NSW GOVERNMENT

Transport for NSW

Heathcote Road bridge widening

Submissions report

June 2021

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Prepared by Aurecon Australasia Pty Ltd (Aurecon) and Transport for NSW

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Approval and authorisation

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First draft	29/03/21	Zoe McLaughlin	Michael Drowley
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Executive summary

The proposal

Transport for NSW proposes to widen the Heathcote Road bridge and its approaches (the proposal). The proposal is located about halfway along a 5.4 kilometre section of Heathcote Road between New Illawarra Road in Lucas Heights and Princes Highway in Heathcote. The proposal is required to improve safety on the bridge and its approaches, as the existing narrow road lanes and shoulders do not meet current road design standards and are associated with a poor crash history.

The key features of the proposal include:

- widening of the bridge by about 1.4 metres on each side to provide one wide 3.5 metre lane in each direction with 1.2 metre shoulders
- widening and adjustments to the northern and southern bridge approaches, up to a length of about 250 metres either side of the bridge, to improve road alignment, increase lane and shoulder widths and reinstate the existing breakdown bays either side of the bridge
- new bored-pile retaining walls to support the slope along both bridge approaches, which would be up to two metres high and range in length up to 100 metres
- slope stabilisation measures including rock scaling, shotcreting, rock bolting, rock netting, and vegetation removal
- new and modified drainage infrastructure including replacement and extension of existing cross culvert pipes on the approaches for the widened road pavement, improved drainage gutter along the base of the rock cuttings, new longitudinal drainage outlet at each abutment and scour protection at all discharge points
- adjustments to optical fibre conduits for the length of the proposal area
- repair and maintenance work to the existing bridge structure including:
    - repairs to cracks
    - replacement of all bearings
    - joint replacement
    - application of an anti-carbonation coating on the bridge structure, including piers
    - installation of new steel maintenance staircase for side access to the bridge for bridge inspections
- other ancillary work required to support construction of the proposal, including two off site construction compounds and establishment of a temporary access track, waterway crossing and crane pads.

Display of the Review of Environmental Factors

Transport for NSW prepared a review of environmental factors (REF) for the Heathcote Road bridge widening proposal. The REF was publicly displayed for about 10 weeks between 15 December 2020 and 24 February 2021. During this time, Transport for NSW invited the public to provide feedback on the proposal.

The REF was made available for public viewing and download on the Heathcote Road bridge virtual information centre, which could be accessed directly, as well as via the Transport for NSW project website. The website link was advertised via a social media advertising campaign. No physical copies of the REF were displayed, and face-to-face community consultation activities avoided due to COVID-19 restrictions and social distancing requirements.

Transport for NSW carried out a letterbox drop that involved distributing 9,000 brochures and 12,000 postcards to local residences and a Facebook Live project information session to take questions and

discuss the REF during the public display period. The aim of these community engagement activities was to give the community opportunity to learn more about the project, ask questions and 'have their say'.

Transport for NSW also carried out targeted consultation with key stakeholders including: the Australian Nuclear Science and Technology Organisation (ANSTO), Sutherland Shire Council, the Transport Management Centre, NSW National Parks and Wildlife Service (NPWS), Department of Primary Industries Fisheries (DPI Fisheries), Heritage NSW, Holsworthy Military Barracks, NSW Crown Lands and Aboriginal Land Councils.

Summary of issues and responses

Public display of the REF and the supporting consultation resulted in a total of 48 submissions, which comprised 44 submissions from the general community and four submissions from government agencies: NPWS, DPI Fisheries, Heritage NSW and Sutherland Shire Council.

Most of the submissions related to the 'proposal need and options' category, and were focused around the following sub-issues (the top three sub-issues raised overall):

- the need for a bridge duplication or additional lanes to address the existing safety and/or traffic issues along Heathcote Road (raised 25 times by the community and by Sutherland Shire Council)
- whether the benefits of the proposal would be justified given its expected cost and impacts (raised 19 times by the community and by Sutherland Shire Council)
- suggestions for Transport for NSW to consider alternative alignment or upgrade options in addition to, or rather than, the proposed upgrade of the Heathcote Road bridge (raised 12 times).

Other key sub-issues raised in the submissions were related to:

- the fauna connectivity and habitat features proposed, including support for their inclusion in the proposal and suggestions for their design. This was the focus of a large joint submission that was prepared by the Sutherland Shire Environmental Centre in consultation with and co-signed by several other environmental organisations
- the traffic impacts that may result from the proposed closure of a section of Heathcote Road during construction as well as the associated socio-economic impacts and access impacts.

The responses to the main issues raised by the community are summarised below.

Need for bridge duplication or additional lanes

Bridge widening (with one wider lane in each direction) was chosen as the preferred option for the proposal over bridge duplication or providing additional lanes because:

- the need to improve road safety along the Heathcote Road bridge and its approaches was prioritised over the need to improve the capacity of the Heathcote Road bridge to cater for future traffic growth, as this is not an immediate concern
- it is not considered possible to build a bridge duplication or additional lanes in the short-term due to the substantial additional time (compared to the widening option) that would be required to complete construction, property acquisition, environmental assessment and approval processes
- bridge widening may result in very similar safety and traffic flow benefits to a bridge duplication, in the short-term with the road in its current configuration, as the main issues currently appear to be a result of vehicles navigating the narrow lanes of the Heathcote Road bridge, which acts as a 'pinch point'
- the additional cost, complexity, and timeframes associated with the bridge duplication option are not currently considered justified.

The feasibility of providing a new bridge or additional lanes along Heathcote Road in the future would be investigated as part of the separate Heathcote Road duplication project, which has had $35 million in

funding announced in November 2020. The preferred option and timeframe for this potential longer-term solution are yet to be determined as investigations are still in the early stages.

Justification of proposal benefits compared to estimate cost and impacts

Transport for NSW understands the immediate need to improve safety on the Heathcote Road bridge given its higher than average crash history, lack of compliance with current road safety standards and widespread community concern. The proposal would reduce the risk and severity of road incidents along the Heathcote Road bridge and its approaches by:

- increasing the lane and shoulder widths and re-aligning the curve and gradient of the bridge approaches to achieve compliance with current Austroads road design guidelines
- providing additional room for error for vehicles using the bridge, which is likely to reduce the risk of head-on collisions caused by larger vehicles crossing into the oncoming lane.

The proposal would result in other notable benefits including improvements to network reliability and traffic flow, the condition of the existing Heathcote Road bridge, drainage infrastructure and fauna connectivity. These long-term benefits are considered to outweigh the expected costs and impacts of the proposal, including the temporary impacts to traffic, noise and vibration, and water quality during construction. The proposal design and construction methodology are also being refined to further reduce impacts.

Transport for NSW does not believe it is acceptable to wait until a longer-term option is ready to be implemented, as it would delay the necessary road safety improvements for several years. Regardless, the proposal has been designed so as not to preclude potential future corridor upgrade works and to minimise any issues associated with two separate upgrades of the Heathcote Road bridge and its approaches.

Alternative alignment or upgrade suggestions

The focus of the proposal is on an upgrade of the Heathcote Road bridge and its approaches that can improve road safety and network reliability in the short-term. As such, suggestions that involve alternative alignments or additional upgrades beyond the existing Heathcote Road bridge and its approaches, including other locations along Heathcote Road, are considered outside the scope of the proposal. Regardless, Transport for NSW has noted the suggestions raised by the community and will forward them for consideration in ongoing investigations relating to the wider road corridor and network, where relevant.

The proposal for Heathcote Road bridge widening is part of a larger suite of road safety improvements that have been completed, or are in planning for the Heathcote Road corridor and surrounding road network including:

- Heathcote Road duplication project, which is in early strategic investigations and would focus on investigating the feasibility of a potential duplication of Heathcote Road from The Avenue at Voyager Point up to its intersection with the Princes Highway at Engadine
- Heathcote Road Upgrade project at Holsworthy, which is an ongoing project that would upgrade a two-kilometre section of Heathcote Road between Infantry Parade and The Avenue
- Heathcote Road intersection improvements project, which involved upgrades to the intersections with Heathcote Road at Princes Highway, Engadine and at New Illawarra Road, Lucas Heights that were completed in 2019
- Speed limit review on Heathcote Road, which revised the speed limit along a section of Heathcote Road in 2019.

Fauna connectivity feature design

Transport for NSW acknowledges the need to design fauna connectivity and habitat features for the proposal in accordance with best practice standards and research to maximise the effectiveness of any fauna connectivity or habitat features implemented. The preliminary design of the proposal has been developed in consideration of the recommendations from the recent parliamentary inquiry into koala

populations and habitat in NSW, knowledge gained from a review of recent literature and lessons learnt from recent projects delivered by Transport for NSW.

The design of fauna connectivity features would be refined during detailed design in consultation with suitably qualified ecologists and DPI Fisheries. This would include consideration of arboreal fauna furniture, tie-in fencing and a landscaping and planting strategy that would aim to incorporate koala feed trees. Following refinement, Transport for NSW would provide an update to key stakeholders with more detailed information on the design of the proposed fauna connectivity features.

Construction traffic impacts

The proposal would require the full closure of Heathcote Road between New Illawarra Road and the Princes Highway for public and construction worker safety during construction due to the steep terrain and narrow width of the existing road corridor, which provides limited space for construction activities. Transport is however investigating alternatives to minimise the duration of daytime closures where possible.

Transport is seeking to manage the risk of construction traffic impacts and any related socio-economic and access impacts by:

- continuing to refine the construction methodology to minimise the need for full road closures during peak traffic periods (including school drop-off and pick-up periods)
- continuing to consult with the Transport Management Centre and the project teams of nearby road upgrade projects to better understand the proposed timing of any nearby road and lane closures and schedule construction work to minimise cumulative traffic impacts
- using the same contractor for the Heathcote Road bridge as the Linden Street Upgrade project, which may increase the ability for construction traffic to be scheduled effectively to minimise overlap
- maintaining access for private properties, emergency response vehicles, NPWS staff and utility providers along Heathcote Road at all times, where possible. If a stage of the work temporarily restricts access, alternative arrangements would be developed in advance
- consulting with Shire Christian School prior to the implementation of the proposed detour route to identify ways to try and minimise traffic impacts on staff, students and parents.

Additional assessment

The Biodiversity Assessment Report prepared for the REF recommended further investigation to determine the presence of *Hibbertia woronorana* within the proposal area. This recommendation is considered a precautionary approach, as this species is not currently listed as threatened under State or Commonwealth legislation, however there is potential for it to be listed as threatened in the future.

Accordingly, since the public display of the REF, an additional targeted field survey and biodiversity assessment was carried out for the proposal by ecologists from NGH Consulting to identify whether *Hibbertia woronorana* is present within the proposal area and assess any potential impacts on this species.

The targeted field survey identified the presence of 44 individuals of *Hibbertia woronorana* within the biodiversity study area, which were all located on the opposite side of Heathcote Creek to the proposal and would not be impacted due to the construction or operation of the proposal. No individuals of *Hibbertia woronorana* were identified within the proposal area. However, due to access constraints, not all areas of potential habitat within the proposal area could be surveyed. Additional individuals of *Hibbertia woronorana* have the potential to occur within the proposal area on top of the road cuttings either side of Heathcote Road bridge, which has conservatively been assessed as suitable habitat.

The assessment assumed up to 0.73 hectares of potential habitat for *Hibbertia woronorana* could be directly impacted during construction of the proposal. Indirect impacts such as erosion and sedimentation and the invasion and spread of weeds also have the potential to occur.

A Test of Significance for these potential impacts concluded that, should individuals of the species be impacted by the proposal, the impact is not considered likely to be significant as extensive areas of suitable habitat occur within the locality. The potential for impacts would also be minimised through mitigation measures such as further targeted surveys, erosion and sediment management, and the control of weeds.

Next steps

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

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

Contents

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Appendices

1. Introduction and background

1.1 The proposal

Transport for NSW proposes to widen the Heathcote Road bridge and its approaches (the proposal).

