritime Services Land (Roads and Maritime, 2014d) and relevant Roads and Maritime Waste Fact Sheets.	Contractor	Detailed design/ pre-construction	Core standard safeguard W1 Section 4.2 of QA G36 Environment Protection

General waste impacts	Waste accumulation, littering and general tidiness will be monitored during routine site inspections.	Contractor	Construction	Additional safeguard: W2
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	Construction Operation	Additional safeguard: W3
Hazard and Risk	<p>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:</p> <ul style="list-style-type: none"> • Details of hazards and risks associated with the activity • Measures to be implemented during construction to minimise these risks • Record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • A monitoring program to assess performance in managing the identified risks • Contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. <p>The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage publications.</p>	Contractor	Detailed design/ pre-construction	Core Safeguard HAZ1

<p>Hazard and Risk</p>	<p>Where possible, hazardous materials and dangerous goods, avoided or substituted for less hazardous alternatives throughout the construction process. Where this is not possible, in the case for necessary fuels, oils and fluids required for activities in the proposed amended activity for example, the appropriate management and handling procedures will be implemented as part of the CEMP. This will include a Hazard and Risk Management Plan (HRMP) and Waste Management Plan (WMP) which will include, but not be limited to measures to avoid the generation of hazardous wastes, and the appropriate procedures for their storage, transport and disposal.</p> <p>The WMP will be prepared taking into account the Environmental Procedure – Management of Wastes on Roads and Maritime Services Land (Roads and Maritime, 2014d), and other relevant Transport for NSW hazardous materials and dangerous goods handling procedures to reduce environmental and worker risk such as Managing the risks of working with bitumen and bituminous products (Roads and Maritime, 2013e).</p> <p>The appropriate management and removal of existing hazardous materials and dangerous goods identified adjacent to the proposed works in the form of asbestos containing materials (ACM) and synthetic fibre materials (SFM) is addressed in section 6.2.4 of the Project REF.</p>	<p>Contractor</p>	<p>Detailed design/ pre-construction</p>	<p>Core Safeguard HAZ2</p>
<p>Property protection</p>	<p>Additional safety measures required to provide protection for private properties along Appin Road will be investigated during detailed design.</p>	<p>/ Contractor</p>	<p>Detailed design</p>	<p>Additional safeguard HAZ3</p>
<p>Air Quality</p>	<p>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:</p>	<p>Contractor</p>	<p>Detailed design/ pre-construction</p>	<p>Core standard safeguard AQ1</p>

	<ul style="list-style-type: none"> • A procedure for monitoring dust onsite and weather conditions • An identification procedure for potential sources of air pollution and mitigation measures for likely scenarios such as imposing speed limits throughout the proposed amended activity footprint and site compounds • Maintaining air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • Compliance with Stockpile Site Management Guidelines (Roads and Maritime, 2015a) • Methods to manage work during strong winds or other adverse weather conditions such as reducing active earthworks on hot windy days • Implement a vehicle, plant and machinery maintenance program to comply with manufacturers specifications and ensure compliance with the NSW Protection of Environment Operations Act 1997. <p>A progressive rehabilitation strategy for exposed surfaces.</p>			Section 4.4 of QA G36 Environment Protection
Greenhouse gas and climate change	<p>Detailed design will consider opportunities to reduce building and construction material quantities and use appropriate materials wherever reasonable and feasible.</p> <p>Pavement design will ensure resilience against extreme temperature and intense and more frequent rainfall events.</p> <p>The use of climate tolerant vegetation will be considered and its ability to align with the existing landscape will be included in the landscape character and visual amenity design.</p>	Contractor	Detailed design	Additional safeguard GG1

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Greenhouse gas and climate change	Equipment performance and running and idling times will be monitored and managed to reduce emissions.	Contractor	Construction	Additional safeguard GG2
Cumulative impacts	<p>Other developers will be consulted:</p> <ul style="list-style-type: none"> To obtain information about project timeframes and impacts. Identify and implement appropriate safeguards and management measures to minimise cumulative impacts. If required, this may include implementing traffic management controls in consultation with other project developers to minimise cumulative construction traffic impacts on Appin Road. <p>To manage the interfaces of the proposed amended activity's staging and programming in combination with the other projects occurring in the area.</p>	Transport for NSW / Contractor	Pre-construction / Construction	Additional safeguard: CI1
Cumulative impacts	All environmental management plans will be prepared to consider other developments in the area.	Contractor	Pre-construction	Additional safeguard: CI2
Cumulative impacts	Further consideration of the proposed amended activity and the Appin Road safety improvement work would be undertaken.	Contractor/Transport for NSW	Pre-construction	Additional safeguard: CI3