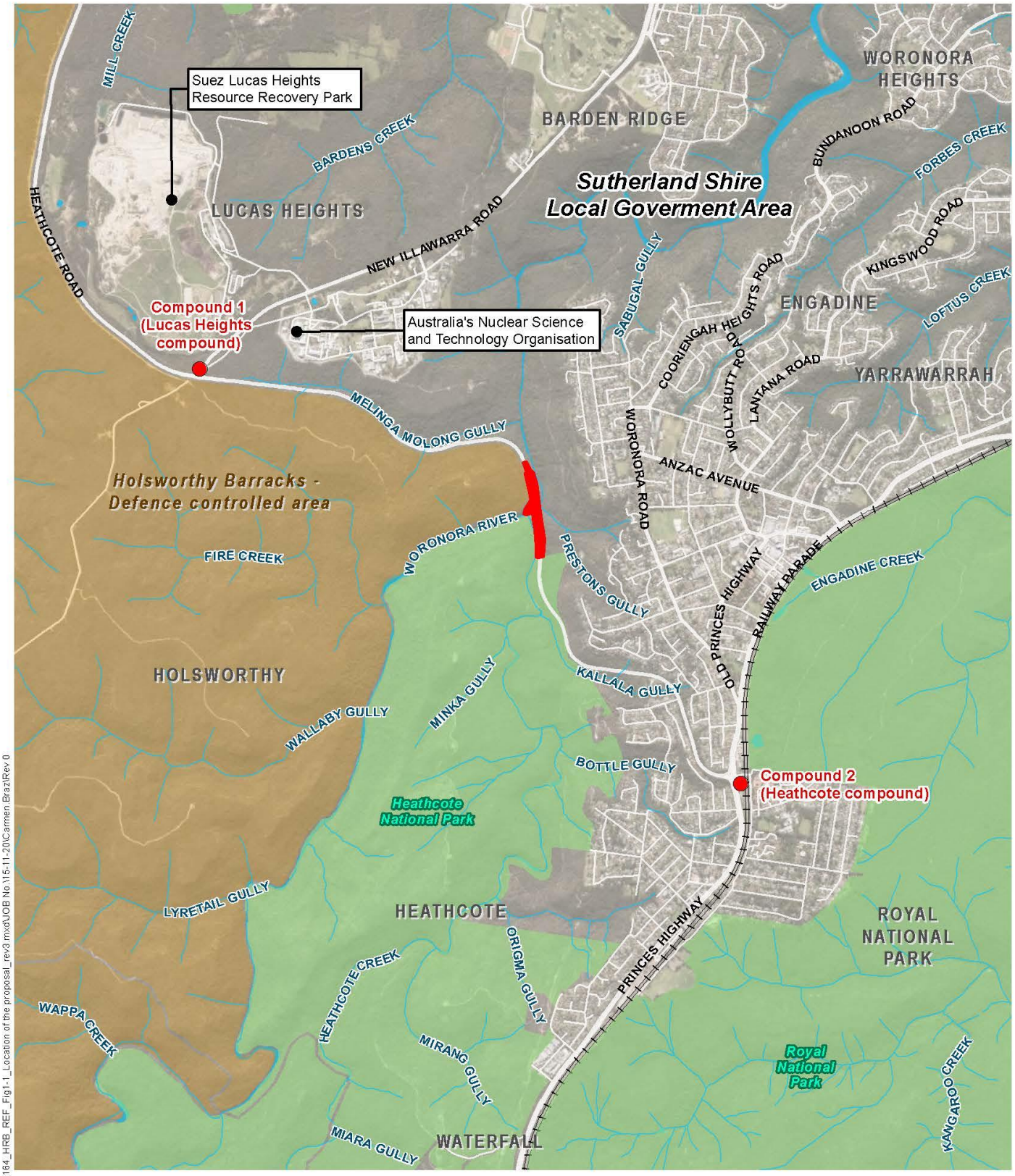
The proposal is located about halfway along a 5.4 kilometre long section of Heathcote Road between New Illawarra Road in Lucas Heights and Princes Highway in Heathcote, New South Wales (NSW) within the Sutherland Shire local government area (LGA). The Heathcote Road bridge is surrounded by steep cliffs, due to its location within the Woronora River valley, and has limited visibility to the surrounding residential areas. This section of Heathcote Road is located within the 'A6 road corridor', which services north–south journeys for freight and general traffic in Sydney. Figure 1-1 shows the location of the proposal.

The proposal is required to improve safety on the bridge and its approaches as the existing narrow road lanes and shoulders do not meet current road design standards. The need for the proposal has also been driven by the poor crash history record on the bridge and its approaches.

Key features of the proposal include (refer to Figure 1-2):

- widening of the bridge by about 1.4 metres on each side to provide one wide 3.5 metre lane in each direction with 1.2 metre shoulders
- widening and adjustments to the northern and southern bridge approaches about 250 metres either side of the bridge to improve the road alignment, increase lane and shoulder widths and reinstate the existing breakdown bays either side of the bridge
- new bored-pile retaining walls to support the slope along both bridge approaches, which would be up to two metres high and range in length up to 100 metres
- slope stabilisation measures including rock scaling, shotcreting, rock bolting, rock netting, and vegetation removal
- new and modified drainage infrastructure including replacement and extension of existing cross culvert pipes on the approaches for the widened road pavement, improved drainage gutter along the base of the rock cuttings, new longitudinal drainage outlet at each abutment and scour protection at all discharge points
- adjustments to optical fibre conduits for the length of the proposal area
- repair and maintenance work to the existing bridge structure including:
    - repairs to cracks
    - replacement of all bearings
    - joint replacement
    - application of an anti-carbonation coating on the bridge structure including piers
    - installation of new steel maintenance staircase for side access to the bridge for bridge inspections
- other ancillary work required to support construction of the proposal including two off site construction compounds and establishment of a temporary access track, waterway crossing and crane pads.

A more detailed description of the proposal is provided in the *Heathcote Road bridge widening Review of Environmental Factors* (REF) prepared by Transport for NSW in December 2020.



Proposal area
Holsworthy Barracks - Defence controlled area
National park
Watercourses

Source: Aurecon, TfNSW, Spatial Services, Esri

1:38,000 @ A4
0 500 1,000m

Projection: GDA 1994 MGA Zone 56

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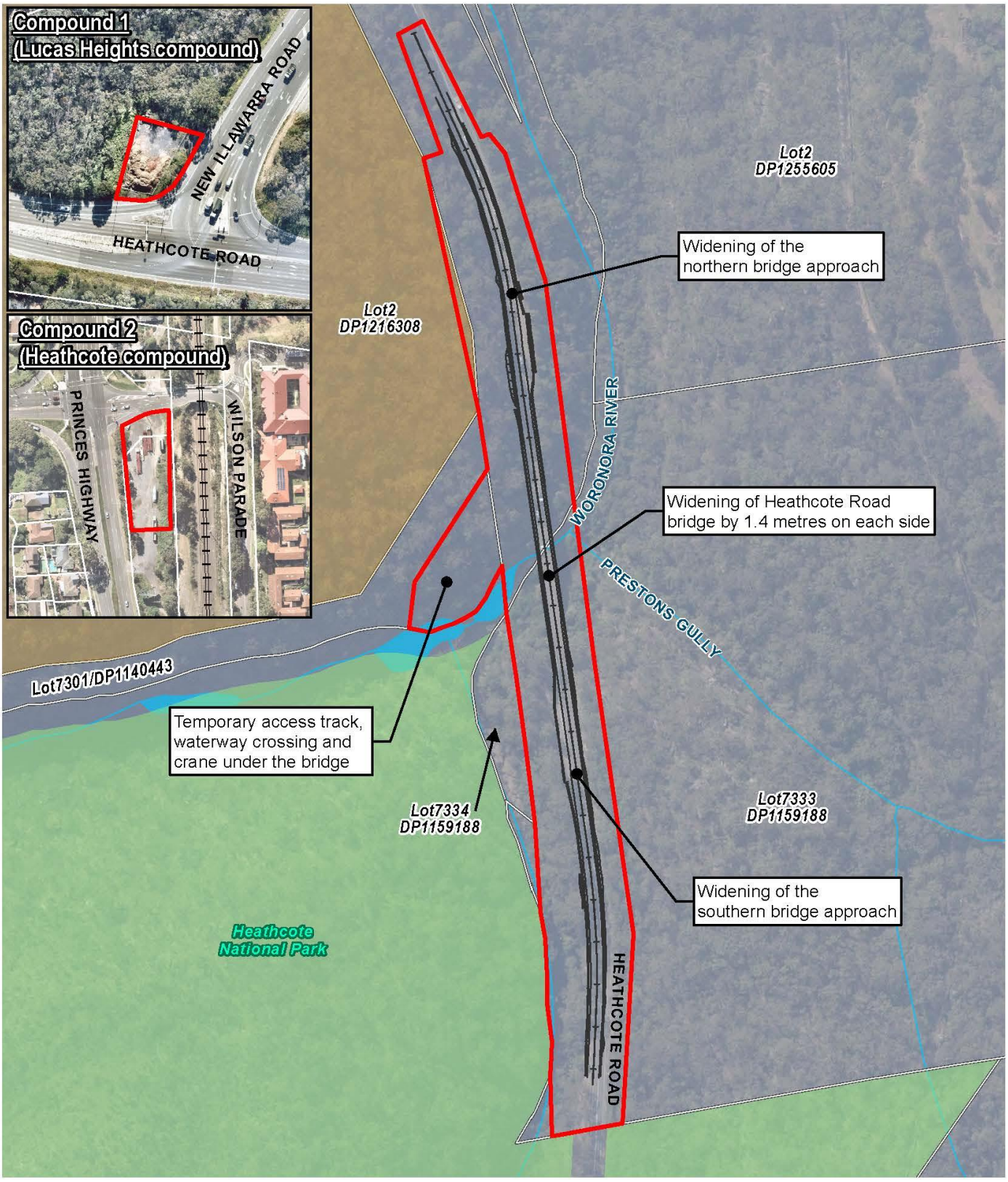
FIGURE 1-1: Location of the proposal



Proposal area

Indicative design (subject to detailed design)

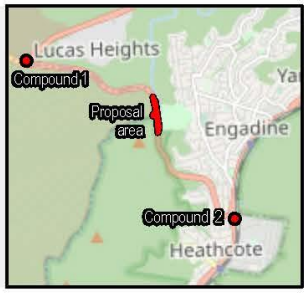
Holsworthy Barracks - Defence controlled area

National park

Lot

Watercourses

Water bodies



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Source: Aurecon, TfNSW, Spatial Services, Esri

1:3,250 @ A4

0 50 100m

Projection: GDA 1994 MGA Zone 56

FIGURE 1-2: Overview of the proposal

1.2 REF display

Transport for NSW prepared a review of environmental factors (REF) to assess the potential environmental impacts of the proposed works.

The REF was publicly displayed for about 10 weeks between Wednesday 16 December 2020 and Wednesday 24 February 2021. No physical copies of the REF were displayed, and face-to-face community consultation activities were avoided, due to COVID-19 restrictions and social distancing requirements.

The REF was made publicly available for viewing and download on the Heathcote Road bridge virtual information centre at ***nswroads.work/Heathcote-info-centre***, which could be accessed directly, as well as via the Transport for NSW project website ***nswroads.work/heathcote***. Figure 1-3 shows a screenshot of the virtual information centre. The website link for the virtual information centre was advertised via a social media advertising campaign, as well as print notifications directed to residents in suburbs from Lucas Heights to Wollongong who may be impacted by the proposal.

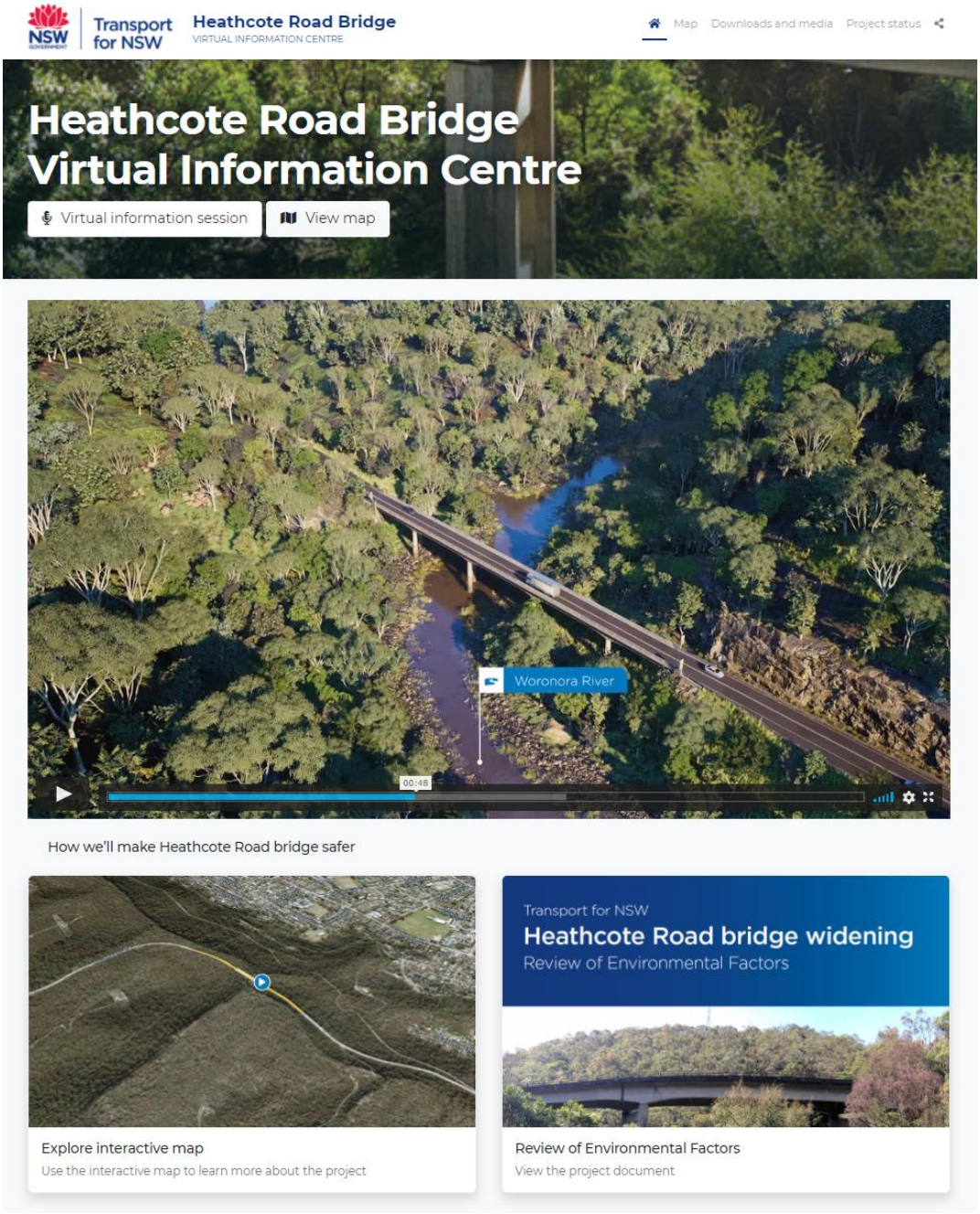

Figure 1-3 Screenshot of the Heathcote Road bridge virtual information centre

Transport for NSW carried out a letterbox drop in mid-December at the start of the REF display period to inform local residents near the proposal site that the REF was on display. This involved distributing 9,000 brochures to residences in Heathcote, Engadine and Lucas Heights, the Service NSW centre at Engadine, as well as a briefer postcard to about 12,000 residences across the Sutherland Shire.

A Facebook Live project information session was also held by Transport for NSW on 2 February 2021 during the public display period to provide further information on the proposal, answer questions from the community and encourage the community to provide a formal submission on the REF. Further information on the Facebook Live session is provided in Section 2.1.2.

In addition to the above REF display communications and engagement, Transport for NSW conducted additional consultation activities with several key stakeholders to brief them on the REF, answer questions and encourage them to make a submission, including with:

- Australian Nuclear Science and Technology Organisation (ANSTO)
- Sutherland Shire Council
- the Transport Management Centre (TMC)
- NSW National Parks and Wildlife Service (NPWS)
- Department of Primary Industries Fisheries (DPI Fisheries)
- Heritage NSW
- Holsworthy Military Barracks
- NSW Crown Lands
- Aboriginal Land Councils

1.3 Purpose of the report

This submissions report relates to the REF prepared in December 2020, for the Heathcote Road bridge widening proposal and should be read in conjunction with that document.

The REF was placed on public display and submissions relating to the proposal were received by Transport for NSW. This submissions report summarises the issues raised and provides responses to each issue (Chapters 2 and 3). It also details additional investigations carried out since finalisation of the REF (Chapter 4) and identifies new or revised environmental management measures (Chapter 5). No proposal changes are proposed that would require the preparation of a preferred infrastructure report.

2. Response to community issues

2.1 Overview of issues raised

2.1.1 Issues raised in formal submissions received from the community

Transport for NSW received 44 submissions accepted up until 24 February 2021 from the community in response to the display of the REF.

Appendix A lists the respondents and each respondent's allocated submission number and where the issues from each submission have been addressed in Chapter 2 of this report.

One of the submissions received was a large joint submission prepared by the Sutherland Shire Environmental Centre in consultation with and co-signed by several other environmental organisations, including National Parks Association Southern Sydney, Rewilding Sydney's Koalas, Woronora Valley Association Southern Sydney, Sandy Point Residents Association, Friends of the Royal National Park, Oatley Flora and Fauna Conservation Society, Georges River Environmental Alliance. This submission focused on the potential biodiversity impacts and opportunities for the proposal, including the design of the fauna connectivity and habitat features proposed.

Each submission has been examined individually to appreciate the issues being raised. 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, a single response has been provided. It is noted that most submissions covered multiple issues, therefore the total number of issues raised is greater than the total number of submissions received.

Figure 2-1 provides a summary of key issue categories raised by the community, including the number of times an issue was raised relating to each category.

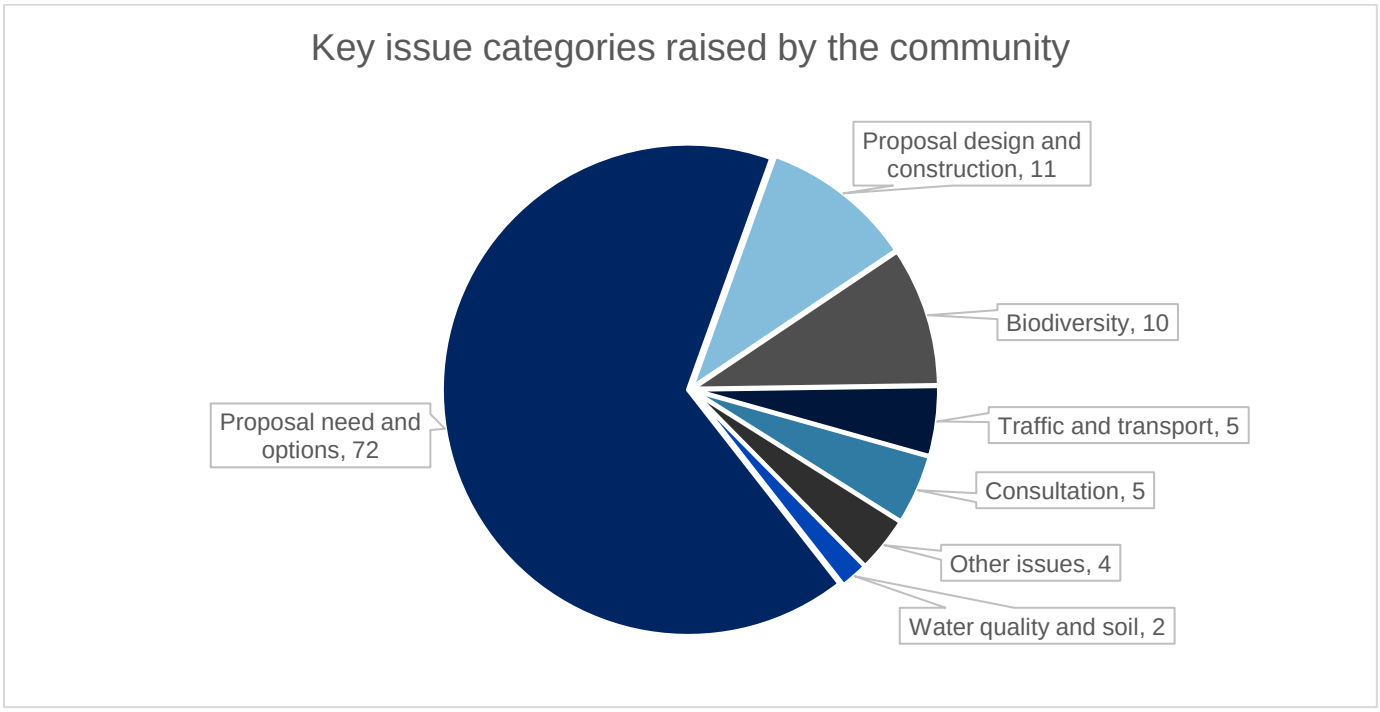

Figure 2-1 Summary of the number of times the key issue categories were raised by the community

Figure 2-1 shows that most of the submissions related to the 'proposal need and options' category were focused around the following sub-issues (the top three sub-issues raised overall):

- comments and concerns relating to the need for a bridge duplication or additional lanes to address the existing safety and/or traffic issues along Heathcote Road (raised 25 times)
- queries or concerns regarding whether the benefits of the proposal would be justified given its expected cost and impacts (raised 19 times)
- suggestions for Transport for NSW to consider alternative alignment or upgrade options in addition to, or rather than, the proposed upgrade of the Heathcote Road bridge (raised 12 times).

Other key sub-issues raised in the community submissions were related to:

- the fauna connectivity and habitat features proposed, including support for their need to be included in the proposal design and several suggestions for further consideration during detailed design
- concern regarding the traffic impacts that may result from the proposed closure of a section of Heathcote Road during construction of the proposal as well as the associated socio-economic impacts from traffic delays.

2.1.2 Issues raised during the Facebook Live session

The Transport for NSW project team for the Heathcote Road bridge also responded to several issues and questions raised by the community during the Facebook Live session.

The Facebook Live video received about 44,000 views by the end of the consultation period, of which 9,932 views were of the entire video. The Facebook Live session video was also posted to the TfNSW project webpage where it has received a further 1,000 views.

The Facebook Live session included an introduction to the project team, overview of the proposal scope and need, and notification of the public display of the REF. Viewers were encouraged to access the REF for detailed information on the proposal and environmental assessment and provide submissions and feedback on the proposal via the Heathcote Road bridge virtual information centre.

The issues and questions raised by the community during the Facebook Live session were generally consistent with the issues raised in the formal submissions. They included comments about:

- the need and benefits of bridge widening
- project funding and queries over value for money
- how the proposal fits into longer-term plans for the Heathcote Road bridge such as a future bridge duplication or provision of additional lanes
- the REF public display and general consultation process
- environmental impacts of the proposal, including heritage impacts and traffic impacts from the planned road closures
- design for Koala connectivity and fencing.

The issues and questions raised were verbally responded to by the project team during the live session, and as such are not directly addressed within this report. A link to the transcript of the Facebook Live session is provided in Appendix C.

2.2 Proposal need and options

2.2.1 Need for bridge duplication and/or additional lanes

Submission number(s)

1, 3, 4, 5, 6, 8, 9, 12, 13, 14, 15, 16, 19, 20, 22, 23, 24, 28, 32, 33, 35, 36, 37, 39, 40

Issue description

The respondents raised the following issues relating to the need for a bridge duplication or provision of additional lanes:

- concerns that the current design is a 'quick fix' that would not be suitable in the future due to traffic growth and planned development within the Sutherland Shire
- concerns that the bridge widening alone would not be able to improve safety and decrease risk of crashes
- opinions that a new bridge parallel to the existing bridge or additional lanes on the Heathcote Road bridge are required to address the existing safety and traffic flow issues experienced
- requests for a commitment for a future 'longer term' upgrade that would involve a bridge duplication and/or additional lanes.

Response

Why is a short-term safety upgrade preferred over a longer-term option?

Section 2.3.1 of the REF outlines that the key objectives of the proposal are to:

- improve road safety by increasing the road and shoulder lane widths on the bridge and approaches
- improve network reliability
- deliver a design solution that has the ability to be implemented in the short-term.

The need to improve road safety in the short-term along the Heathcote Road bridge and its approaches is evidenced by:

- the results of the consultation carried out by Transport for NSW in May and June 2020, which identified that over 80 per cent of people were concerned about the safety of the Heathcote Road bridge
- recent road incidents that have occurred on the Heathcote Road bridge and its approaches, including fatalities and serious injuries (refer to Figure 2-2)
- the urban casualty crash rate for the A6 section of Heathcote Road (1.77 casualties per kilometre per year), which is about 2.14 times higher than the typical rate for the same road type
- the commitment made by the Minister for Roads, Maritime and Freight in 2018 to improve the safety of the Heathcote Road bridge.

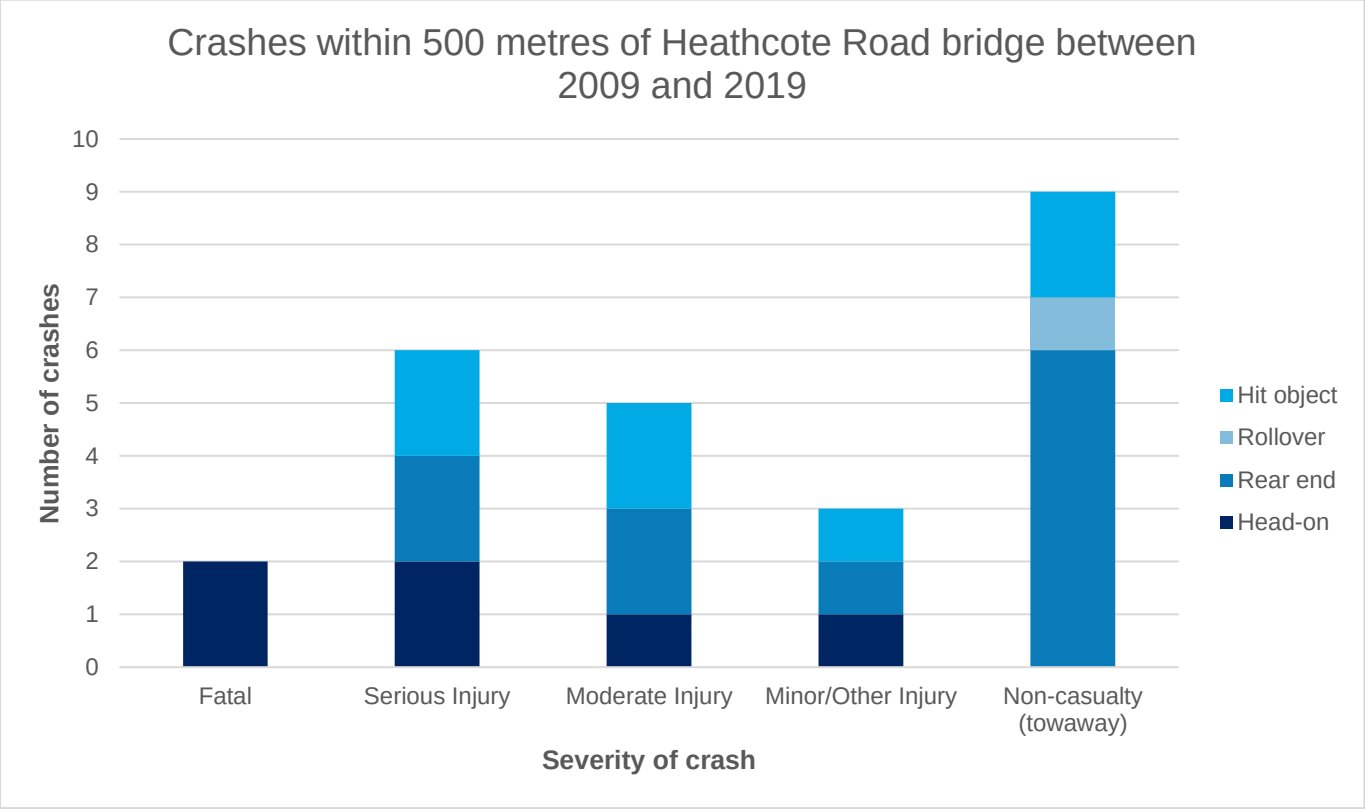

Figure 2-2 Summary of crash statistics for Heathcote Road bridge and its approaches

The need to improve the capacity of the Heathcote Road bridge and its approaches to cater for future traffic growth is not included in the objectives and is considered less urgent because:

- a review of traffic data collected from the proposal area indicates that traffic is currently travelling at or above the speed limit throughout the corridor on average, suggesting that there are no general issues with congestion
- the population of the Sutherland Shire has a relatively slow rate of change, with an annual increase of 0.7 per cent between 2006 and 2016 compared to the population of Greater Sydney, which is growing at a rate of 1.8 per cent per annum (Sutherland Shire Council, 2020)
- the main existing reduction in speed within the A6 section of the Heathcote Road corridor appeared to be as a result of vehicles slowing to navigate the narrow lanes of the Heathcote Road bridge, which would be addressed by a bridge widening without the need for additional lanes.