6.3 Licensing and approvals

Table 6-2 Summary of required licensing and approvals

Instrument	Requirement	Timing
<i>Roads Act 1993 (s138)</i>	Road occupancy license to dig up, erect a structure or carry out work in, on or over a road.	Prior to start
<i>Protection of the Environment Operations Act 1997</i>	EPL required to under Schedule 1, Clause 35, road construction	Prior to start

7 Definitions/Abbreviations

Term /acronym	Description
ARD	Archaeological Research Design
ATR	Archaeological Technical Report
AusLink	Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions
BC Act	<i>Biodiversity Conservation Act 2016 (NSW).</i>
BDAR	Biodiversity Development Assessment Report
CEMP	Construction / Contractor's environmental management plan
EIA	Environmental impact assessment
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW).</i> Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth).</i> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
Heritage Act	<i>Heritage Act 1977 (NSW)</i>

LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
NSW	New South Wales
NPW Act	National Parks and Wildlife Act 1974 (NSW)
RCBC	Reinforced concrete box culvert
Roads and Maritime	NSW Roads and Maritime was dissolved by the Transport Administration Amendment Bill in August 2019, all function are now managed by Transport for NSW
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP (Biodiversity and Conservation)	State Environmental Planning Policy (Biodiversity and Conservation) 2021
SEPP (Planning Systems)	State Environmental Planning Policy (Planning Systems) 2021
SEPP (Precincts – Central River City)	State Environmental Planning Policy (Precincts – Central River City) 2021
SEPP (Precincts – Eastern Harbour City)	State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
SEPP (Precincts – Regional)	State Environmental Planning Policy (Precincts – Regional) 2021

SEPP (Precincts – Western Parkland City)	State Environmental Planning Policy (Precincts – Western Parkland City) 2021
SIS	Species Impact Statement
Vehicle strike	Vehicle strike (or road strike) refers to a vehicle colliding with an animal as it attempts to cross a road. It usually results in the koala being injured or killed.
SEPP (Resilience and Hazards)	State Environmental Planning Policy (Resilience and Hazards) 2021
SEPP (Transport and Infrastructure)	State Environmental Planning Policy (Transport and Infrastructure) 2021
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Transport for NSW.

8 References

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Department of Planning and Environment, *Greater Macarthur 2040 – update*, 2021

Department of Planning and Environment, *Guidelines for Division 5.1 assessments*, June 2022

Department of Planning and Environment ‘*How to keep koalas off roads*’ June 2020

Ecological Australia, *Appin Road Upgrade Biodiversity Assessment_V2_221102*

Environmental Planning and Assessment Act 1979 (NSW)

Environment Protection and Biodiversity Conservation Act 1999 (Federal)

Hockings, A., *Investigation the spatial movements of koalas in relation to an exclusion fence on Skyline Road, Monaltrie*, June 2021

Investigation of the Impact of Roads on Koalas, Australian Museum Business Services for NSW Roads and Traffic Authority, December 2011

Landscape design guideline 2018 (nsw.gov.au)

NSW Chief Scientist, *Advice on the protection of the Campbelltown Koala population*, 2020

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Referral guidance for the endangered koala – DCCEEW

RTA, *Biodiversity Guidelines*, September 2011

Strategic assessment of some NSW road and traffic management works – DCCEEW

Transport for NSW, *Koala crossings to feature in safety upgrades throughout Sydney's south-west* (press release)

Transport for NSW, *Appin Road Upgrade, Mount Gilead to Ambarvale - Review of Environmental Factors, November 2018* (nsw.gov.au)

Transport for NSW, Appin Road Upgrade - Mount Gilead to Ambarvale | Your Say Transport for NSW (website)

Transport for NSW, Appin Road Upgrade, Mount Gilead to Ambarvale - Review of Environmental Factors - Appendix C
Biodiversity Assessment - November 2018 (nsw.gov.au)

Transport for NSW, *Appin Road improvements – Review of Environmental Factors, 2018*

Appendix A – Letter from koala expert Steve Ward (12 October 2023)

Appendix B – Biodiversity Impact Assessment, Ecological (October 2023)

Appendix C – Amended REF – Aboriginal and
Historic Heritage Constraints and
Recommendations, GML Heritage, October 2023