Why can't bridge duplication or additional lanes be delivered in the short-term?

It was not considered feasible to provide a new bridge structure or additional lanes in the short term due to a number of constraints including the complexity of design and construction required because of the challenging terrain. Additionally, the surrounding corridor has Commonwealth and National Park land and any impacts would require complex and lengthy approvals and acquisitions. A duplication option would also greatly exceed the allocated funding for short term improvements. At present there is also no preferred option for a major corridor upgrade as strategic investigations for the potential duplication of the greater Heathcote Road corridor are in early stages (see section below).

Therefore, widening the Heathcote Road bridge and its approaches was evaluated to be the best strategic option that could improve safety within the short-term. The bridge widening would also improve traffic flow and network reliability by reducing delays associated with road incidents and vehicles slowing to navigate the narrow bridge (refer to Section 2.2.2).

What is the status of investigations into a bridge duplication or additional lanes for the future?

The NSW Government announced $35 million in additional funding for Heathcote Road on 9 November 2020. The funding will go towards planning for the duplication of Heathcote Road from The Avenue at Voyager Point up to its intersection with the Princes Highway at Engadine. This includes investigations into the long-term feasibility of a duplication of the Heathcote Road bridge over the Woronora River.

The work planned includes detailed geotechnical investigations, environmental investigations (including biodiversity and heritage investigations), surveying, traffic modelling, feasibility studies, stakeholder engagement and the development of strategic designs and staging options. This work will inform a business case that will assess the preferred options identified based on priorities and value for money. By the end of 2021, Transport for NSW will deliver a draft Strategic Corridor Plan and a draft Program Strategic Business case.

Refer to Section 2.2.3 for further discussion on other potential longer-term upgrades that are being investigated for the wider road network.

2.2.2 Justification of proposal benefits compared to estimated cost and impacts

Submission number(s)

1, 2, 7, 8, 9, 10, 15, 18, 19, 20, 21, 22, 26, 31, 32, 33, 35, 37, 40

Issue description

The respondents raised the following issues relating to the justification of the proposal:

- queries regarding why two separate upgrades are being investigated (i.e. a short-term widening and a longer-term future upgrade) as this approach may cost more than if only a longer-term upgrade (i.e. additional lanes or a new bridge) was built
- concerns that the proposal would be a waste of money as it is only a short-term solution that may quickly become inadequate due to increased traffic volumes
- concerns that the proposal would be a waste of money as it may not resolve the existing safety or traffic issues
- comments that the safety benefits of the proposal would be outweighed by the expected cost and traffic impacts associated with the proposed road closure
- comments acknowledging there are limited funds for road upgrades so there is a need to prioritise decisions and achieve the best value for money
- comment that additional lanes would cost a lot of money (compared to widening the existing lanes) without adding a lot of additional value as vehicles usually flow across the bridge at a reasonable rate
- comment that they are satisfied with the bridge widening proposed as it is a very complex project
- query regarding what the $35 million allocated for planning would cover

Response

Why are two separate upgrades for the Heathcote Road bridge being investigated?

As discussed in Section 2.2.1, Transport for NSW understands the immediate need to improve safety on the Heathcote Road bridge given its higher than average crash history, lack of compliance with current road safety standards and widespread community concern (refer to Section 2.2.1). The need to prioritise road safety is aligned with the NSW Government's *Road Safety Plan 2021 – Towards Zero* (NSW Government, 2018), which includes targets to reduce road fatalities by 30 percent by 2021 and to achieve zero harm by 2056. In comparison, the need to improve traffic flow along Heathcote Road is not considered to be as urgent. Therefore, a design solution that can improve road safety along the Heathcote Road bridge and its approaches in the short-term needed to be identified.

Options to provide additional lanes or a new bridge along the A6 section of Heathcote Road are being investigated separately to this proposal because it was not considered possible to build a new bridge or provide additional lanes within the short-term (refer to Section 2.2.1). Moreover, Transport for NSW does not believe it is acceptable to wait until these longer-term options are ready to be implemented, as it would likely delay the necessary road safety improvements for several years. Therefore, any future duplication of the Heathcote Road bridge would be built separately to the current proposal so that safety can be improved as quickly as possible.

The development of the proposal has been designed to consider possible flexibility for the potential long term needs of the corridor so as not to preclude potential future corridor upgrade works (for example, consideration of whether the bridge could be adapted to a single direction two lane carriageway if it were required in future). This would also minimise any potential 'waste of money' associated with carrying out two separate upgrades of the Heathcote Road bridge and its approaches.

How are the benefits of the proposal justified considering the expected cost and impacts?

The proposal would reduce the risk and severity of road incidents along the Heathcote Road bridge and its approaches by:

- increasing the lane and shoulder widths and re-aligning the curve and gradient of the bridge approaches to achieve compliance with current Austroads road design guidelines
- providing additional room for error for vehicles using the bridge, which is likely to reduce the risk of head-on collisions caused by larger vehicles crossing into the oncoming lane.

The proposal would also result in other notable benefits including improvements to:

- network reliability and traffic flow by:
    - minimising the need for vehicles to slow down when approaching the bridge or waiting for larger vehicles to pass
    - reducing the likelihood of vehicles stalling on the incline after crossing the bridge
    - reducing the frequency of occurrence and severity of incidents, which would reduce the frequency of unplanned road closures and the associated large traffic delays
    - providing additional space for vehicles to 'flow around' any unexpected hazards on the Heathcote Road bridge such as broken-down vehicles
- the condition of the existing Heathcote Road bridge, which is over 75 years old, by carrying out necessary repairs and maintenance to fix cracking and concrete spalling
- drainage in the proposal area by formalising the drainage channel and discharge points and improving scour protection and cross-fall on the road and bridge sections
- fauna connectivity under the Heathcote Road bridge by incorporating fauna furniture to aid the movement of koalas.

The proposal is justified as these long-term benefits are considered to outweigh the expected costs and impacts of the proposal, including the temporary impacts on traffic, noise and vibration and water quality during construction. The proposal design and construction methodology are also being refined to further reduce impacts. For example, it is likely that some construction activities would be completed under night road closures to maintain access during the day and minimise traffic impacts.

It is noted that alternative strategic options such as providing additional lanes or a new bridge structure are not currently considered to be justified. This is because these options would cost significantly more money, be more challenging to design, take longer to construct and result in substantially greater impacts to biodiversity and Aboriginal heritage. Additionally, there is currently not enough additional land owned by Transport for NSW either side of the existing Heathcote Road carriageway to allow for additional lanes or a new bridge structure without major property acquisition. The surrounding land includes Commonwealth Defence and National Park land, which would be highly complex and time consuming for Transport for NSW to acquire.

What are the project costs and what would this cover?

The Heathcote Road bridge widening project has been allocated a budget of $73 million, which would cover the delivery of the project including planning, design and construction costs.

The $35 million budget referenced in the submission was allocated by the NSW Government in November 2020 to the Heathcote Road duplication project, which is separate to the Heathcote Road bridge widening project. This budget will go towards planning for the duplication of Heathcote Road from The Avenue at Voyager Point up to its intersection with the Princes Highway at Engadine, and will initially cover work including, but not limited to (Transport for NSW, 2020c):

- detailed geotechnical investigations
- surveying
- feasibility studies
- stakeholder engagement
- environmental and biodiversity investigations
- traffic modelling
- cultural heritage investigations
- development of strategic design and staging options
- development of a draft Strategic Corridor Plan and draft Program Strategic Business case

2.2.3 Alternative alignment or upgrade suggestions

Submission number(s)

2, 7, 10, 11, 21, 26, 28, 33, 41, 42, 43, 44

Issue description

The respondents raised the following suggestions and queries relating to alternative alignment or upgrades beyond the Heathcote Road bridge and its approaches:

- suggestions to realign Heathcote Road including options through Defence Land and Heathcote National Park
- suggestion to move the bridge upstream to straighten the road alignment
- suggestion for dedicated left only turn lane at the intersection of Heathcote Road and Princes Highway to reduce road delays and congestion
- queries regarding other nearby intersections and road upgrades and the status of any current or previously proposed road upgrades
- suggestions to build a new bridge connecting Heathcote Road along a new alignment to connect with Princes Highway further south of Heathcote
- suggestions to build a new 'Illawarra Motorway' or extend New Illawarra Road west to Waterfall
- suggestions to review opportunities to provide additional measures for fauna connectivity (particularly focusing on koalas) at several other locations along the Heathcote Road corridor that have records of fauna roadkill such as the underpasses at Harris Creek, Williams Creek and Deadmans Creek at Sandy Point
- suggestion that providing additional fauna connectivity measures at other locations along Heathcote Road at the same time as the Heathcote Road bridge widening construction would provide value as road closures would already be in place and procurement for equipment could be done at the same time.

Response

The focus of the proposal is on an upgrade of the Heathcote Road bridge and its approaches that can improve road safety and network reliability in the short-term. As such, suggestions that involve alternative alignments or additional upgrades beyond the existing Heathcote Road bridge and its approaches, including other locations along Heathcote Road, are considered outside the scope of the proposal.

Regardless, Transport for NSW has noted the suggestions raised by the community and will forward them for consideration in ongoing investigations relating to the wider road corridor and network, where relevant. This would include further consideration of additional fauna connectivity measures that could be incorporated in the design of future upgrades of the Heathcote Road corridor, such as part of the Heathcote Road duplication project. In addition, incorporating additional fauna connectivity measures at other locations along Heathcote Road as part of the separate Heathcote Road duplication project may provide better value for money than if they were incorporated as part of the current proposal. This is because there is a risk that they may be placed in the wrong spot if they were constructed prior to identification of the preferred design for the Heathcote Road duplication project, resulting in conflicts with the design and the need for rework.

Table 2-1 and Figure 2-3 presents a summary of nearby road upgrade projects that are ongoing or have been recently completed by Transport for NSW within the surrounding road corridor, which includes several improvements along Heathcote Road.

Table 2-1 Summary of nearby investigations and road upgrades proposed or completed

Project / Program	Details	Status	Link to further information
Heathcote Road duplication	The NSW Government has announced $35 million in additional funding for Heathcote Road. The funding was announced on 9 November 2020 and will go towards planning for the duplication of Heathcote Road from The Avenue at Voyager Point up to its intersection with the Princes Highway at Engadine. The options to be considered will likely include the potential duplication of the Heathcote Road bridge.	Early strategic investigations	Heathcote Road projects fact sheet (nsw.gov.au)
Heathcote Road Upgrade, Infantry Parade Holsworthy to The Avenue Voyager Point	The NSW Government has invested $183 million to upgrade a two-kilometre section of Heathcote Road at Holsworthy between Infantry Parade and Voyager Point. The upgrade would reduce traffic congestion, improve safety, meet future traffic volumes and improve pedestrian and cyclist connectivity to Holsworthy Train Station and surrounding areas.	Construction in progress	Heathcote Road upgrade - Projects - Roads and Maritime Services (nsw.gov.au)
Heathcote Road intersection improvements	The NSW Government funded this project as part of its $300 million Gateway to the South Pinch Points Program and involved improvements at the intersections with Heathcote Road at Princes Highway, Engadine and at New Illawarra Road, Lucas Heights.	Completed in 2019	Heathcote Road intersection improvements - Projects - Roads and Maritime Services (nsw.gov.au)
Speed limit review on Heathcote Road	The speed limit was reduced from 100 km/h to 90 km/h between 250 metres east of The Avenue and 150 metres west of New Illawarra Road to improve safety for motorists travelling along Heathcote Road.	Completed in 2019	Speed limit lowered on Heathcote Road - 2019 Roads and Maritime Services
M6 – Stage 1	In December 2019, the M6 Stage 1 (previously referred to as the F6 Extension - Stage 1) received planning approval. The project is a key element of the NSW Government's transport vision for NSW, connecting Sydney's south to the wider motorway network. A potential new motorway connection between Loftus and Waterfall was originally included as 'Section D' in the study area for the M6. However, the draft design plans released in June 2018 do not include plans to further investigate this section for a motorway connection.	Construction is in progress	M6 - Stage 1 - Projects - Roads and Maritime Services (nsw.gov.au)

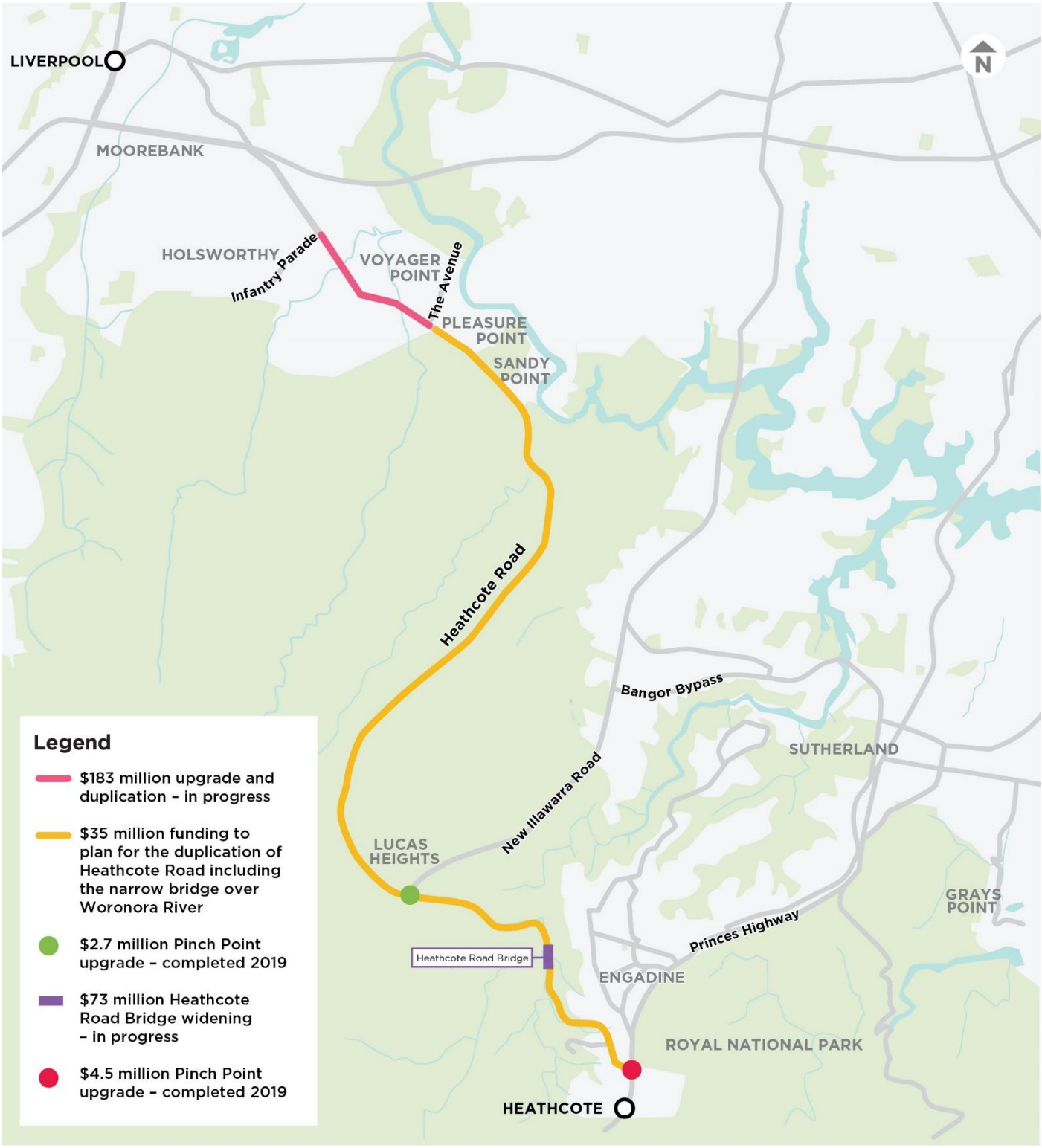

Figure 2-3 Recently completed or planned projects along Heathcote Road (Transport for NSW, 2020c)

2.2.4 Additional needs for consideration

Submission number(s)

7, 10, 17, 26, 28, 31, 40

Issue description

The respondents raised the following comments and opinions relating to the need to minimise traffic delays and address other road safety issues:

- comments regarding the need to avoid traffic delays associated with the road closure as these can lead to road safety issues due to driver fatigue
- comments regarding the need to address traffic delays along the Heathcote Road corridor, including traffic delays experienced at the intersection with the Princes Highway as well as general congestion during peak hours, weekends and public holiday periods
- opinion that the existing road accidents are caused by poor driver training and speed
- comments that more road connections are needed not bigger roads or bridges, as there is a lack of alternative routes.

Response

Transport for NSW acknowledges the link between traffic delays and road safety, due to increased travel time resulting in driver fatigue, as well as appropriate driver training and speed limits. This is supported by the *Road Safety Plan 2021 – Towards Zero* (NSW Government, 2018), which outlines that a safe road transport system involves safe roads, safe speeds, safe vehicles and safe people. Analysis of crash history statistics within 500 metres of the Heathcote Road bridge between 2009 and 2019 shows that (Transport for NSW, 2020f):

- a permanent road feature was noted as a hazard in 64 per cent of crashes, which included the existing steep grade, narrow bridge as well as other road design and bridge features
- speeding was involved in 36 per cent of crashes
- driver fatigue was involved in 16 per cent of crashes.

These statistics show that the road environment is the dominant factor in contributing to crash risk in this location, with speeding and driver fatigue also contributing to some crashes. Therefore, Transport for NSW is proposing improvements to the road environment by upgrading the Heathcote Road bridge and its approaches to target the major road crash risk factor and would consider complementary actions such as driver fatigue awareness and speeding safety campaigns to address the other factors. Transport for NSW would also consult with the NSW Police Force during construction and operation of the proposal to discuss traffic management and enforcement of speed limits, as required.

The proposal is expected to result in long-term benefits to road safety, including through providing a ‘safe road’ that complies with current road design standards as well as reducing the expected frequency of road delays associated with road incidents. However, construction for the proposal would require a full road closure of the section of Heathcote Road between New Illawarra Road and the Princes Highway. A full road closure is required due to the limited space within the existing road corridor to safely carry out the complex construction work for the proposal. This proposed detour route is likely to temporarily increase travel time between New Illawarra Road and the Princes Highway by about 29 minutes compared to normal conditions. As a result, Transport for NSW is investigating ways to modify the construction methodology to eliminate the need for a continuous road closure during peak traffic periods to minimise traffic impacts and risk of driver fatigue. Transport for NSW is also consulting with the Transport Management Centre to minimise any additional cumulative traffic delays associated with other planned road upgrades or traffic delays along the wider road network.

The proposal is one of several road upgrades along the Heathcote Road corridor that have been planned or recently completed (refer to Section 2.2.3). Although the current proposal is focused on improving road safety, some of these road upgrades are specifically focused on reducing traffic delays or providing new road connections along the Heathcote Road corridor. For example, an upgrade of the intersection Princes Highway and Heathcote Road was completed in 2019 as part of the Gateway to the South Pinch Point Program to minimise congestion and delays at the intersection during peak periods. Since this upgrade has been completed, the overall intersection approach delay has decreased by eight per cent during both the AM peak hour (7 to 8 am) and PM peak hour (4 to 5 pm) (Transport for NSW, 2020a).

Transport for NSW will continue to investigate additional improvements that could be made to the Heathcote Road corridor or surrounding road network to reduce traffic delays in peak periods and/or provide new road connections and alternative routes. This includes any additional improvements identified as part of ongoing investigations into the potential duplication of Heathcote Road between The Avenue at Voyager Point and the Princes Highway at Engadine.

Submission number(s)

43, 44

Issue description

The respondents raised the following comments relating to the need for fauna connectivity measures to be considered in the design:

- the survival of native species (particularly the Koala) depends on the provision of safe corridors for movement of wildlife, which provide an escape route from vehicle strike, bushfires and urban development
- less animals on the road means less chance of car accidents caused by motorists swerving to avoid animals
- the Koalas of southern Sydney are essentially the same population as those in south-west Sydney, which move easterly via river and creek bushland corridors from Appin/Campbelltown to Glenfield to ‘safer large bushland havens’ near the proposal including the Holsworthy Military Training Area and Heathcote National Park
- the need for wildlife corridors is formally reflected in one of the aims of the 2015 *Sutherland Shire Local Environmental Plan* - “to protect and enhance the natural environment and scenic quality of the Sutherland Shire through the retention and rehabilitation of wildlife habitats, wildlife corridors, bushland, foreshores and waterways.”
- NSW Legislative Council inquiry into Koala populations and habitat in New South Wales report:
    - includes recommendation 12 ‘ensure that the combination of underpasses, overpasses and exclusion fencing along roads is incorporated into both the retrofitting of existing infrastructure and new development in areas of known koala habitat.’
    - includes recommendation 14 ‘that the Roads and Maritime Services allocate appropriate and sufficient funds for the ongoing maintenance and management of exclusion fencing along roads’
- the survival of the Koala is an important community issue and there is widespread concern about the number of koalas being killed on the road near the Heathcote Road bridge
- the proposal provides an opportunity to improve rather than worsen koala survival prospects
- the consideration of koalas and inclusion of fauna connectivity measures in the design of the proposal is supported by the Sutherland Shire Environment Centre, National Parks Association Southern Sydney, Rewilding Sydney's Koalas, Woronora Valley Association Southern Sydney, Sandy Point Residents Association, Friends of the Royal, Oatley Flora and Fauna Conservation Society, Georges River Environmental Alliance as well as Sutherland Shire Councillors.

Response

Transport for NSW appreciates the valuable and extensive biodiversity knowledge and support from several local environmentally focused organisations regarding the need to consider Koalas and include fauna connectivity measures in the design of the proposal. The information and comments raised will be further considered when developing the final design solution/s for the fauna connectivity and habitat features to be implemented as part of the proposal.

The relationship between animals on roads and the risk of road incidents is supported by the historical crash data for Heathcote Road bridge and its approaches, which includes minor crashes in 2010 and 2012 that were caused by motorists avoiding animals (Transport for NSW, 2020f).

Issues and responses relating to the design of the fauna connectivity and habitat features for the proposal are provided in Section 2.3.2.

Submission number(s)

7

Issue description

The respondent commented that the existing Heathcote Road bridge and approaches needs to be replaced entirely.

Response

The proposal includes repair and maintenance work to improve the condition of the existing bridge structure including replacement of all bridge bearings and expansion joints, repairing areas of concrete cracking and spalling and application of an anti-carbonation coating on the bridge to improve concrete durability. This is considered sufficient to avoid the need to replace the Heathcote Road bridge and approaches. Replacing the existing bridge with a new bridge is not considered justified as it would result in substantially greater costs, environmental impacts and road closures.

2.2.5 Need for safety improvements

Submission number(s)

3, 4, 6, 7, 20, 33, 44

Issue description

The respondents raised the following comments relating to the need for safety improvements on the Heathcote Road bridge and its approaches:

- the proposal is an important safety initiative as the road and bridge has been associated with several fatalities
- the upgrade needs to be completed quickly to minimise the ongoing risk of road incidents, which is shown by observations of regular near misses
- the road is dangerous and some people do not use it because of safety concerns
- increased traffic in the future would continue to increase the risk of road incidents, particularly due to more freight vehicles.

Response

Transport for NSW has noted the need and support for safety improvements along the Heathcote Road bridge and its approaches to be delivered as soon as possible to address community concern and reduce the risk of road incidents.

The need to improve road safety along the Heathcote Road bridge and its approaches is evidenced by the poor crash history and crash statistics in this area (provided in Section 2.2.1).

2.3 Proposal design and construction

2.3.1 Need for barrier between lanes

Submission number(s)

3, 39

Issue description

The respondents raised the following comments relating to the need for a physical barrier between lanes:

- the bridge needs a solid concrete barrier in the centre to prevent head-on collisions
- the approaches need a median strip with wire rope safety fencing.

Response

The proposal has been designed to NSW and Australian engineering and road safety standards developed by Transport for NSW and Austroads. It would provide space for 3.5 metre wide traffic lanes and 1.2 metre shoulders on the bridge with a painted median visually separating the opposing traffic lanes. The increased width of the road lanes and shoulders would provide increased room for error for vehicles navigating the bridge to reduce the risk of vehicles crossing into oncoming lanes and causing a head-on collision.

The proposal does not include a physical median barrier separating the traffic lanes on the bridge due to several engineering and safety issues including:

- load limits for the structural engineering capacity of the existing bridge structure, which ruled out some barrier types (e.g. concrete F type barriers) due to weight
- lack of space on the bridge for barrier deflection, which would not provide enough room for some barrier types (e.g. back-to-back three beam barriers would require a two metre wide median area to prevent vehicles bouncing off and crashing into the outer bridge barrier), due to limits on the width that the existing bridge structure could be widened to (about 9.6 metres)
- the need to core into the bridge deck to install a physical barrier, which would weaken the bridge structure.