Appendix D – Issue categories and where to find responses

Sub no.	Respondent	Section where issues are addressed
1	Individual	3.11.1
2	Individual	3.11.1
3	Individual	3.9.2, 3.10
4	Individual	3.9.2, 3.9.4
5	Individual	3.5.2, 3.11.3
6	Individual	3.4.3, 3.6.1
7	Individual	3.2.1
8	Individual	3.11.1
9	Individual	3.4.3, 3.5.1, 3.9.2
10	Individual	3.4.3
11	Individual	3.9.2
12	Individual	3.5.1
13	Individual	3.4.3
14	Individual	3.9.2
15	Individual	3.11.1
16	Individual	3.9.2
17	Individual	3.5.1, 3.5.2
18	Individual	3.5.1, 3.9.2
19	Individual	3.9.2
20	Individual	3.5.1
21	Individual	3.5.1
22	Individual	3.4.3
23	Individual	3.4.3, 3.11.1
24	Individual	3.9.2
25	Individual	3.11.1
26	Individual	3.11.1
27	Individual	3.11.1
28	Individual	3.5.1, 3.11.1
29	Individual	3.6.1
30	Individual	3.4.3
31	Individual	3.11.1
32	Individual	3.9.2
33	Individual	3.4.3
34	Individual	3.11.1
35	Individual	3.4.3, 3.4.4
36	Individual	3.11.1
37	Individual	3.11.1
38	Individual	3.11.1
39	Individual	3.11.1
40	Individual	3.4.4

41	Individual	3.11.1
42	Individual	3.4.3, 3.11.1
43	Individual	3.2.1
44	Individual	3.9.3
45	Individual	3.6.1
46	Individual	3.2.2
47	Individual	3.5.1
48	Individual	3.5.1
49	Other organisation	3.1, 3.4.4, 3.2.1, 3.5.1, 3.9.1, 3.9.2, 3.9.5
50	Individual	3.1, 3.5.1, 3.9.2, 3.10
51	Individual	3.9.2
52	Individual	3.1, 3.5.1
53	Individual	3.1, 3.4.1
54	Individual	3.5.1, 3.5.3
55	Other organisation	3.11.2
56	Individual	3.5.1, 3.9.2
57	Individual	3.1, 3.5.1
58	Individual	3.1, 3.2.2, 3.4.4, 3.5.1, 3.9.2, 3.9.5
59A	Other organisation (International Fund for Animal Welfare)	3.1, 3.2.1, 3.5.1, 3.5.2, 3.9.2, 3.9.5
59B		3.1, 3.2.1, 3.4.2, 3.5.1, 3.5.2, 3.5.3, 3.9.1, 3.9.2, 3.9.5
60	Individual	3.2.1, 3.3.2, 3.4.3, 3.4.4, 3.5.1, 3.8.1, 3.9.1, 3.9.2
61	Individual	3.1, 3.2.2, 3.4.4, 3.5.1, 3.9.2, 3.9.5
62	Individual	3.5.1, 3.5.3
63	Individual	3.4.1, 3.5.1
64	Other organisation (Save Sydney Koalas)	3.1, 3.2.1, 3.2.2, 3.4.1, 3.4.4, 3.5.1, 3.5.3, 3.7.1, 3.8.1, 3.9.2, 3.9.3, 3.9.4, 3.9.5,
65	Individual	3.1, 3.9.5, 3.2.2, 3.4.4, 3.5.1, 3.9.2
66	Other organisation	3.4.2, 3.5.1, 3.9.2
67	Individual	3.9.2
68	Other organisation	3.1, 3.2.1, 3.2.2, 3.4.4, 3.5.1, 3.9.1, 3.9.2, 3.9.5
69	Individual	3.5.1, 3.5.2, 3.9.4
70	Individual	3.1, 3.2.2, 3.4.4, 3.5.1, 3.9.2, 3.9.5
71	Individual	3.1, 3.2.1, 3.2.2, 3.4.4, 3.5.1, 3.9.1, 3.9.2, 3.9.5
72	Individual	3.1, 3.2.2, 3.4.4, 3.5.1, 3.9.2, 3.9.5
73	Individual	3.5.1
74	Individual	3.5.1, 3.5.2
75	Individual	3.5.1
76	Individual	3.2.1, 3.5.1
77	Individual	3.5.1, 3.9.2
78	Individual	3.4.2, 3.5.1
79	Individual	3.1, 3.5.1, 3.9.2, 3.9.4, 3.10
80	Individual	3.4.3, 3.11.1
81	Individual	3.11.1

82	Individual	3.11.1
83	Individual	3.11.1
84	Individual	3.11.1
85	Individual	3.11.1
86	Individual	3.11.1
87	Individual	3.11.1
88	Individual	3.1, 3.2.2, 3.4.4, 3.5.1, 3.9.2, 3.9.5,
89	Other organisation	3.5.1, 3.7.1, 3.9.2
90	Individual	3.2.3, 3.3.1, 3.9.4, 3.11.4
91	Individual	3.1, 3.2.3, 3.9.2, 3.11.3
92	Individual (MP - Western Sydney)	3.5.2, 3.11.1
93	Local Government organisation	3.5.1, 3.11.1

Appendix E - Traffic and transport advice regarding change in vehicle access arrangements



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