Similarly, a strategic option to include a physical median barrier on the Heathcote Road bridge without widening the bridge was not considered, as it would make the narrow lanes on the bridge even narrower and introduce an additional hazard for motorists.

2.3.2 Fauna connectivity features

Submission number(s)

43, 44

Issue description

The respondents raised the following suggestions and comments relating to the design of the fauna connectivity and habitat features for the proposal:

- the proposal should be constructed in accordance with 'best practice' standards based on the best available research advice to ensure that koalas and other animals have safe passage and that the final solution is fit for purpose and not tokenistic or a waste of money
- Transport for NSW should work with interested stakeholders and experts to refine the preliminary design of fauna connectivity features
- any connectivity measures should be designed and installed with input from a suitably experienced ecologist
- the design should consider what has and has not worked on previous projects such as the recent road upgrades at Compton Road in Queensland and Wilton Road in NSW
- the video of the proposal only showed koala crossing furniture on one side of the bridge underpass and that koalas and other native animals need to be supported with formal crossings on both sides of the Woronora River
- best practice exclusion fencing (such as used on the Compton Road project) should be installed at appropriate locations on both sides of the river, over a suitable length and distance, to direct koalas and other animals away from the road toward the underpasses
- the underpass designs used in the Compton Road project are included in the Queensland Transport and Main Road Department's Road Sensitive Design Manual. These feature koala crossings that consist of ledges above the waterline lower to the ground, which were also used by wallabies and possums
- the DPIE Koala Vehicle Strike Fact Sheet states that most koalas prefer not to use timber crossing furniture and that timber crossing furniture is mainly used to prevent dog attacks
- rope crossings for possums should be considered above Heathcote Road around the areas where exclusion fencing is used, however it is noted that these may be difficult in some locations due to topography
- poles for gliders should be considered as they could be important in sustaining populations from predation and roadkill
- fauna connectivity feature design is to consider the potential for damage during flood and bushfire events
- suggestion that additional fauna connectivity measures should be provided at other locations along Heathcote Road, particularly at the Heathcote Road underpass at Sandy Point.

Response

Transport for NSW acknowledges the need to design fauna connectivity and habitat features for the proposal in accordance with best practice standards and research to ensure the effectiveness of any fauna connectivity or habitat features implemented. In accordance with this, the preliminary design of the proposal has been developed in consideration of the recommendations from the recent parliamentary inquiry into koala populations and habitat in NSW, knowledge gained from a review of recent literature and lessons learnt from recent projects delivered by Transport for NSW. In particular, Transport for NSW sought specialist advice from the Pacific Highway Upgrade project team and considered the *Pacific Highway*

Woolgoolga to Ballina Upgrade Fauna Connectivity Strategy (Roads and Maritime, 2019). The final design solution/s would be confirmed during detailed design and subject to specialist ecologist advice and further consultation with key stakeholders.

Transport for NSW also acknowledges the mention of the *Fauna Sensitive Road Design Manual* developed by the Queensland Department of Transport and Main Roads and their demonstrated application on completed transport works including Compton Road upgrade. These are also referenced within the Fauna Connectivity Strategy 2011. These resources and other relevant literature and learnings from other Transport for NSW projects will continue to be considered as part of the development of fauna connectivity features during detailed design in consultation with specialist ecologist advice.

Monitoring completed for other road upgrade projects has shown that Koalas do use bridge underpass crossings and that timber furniture can provide refuge and facilitate movement of other smaller species. As noted above, the final fauna crossing design including the materials, final form and possible application of ledges would be confirmed during detailed design.

The online fly-through video of the proposal provided on the Heathcote Road bridge virtual information centre included a marker to indicate the general location of Koala crossing features that would be implemented as part of the proposal. However, this was indicative only. The scope of the proposal includes provision for fauna connectivity on both sides of the Woronora River, as mentioned within the REF. The need for connectivity on both sides is supported by the biodiversity assessment for the proposal, which indicated that Koala movement corridors exist on both the northern side of Woronora River between Holsworthy/Campbelltown and the area near ANSTO, and separately on the southern side between Heathcote National Park and Engadine. Koala vehicle strike records in the area, including on the bridge, confirm the existing road as a barrier to north-south movement. As such, although the proposed bridge widening itself was not found to create a new barrier to connectivity, the proposal presented an opportunity to improve existing Koala connectivity issues at this location through provision of Koala connectivity features within the scope. Connectivity features for other arboreal fauna such as gliders are not proposed as their application and effectiveness at this location is constrained by the local topography.

Transport for NSW acknowledges the use of fencing as an important consideration in effective fauna connectivity design to ensure fauna are directed to use the crossing structures provided. Transport for NSW is currently considering options to provide fencing as part of detailed design in consultation with specialist ecological advice. This would also include evaluation of the best type of fencing to be used including consideration of steel-top and floppy-top Koala exclusion fencing types. It is noted that the steep topography would make it difficult to install effective fences in some areas. Recognising this, the proposal has also sought knowledge from the recent Pacific Highway Upgrade, which included provision of fauna connectivity and fencing within similar topography, to identify potential design solutions such as fencing connected to bridge abutments to prevent access to the road corridor.

It is noted that the proposal is located in a bushfire and flood risk area. The detailed design of the proposal, including the fauna connectivity features, would include consideration of the potential risk of bushfire and flood events on the proposal during construction and operation, including the potential for 'wash away' and damage. Flooding and bushfire risks during construction would be managed through implementation of a Flood Action Plan and Hazard and Risk Management Plan as part of the CEMP.

Provision of additional fauna connectivity measures at other locations along Heathcote Road, such as the underpass at Sandy Point, would be considered separately as part of the ongoing investigations for a potential longer-term duplication of the Heathcote Road corridor (refer to Section 2.2.3). This would include an initial assessment to identify the existing fauna connectivity needs along Heathcote Road and develop appropriate connectivity measures in consultation with an ecologist. This is because fauna connectivity features must be tailored to the existing movement patterns of particular fauna species within a specific location to be effective.

2.3.3 Other bridge design suggestions or issues

Submission number(s)

12, 27

Issue description

The respondents raised the following issues relating to the proposed bridge design:

- concern regarding the structural adequacy of the bridge design and suggestions regarding improvements to the structural support
- suggestion that sides are needed on top of the bridge edge barrier to reduce driver distraction from the views.

Response

The concept design for the proposal has been developed by highly experienced and qualified engineers, who have proven expertise in the delivery of bridge design and construction for Transport for NSW. Transport for NSW has its own bridge design experts who oversee and review the design and engineering process to ensure that assumptions feeding into the design are correct, feasible and safe. As such, the proposed bridge widening design using headstock widening, post tensioning and new steel girders is considered to be structurally adequate to support the required loads.

The proposal would involve replacing the existing barriers on the Heathcote Road bridge with new F type safety barriers on either side, which are compliant with current design standards and would be about 30 centimetres higher than the existing barriers. There is little evidence from analysis of crash history statistics that driver distraction due to the scenic views has resulted in road incidents on the Heathcote Road bridge. Therefore, higher sides on the bridge are not considered to be required.

2.3.4 Construction methodology

Submission number(s)

17, 30

Issue description

The respondent raised the following suggestions relating to the construction methodology:

- delay the construction of the proposal until the Heathcote Road duplication is built between the Princes Highway and New Illawarra Road as this may allow the existing bridge to stay open during construction
- adjust construction methodology to build a new bridge and keep the existing bridge open while its being built to minimise construction traffic impacts (similar to the Deadmans Creek bridge upgrade)
- police any reduced speed limit to improve compliance.

Response

As discussed in Section 2.2.2, Transport for NSW does not believe it is acceptable to wait until the separate Heathcote Road Duplication project is ready to be implemented as there is a need to improve road safety as quickly as possible and this would likely delay the necessary safety improvements for several years.

Moreover, the Heathcote Road Duplication project is still in very early investigation stages, so the preferred additional strategy upgrades to be implemented along Heathcote Road (if any) are yet to be determined.

A new temporary or permanent bridge would also not be able to be built within the short-term due to substantially longer and more complex engineering, property acquisition, construction and environmental approval processes. It would also require much longer road closures compared to the current proposal due to the need to widen the existing road cutting, and as a result would not reduce construction traffic impacts.

Transport for NSW would engage with the NSW Police Force during construction of the proposal to discuss traffic management and enforcement of temporary speed limits, as required.

2.3.5 Property acquisition

Submission number(s)

29

Issue description

The respondent has indicated interest in potential acquisition and queried whether Transport for NSW propose to compulsorily acquire or lease his residential property during construction due to its proximity to the proposal.

Response

Transport for NSW has no current plans to compulsorily acquire or lease privately owned properties for construction or operation of the proposal. However, Transport for NSW has noted the query and will seek to consult with any directly affected residents to minimise the potential for impacts to property and land use.

All land acquisition would be carried out in consultation with the relevant landholders in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991* and the supporting NSW Government Land Acquisition Reform 2016. Transport for NSW would also need to abide by the requirements of the *Crown Lands Management Act 2016* and *Crown Land Legislation Amendment Act 2017* when seeking to acquire or lease Crown Land for construction of the proposal.

2.3.6 Vegetation maintenance during operation

Submission number(s)

29

Issue description

The respondent noted that there is overgrown vegetation along the existing road corridor near the entrance to their property, which limits visibility of traffic when exiting their property directly onto Heathcote Road. As such, they have requested that Transport for NSW complete vegetation maintenance along the road verges within sight lines to the property driveway to improve safety for private property access.

Response

Transport for NSW has noted the concern regarding the impact of existing road corridor vegetation on the safety of private property access. Transport for NSW will refer this issue to the relevant regional asset maintenance team who are responsible for ongoing maintenance along this road section.

2.3.7 Road speed

Submission number(s)

28

Issue description

The respondent has requested a reduced posted speed limit to improve safety.

Response

The proposal has been designed to have a posted speed limit of 70 kilometres per hour, which is consistent with the existing speed limit of the Heathcote Road bridge and its approaches.

Transport for NSW conducted a speed zone review for Heathcote Road in April 2019 following a serious road incident, which resulted in reduction of the posted speed limit from 100 kilometres per hour to 90 kilometres per hour within the road section 250 metres east of The Avenue and 150 metres west of New Illawarra Road (Transport for NSW, 2019c).

Transport for NSW may choose to conduct another speed zone review of Heathcote Road during operation of the proposal. This review would assess whether changes to the posted speed limits are required based on a number of factors including the crash history, road geometry, road environment and traffic volumes.

2.4 Traffic and transport

2.4.1 Construction traffic impacts

Submission number(s)

17, 29, 30, 34

Issue description

The respondents raised the following concerns and queries relating to the construction traffic impacts:

- concern regarding the high volume of cars that would need to be effectively and safely rerouted each day during the implementation of the detour
- concerns that the additional travel time due to the detour route may be longer than the average 29 minutes predicted due to traffic congestion, as delays have been observed to be longer during recent road incidents on Heathcote Road
- comment that over half of the students at Shire Christian School use the A6 section of Heathcote Road to travel to and from school each day
- concerns that the traffic impacts from the detour route would impact staff, students and parents traveling to and from the Shire Christian School in Barden Ridge as well as the school bus route
- concern additional travel time due to detour route would increase risk of driver fatigue
- query regarding impact of road closure on private property access along Heathcote Road

Response

The proposal would require the full closure of Heathcote Road between New Illawarra Road and the Princes Highway for public and construction worker safety during construction due to the steep terrain of the surrounding area and narrow width of the existing road corridor, which provides limited space for

construction activities. Transport for NSW would maintain access for private properties as well as emergency response vehicles, NPWS staff and utility providers at all times, where possible. If a stage of the work temporarily restricts access along Heathcote Road, alternative arrangements would be developed in consultation with the relevant stakeholders in advance.

It is acknowledged that the magnitude of traffic delays experienced during operation of the detour route may change depending on several factors such as unrelated delays in the wider road network. The traffic modelling for the proposal shows that the travel time between the Princes Highway and New Illawarra Road may be increased during the full road closure by about 23 to 37 minutes compared to normal conditions during peak traffic periods.

Transport for NSW are investigating ways to modify the construction methodology to minimise the need for day time closures during peak traffic periods (including school drop-off and pick-up periods) to minimise traffic impacts. Transport for NSW would also consult with Shire Christian School prior to implementation of the proposed detour route to identify ways to try and minimise traffic impacts on staff, students and parents.

Implementation of the proposed detour route would also be subject to approval and the requirements of the Transport Management Centre. The core role of the Transport Management Centre is to work closely with other government agencies and service providers to maximise the safety and efficiency of the NSW road network by balancing the needs of the transport network when providing approval of road closures. Transport for NSW would continue to consult with the Transport Management Centre to minimise potential traffic impacts associated with the proposed detour route and identify additional safeguards or management measures, as required.

2.4.2 Cumulative traffic impacts

Submission number(s)

35

Issue description

The respondent raised the following concerns and comments relating to cumulative traffic impacts with other nearby projects:

- comment that the Princes Highway Upgrade at Acacia Road has been delayed and may not be completed by the commencement of construction for the proposal
- comment that the Linden Street Upgrade project may not commence before the proposal and does not consider the potential impacts of the road closures as part of the Heathcote Road bridge widening project
- concern that the cumulative traffic delays would be large as the detour route passes through areas that are already under severe traffic stress from other construction projects.

Response

Transport for NSW acknowledges that there is the potential for some construction activities for the proposal to occur at the same time as work for other nearby road upgrade projects, including the Princes Highway Upgrade, Kirrawee and Linden Street Upgrade projects.

Construction activities for the Princes Highway Upgrade, Kirrawee project started in April 2018, however the project has since been delayed. The most recent project upgrade for the Princes Highway Upgrade, Kirrawee released in March 2021 states that the construction work has restarted and would involve work along the intersections of the Princes Highway with Acacia Road, Oak Road, Kingsway and President

Avenue (refer to Figure 2-4) (Transport for NSW, 2021b). The proposed detour route for the Heathcote Road widening project plans to use the some of these road sections along the Princes Highway.

Figure 2-4 Overview of the Princes Highway Upgrade, Kirrawee project (Roads and Maritime Services, 2018)

Linden Street upgrade project is in the pre-construction phase, with the main construction phase scheduled to start at the end of 2021 (Transport for NSW, 2021d). The Linden Street Upgrade project would involve work along Linden Street and River Road (refer to Figure 2-5), which are part of the proposed detour route for the Heathcote Road widening project.

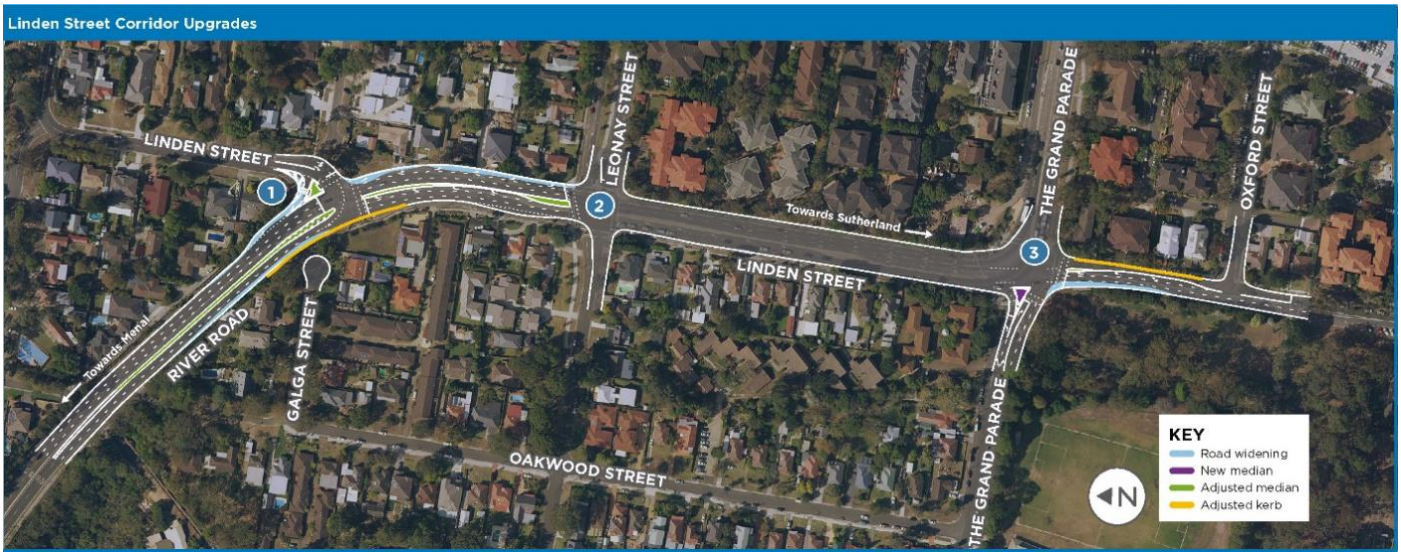

Figure 2-5 Overview of the Linden Street Upgrade project (Transport for NSW, 2020)

Transport for NSW is seeking to manage the risk of cumulative traffic impacts by:

- continuing to consult with the Transport Management Centre as well as the project teams for the Princes Highway Upgrade, Kirrawee and Linden Street Upgrade projects to better understand the proposed timing of any road and lane closures
- scheduling construction work in coordination with other projects in the area to minimise cumulative traffic impacts. For example, the full closure of the Heathcote Road bridge would be scheduled when there is minimal construction occurring along the proposed detour route, where possible
- refining the construction methodology to avoid or minimise the need for full road closures during peak traffic periods
- using the same contractor for the Heathcote Road bridge as the Linden Street Upgrade project, which may increase the ability for construction traffic to be scheduled effectively to minimise overlap between work sites (Transport for NSW, 2021d)

2.5 Biodiversity

2.5.1 Assessment methodology

Submission number(s)

25, 38

Issue description

The respondents raised the following comments relating to the assessment methodology for biodiversity:

- the Biodiversity Assessment Report (BAR) is not consistent with the Biodiversity Assessment Method (BAM), including the methodology for targeted flora and fauna surveys and assessment of offset requirements carried out
- certain threatened flora species were not directly considered in biodiversity assessment including *Eucalyptus camfieldii*, *Pultenaea aristata* and *Prostanthera saxicola*
- certain threatened fauna species were not directly considered in biodiversity assessment including Rosenbergs Goanna and the Broad Headed Snake
- areas above the cuttings have not been surveyed, which may contain threatened species and therefore should be surveyed prior to clearing.

Response

The submission correctly identified that the *Heathcote Road Bridge Widening – Biodiversity Assessment Report* (NGH Consulting, 2020) (referred to as the BAR) prepared for the proposal was not prepared in accordance with the BAM. However, the proponent of activities assessed and determined under Division 5.1 of the EP&A Act can choose whether or not to 'opt in' to the Biodiversity Offsets Scheme and BAM.

The proposal can be assessed under Division 5.1 of the EP&A Act as it involves an upgrade of road infrastructure and is to be carried out by a public authority, Transport for NSW (refer to Section 4.1 of the REF). Transport for NSW did not choose to 'opt in' to the BAM for the proposal and as such, the BAR for the proposal did not need to follow the requirements outlined in the BAM. The BAR applied tests of significance to assess the potential significance of biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016* (refer to Appendix C of the BAR) and concluded that the proposal is not likely to

significantly affect threatened species. Therefore, the methodology used in preparation of the BAR is considered appropriate to assess biodiversity impacts of the proposal.

The threatened flora and fauna species mentioned in the submission have all been considered in Appendix B of the BAR, which stated that:

- *Eucalyptus camfieldii* (Camfield's Stringybark) has been assessed as having marginal presence of habitat and low likelihood of occurrence within the proposal area as this species has not been detected and is generally easy to identify and survey
- *Pultenaea aristata* (Prickly bush-pea) has been assessed as having marginal presence of habitat and low likelihood of occurrence within the proposal area as the proposal is outside the northern extent of this species
- *Prostanthera saxicola* has been assessed as having absent habitat and low likelihood of occurrence within the proposal area
- *Hoplocephalus bungaroides* (Broad-headed Snake) has been assessed as having marginal presence of habitat and a moderate likelihood of occurrence within the proposal area
- *Varanus rosenbergi* (Rosenberg's Goanna) has been assessed as having marginal presence of habitat and low likelihood of occurrence within the proposal area.

Appendix C of the BAR includes a test of significance for potential effects of the proposal on the Broad-Headed Snake. The assessment found that the proposal would result in the removal of up to 3.12 hectares of habitat and up to five suitable hollow-bearing trees for Broad-headed Snake. This reduction would occur in vegetation that is not considered high quality due to the high level of existing disturbance from the adjacent road and context of the surrounding habitat. As a result, these potential impacts are not considered likely to adversely affect the viable local populations of this species and would be further minimised through the implementation of mitigation measures. Therefore, the proposal is considered unlikely to result in a significant impact to the Broad-headed Snake.

The species that were assessed as having low likelihood of occurrence within the proposal area were not considered any further due to the low potential for significant impacts.

Section 2.4.5 of the BAR acknowledges the limitations of the field survey including the inability to access the top of the 8 to 13 metre high vertical rock cutting on the southern side approach and the 8 to 10 metre vertical rock cutting on the northern side approach. These areas were observed visually from key viewpoints using binoculars and a conservative approach was carried out when assessing potential biodiversity impacts within this area. Alternative survey methods for these areas were initially considered, such as through the use of drones. However, drones were not advised to be suitable as they are more suited to large open area surveys, not dense vegetation and discrete groundcover surveys, as was required for this survey effort.

Given the assessment limitations, mitigation measures to be implemented during construction include:

- conducting targeted biodiversity surveys within and above the cuttings once construction activities enable safe access
- conducting pre-clearing surveys and supervision of vegetation clearing activities in accordance with the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011)
- incorporating an unexpected threatened species find procedure within the Flora and Fauna Management Plan, which would be implemented during construction as required.

Submission number(s)

43

Issue description

The respondent provided feedback relating to the approach to consideration of biodiversity impacts on the proposal, and in particular that they supported:

- the engagement of an expert ecologist and a peer review process for the proposal
- the consideration of aquatic habitat through the involvement of DPI Fisheries
- the consideration given to microbats and other fauna.

Response

Transport for NSW notes the support regarding the approach taken for consideration of biodiversity impacts (including aquatic habitat, microbats and other fauna) through expert ecologist advice and a peer review process.

Specialist ecologist input will continue to be sought during detailed design for the development of the Microbat Management Plan, fauna connectivity measures, opportunities for permanent microbat habitat provision and design of the temporary waterway crossing.

Transport for NSW will continue to consult with DPI Fisheries during detailed design, with a particular focus on the design of the temporary waterway crossing, to minimise impacts to aquatic habitat.

2.5.2 Existing environment

Submission number(s)

44

Issue description

The respondent noted that there have been several koala sightings close to the Heathcote Road bridge that have not yet been logged in the BioNet Atlas, and that koala sightings and kills have been reported regularly in the local newspaper (The Leader) and on social media.

Response

Transport for NSW appreciates the information on koala sightings and acknowledges that there may have been several additional koala sightings and kills near the proposal area beyond those reported on publicly accessible databases and identified in the REF.

Although no Koalas were observed within the proposal area during targeted surveys for the proposal, the high number of records and sightings of Koalas near the proposal confirms their likely presence in the area surrounding the Heathcote Road bridge. A literature review completed for the proposal also indicated that local Koala studies had concluded that the Holsworthy – Campbelltown area contained a single Chlamydia free Koala population and that fauna connectivity was important to be maintained in the area to maintain the healthy population. The nearby Koala records, sightings and literature review completed for the BAR collectively contributed to the decision to include fauna connectivity measures in the proposal scope.

The data contained in the BioNet Atlas, while extensive, is unlikely to be complete as not all sightings may have been formally reported for inclusion in the database. As such, while the data is extensive, it cannot be

relied upon as a comprehensive inventory of all species nor does it correspond to the actual abundance of a species in NSW.

The community is encouraged to continue reporting and uploading any species sightings to the BioNet Atlas via their website (refer to About the Atlas of NSW Wildlife | NSW Environment, Energy and Science for more information) or the 'I Spy Koala' app (application developed by NSW DPIE, which feeds into BioNet database).

This supplementary recent Koala sighting data further strengthens the justification for the provision of koala connectivity measures as part of the proposal.

2.5.3 Construction impacts

Submission number(s)

43, 44

Issue description

The respondents raised the following comments relating to the construction impacts of the proposal on biodiversity:

- the loss of fauna habitat including flowering Eucalypts, native trees, bush rock and shrubs should be avoided
- the loss of up to 16 hollow bearing trees is concerning because these can take hundreds of years to grow
- the loss of hollow-bearing trees has been listed as a key threatening process by the NSW Scientific Community.

Response

The REF adopted a conservative approach to assessing biodiversity impacts of the proposal, where it was assumed that all vegetation within the proposal area would be directly impacted by construction or operation of the proposal. This approach enabled an understanding of the 'worst-case' impacts of the proposal including the largest area of fauna habitat that may be impacted.

The design and construction methodology for the proposal will be further refined during detailed design to avoid or minimise native vegetation or habitat removal within the proposal area, where possible, with a focus on minimising impacts on hollow bearing trees. Therefore, the loss of fauna habitat from the proposal in reality is likely to be less than assessed in the REF.

2.5.4 Cumulative biodiversity impacts

Submission number(s)

25

Issue description

The respondent comments that the cumulative impact of vegetation removal from the recent Heathcote Road projects should be considered and the resultant offset areas purchased should be given to the National Parks and Wildlife Services.

Response

The Heathcote Road Upgrade at Holsworthy project is located about 10 kilometres north of the proposed Heathcote Road bridge widening project. Due to this notable distance, the Heathcote Road Upgrade at Holsworthy is considered a separate project that would have its own distinct impacts on biodiversity and is subject to its own planning approval and assessment requirements. The offset needs for this project have already been determined and negotiated.

The Heathcote Road duplication project, which considers the potential future upgrade of Heathcote Road between The Avenue at Voyager Point and the Princes Highway at Engadine, is still in the early stages of investigation. As no preferred option has been identified for this project, there is not enough information to inform the potential cumulative biodiversity impact (if any) or identify potential offset strategies that consider both the current proposal and the future Heathcote Road duplication project. It is expected that any potential cumulative impacts would be considered in a future environmental assessment that would be carried out for the Heathcote Road duplication project, when further information is available.

The biodiversity impacts of the proposal would be offset in accordance with the *Guideline for Biodiversity Offsets* (Transport for NSW, 2016) as outlined in Section 2.5.5 below.

2.5.5 Mitigation measures

Submission number(s)

38

Issue description

The respondent commented that the BAR states that no offsets are required, which is inconsistent with the Transport for NSW biodiversity guidelines from 2016, which states that removal of more than one hectare of habitat for species credit species requires offsetting. It further states that as the proposal is removing up to 3.16 hectares of vegetation, offsets would be required for the flora and the fauna species credit species.

Response

Transport for NSW acknowledges that the BAR applied the *Guideline for Biodiversity Offsets* (RMS, 2011) instead of the more recent *Guideline for Biodiversity Offsets* (Transport for NSW, 2016), which was an error. Transport for NSW has committed to offset the biodiversity impacts of the proposal in accordance with the most recent *Guideline for Biodiversity Offsets* (Transport for NSW, 2016). Offsets would be provided for the following species, in accordance with the *Guideline for Biodiversity Offsets* (Transport for NSW, 2016):

- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Heleioporus australiacus* (Giant Burrowing Frog)
- *Pseudophryne australis* (Red-crowned Toadlet)
- *Allocasuarina diminuta subsp. mimica* - endangered population (*Allocasuarina diminuta subsp. mimica* population in the Sutherland Shire and Liverpool City LGAs)
- *Astrotricha crassifolia* (Thick-leaf Star-hair)
- *Grevillea parviflora subsp. supplicans* (Grevillea parviflora subsp. supplicans)
- *Leucopogon exolasius* (Woronora Beard-heath)
- *Hibbertia stricta subsp. furcatula* (Hibbertia stricta subsp. furcatula)
- *Melaleuca deanei* (Deane's Paperbark).

Regardless of this, Transport for NSW did not formally 'opt in' to the Biodiversity Offsets Scheme, so is not legally required to calculate offsets for flora and fauna species credit species in accordance with the BAM.

Submission number(s)

43, 44

Issue description

The respondents have provided several suggestions and comments regarding mitigation measures to minimise biodiversity impacts including:

- suggestion that any removed hollows should be stored and reinstated as has been carried out for other projects such as the Moorebank Intermodal project
- suggestion that trees with hollows (particularly larger hollows) should be retained wherever possible, even if the hollows are not currently observed to be in use by animals
- support for the installation of habitat for threatened microbats to compensate for the removal of existing culverts and scuppers within the bridge structure
- suggestion that the proposal should monitor potential damage from flood and fire events
- request for Transport for NSW to liaise with the relevant authorities to ensure adequate fox control measures are put in place to protect native animals.

Response

As discussed in Section 2.5.2, the design and construction methodology for the proposal will be further refined during detailed design to avoid or minimise impacts on hollow bearing trees, including those that have not been observed to be in current use by animals. The proposal would also consider opportunities to reuse removed hollow bearing trees or other large felled timber as potential habitat features within the proposal area, which would be subject to specialist ecological advice and safety considerations.

Opportunities to incorporate new elements on the bridge such as small gaps beneath the parapet for microbat habitat will continue to be considered. The final design of the microbat habitat features would be developed during detailed design in consultation with a suitably qualified ecologist and Transport for NSW's biodiversity officer and outlined in the Microbat Management Plan.

The detailed design of the proposal would include consideration of the potential risk of bushfire and flood events on the proposal during construction and operation, including the potential for damage. Flooding and bushfire risks during construction would be managed through implementation of a Flood Action Plan and Hazard and Risk Management Plan as part of the CEMP.

Transport for NSW has no current plans for fox management in the area surrounding the Heathcote Road bridge, however is willing to work collaboratively with surrounding land owners and relevant authorities to facilitate access to complete fox control activities, if required.

2.6 Water quality and soil

2.6.1 Construction impacts

Submission number(s)

44

Issue description

The respondent has raised that they are concerned by “the huge potential for irreversible harm to be done to the aquatic habitats of the Woronora River” and request further information on this matter.

Response

The design and construction methodology for the proposal has been developed in consideration of the need to minimise surface water quality impacts, particularly any long-term impacts on the aquatic habitats of the Woronora River.

The need to avoid long-term impacts on the Woronora River is a key reason why the Heathcote Road bridge is proposed to be widened using headstock expansion with supports connected the existing bridge piers. The proposed bridge design using this methodology would not require any new permanent structures within the Woronora River and would require substantially less construction work above waterways than the other options (refer to Section 2.4.3 of the REF). During operation, the proposal also has the potential to reduce surface water quality impacts compared to the existing bridge structure, such as from stormwater runoff, localised erosion and road incidents, by providing new and improved drainage infrastructure within the proposal area.

A temporary access track, laydown area, crane pads, and waterway crossing are proposed to be established in an area under the bridge near the Woronora River to provide access for construction equipment and temporary storage of construction materials. Any potential impacts on the aquatic habitats of the Woronora River from these structures would be temporary, as the waterway crossing structure would be removed and the access track and laydown area would be rehabilitated after construction to return the disturbed areas to pre-existing conditions. The detailed design of the temporary waterway crossing will continue to be developed in consultation with DPI Fisheries, and include appropriate pipe outlets, scour protection and flood immunity to minimise impacts on the Woronora River.

Impacts on water quality and soil associated with construction of the proposal would also be managed in accordance with the Soil and Water Management Plan, which would include the requirements for erosion and sediment control measures to be implemented. Several mitigation measures that have been recommended by DPI Fisheries would also be implemented to minimise the risk of harm to aquatic habitats from the proposal (refer to Section 3.5.7)

In consideration of the measures proposed to avoid or minimise potential surface water impacts from the proposal, DPI Fisheries confirmed that no marine vegetation is likely to be harmed from the proposal, and therefore a section 205 permit under Part 7 of the *Fisheries Management Act 1994* is not required.

Further discussion on the assessment of impacts to aquatic habitats and the measures taken to avoid or minimise impacts on water quality and soil is provided in Section 3.5.7.

2.6.2 Mitigation measures

Submission number(s)

44

Issue description

The respondent requested information on what surface water monitoring would be put in place for the proposal, and the frequency and type of testing that would be carried out.

Response

Impacts on water quality and soil associated with construction of the proposal would be managed in accordance with a Soil and Water Management Plan, which would be prepared with input from a suitably experienced soil conservationist. The Soil and Water Management Plan would include a procedure for routine visual water quality monitoring as well as erosion and sediment control measures, specific measures for the rehabilitation of the temporary access, progressive soil stabilisation plans and mitigation measures recommended by DPI Fisheries (refer to Section 3.3.2). Ecologists would also be present during certain phases of construction to contribute to best practice in accordance with the TfNSW Guidelines, '*Biodiversity Guidelines for protecting and managing biodiversity on RMS projects, 2011*'.

The request for further details on the water quality monitoring procedure relates to content that is not yet available as it is developed during detailed design and pre-construction stages of the proposal as part of the Soil and Water Management Plan preparation.

2.6.3 Issues with virtual information centre

Submission number(s)

35

Issue description

One respondent commented that they had issues using the virtual information centre to lodge their submission, as there were some broken website links, which could have discouraged submissions.

Response

Transport for NSW acknowledges the temporary issues experienced with the broken links on the virtual information centre website. Once the error was identified after being reported through to the project community email address, the issues were quickly resolved to minimise any disruption to the public display and submissions process. Transport for NSW also accepted submissions through the community phone number and email address.

2.7 Other issues

2.7.1 Socio-economic impacts

Submission number(s)

17, 34, 35

Issue description

The respondents raised the following comments and concerns relating to the socio-economic impacts of the proposal:

- concerns that the additional travel time associated with the proposed detour route would negatively impact people who require to travel via Heathcote Road for work, as it would be a notable inconvenience and may cause them to arrive at work tired and irritable
- comment that Heathcote Road appears to be used by several commuters from Wollongong, and the additional travel time during the detour route would make it a 'long way to go to earn a dollar'
- concern that the additional travel time to and from Shire Christian School would reduce the amount of time senior students (particularly Year 12 students) can spend studying at home
- concern that the proposal would impose a massive economic burden on the community due to the traffic delays during the six-month road closure and the actual cost of the works.

Response

As discussed in Section 2.4.1, Transport for NSW are investigating ways to modify the construction methodology to eliminate or minimise the need for day time road closures during peak traffic periods. As such, the six-month full road closure assessed in the REF is considered the 'worst-case' traffic scenario and is likely to be less in reality. Transport for NSW would also continue to consult with the Transport Management Centre and surrounding road upgrade projects to minimise potential cumulative traffic impacts associated with the proposed detour route and identify additional safeguards or management measures, as required. These measures are expected to minimise the duration and magnitude of socio-economic impacts associated with the temporary increased travel time for commuters and freight vehicles.

The cost of the proposal is considered to be justified given the immediate need to improve road safety along the Heathcote Road bridge and its approaches, as the existing road infrastructure is not compliant with current road design standards and has a higher than average crash history. During operation, the proposal would result in long-term benefits to all road users and the community who value safety within the Sutherland Shire LGA by reducing the risk of road incidents. The proposal would also improve network reliability, which would benefit people living and travelling through the study area to work or school.

2.7.2 Existing contamination

Submission number(s)

21

Issue description

The respondent commented that Transport for NSW should be aware that people have been illegally dumping asbestos up the hill from Deadmans Creek and New Illawarra Road for a long time.

Response

Transport for NSW appreciates this information and notes that it is a known issue that will be reiterated to the asset management division to be dealt with, where possible, in collaboration with other government agencies.

3. Response to government agency issues

3.1 Overview of issues raised

A total of four formal submissions were received from government agencies in response to the display of the REF, which have been responded to in the sections below. This included submissions from:

- NSW National Parks and Wildlife Service (NPWS)
- Department of Primary Industries Fisheries (DPI Fisheries)
- Heritage NSW as a delegate of the Heritage Council of NSW
- Sutherland Shire Council

Transport for NSW also carried out consultation activities with ANSTO, the Transport Management Centre and Holsworthy Military Barracks during public display of the REF (refer to Section 1.2), however no formal submissions were received from these stakeholders. Transport for NSW has and will continue to consider any informal feedback provided by government agencies during detailed design and the construction of the proposal.

During a briefing meeting on 21 January 2021, ANSTO representatives provided informal feedback regarding the proposed road closures for construction of the proposal. This included confirmation that the proposal would result in minimal impact to their nuclear medicine deliveries as well as minimal impact to their employees' commutes if overnight road closures are removed by 5 am (due to the shift changeover time).

Transport for NSW has been in regular communication with the Transport Management Centre since early March 2020, including several meetings to communicate and seek feedback on the road closure requirements for construction of the proposal.

3.2 NSW National Parks and Wildlife Service

3.2.1 Property and land use impacts and mitigation measures

Issue description

NPWS provided the following comments relating to property and land use impacts and mitigation:

- comment that none of the proposed work is located within Heathcote National Park but is adjacent
- comment that there are potential indirect impacts on Heathcote National Park from additional encroachment and stormwater, which should be minimised by using existing drainage lines and avoiding work outside the existing proposal area
- comment that any additional works that are found to encroach or impact on Heathcote National Park will require a REF determined by NPWS
- request that the *Guidelines for development adjacent to National Parks and Wildlife Service Lands* (National Parks and Wildlife Service, 2020) are considered, which provide guidance regarding:
    - noise impacts and amenity
    - boundary encroachments
    - management implications, pests, weeds, edge effects
    - erosion and sediment control
    - stormwater runoff

- request for access to be maintained to Pipeline and Scouters Mountain fire trails at all times for NPWS and other emergency services to carry out routine management and emergency access.

Response

Transport for NSW confirms that the design and construction of the proposal would not directly encroach on Heathcote National Park.

Transport for NSW will consider the *Guidelines for development adjacent to National Parks and Wildlife Service Lands* (NPWS, 2020) during preparation of the CEMP and associated sub-plans, including but not limited to the Noise and Vibration Management Plan, Flora and Fauna Management Plan and Soil and Water Management Plan. Transport for NSW would seek to consult with NPWS to discuss any aspects of the guidelines that are not considered feasible to be implemented on the proposal, such as due to the limited space available for construction activities or need for night work, to identify alternative management measures where required.As per mitigation measure TT4, access will be maintained for private properties, emergency response vehicles, NPWS staff and utility providers at all times, where possible. This would include maintaining access to the Pipeline and Scouters Mountain fire trails. If a stage of the work temporarily restricts access along Heathcote Road, alternative arrangements will be developed in consultation with the relevant stakeholders in advance.

Transport for NSW is proposing to provide new and modified drainage infrastructure that would generally follow existing drainage lines, where possible. This would be done in an environmentally sensitive manner, including through provision of scour protection at discharge points, to manage the risk of stormwater and sediment runoff.

3.2.2 Biodiversity mitigation measures

Issue description

NPWS provided the following comments relating to biodiversity mitigation measures for the proposal:

- suggestion that at least one koala feed tree should be planted for every plant or tree removed for the proposal to show an act of goodwill
- request for all fauna sightings to be entered into BioNet within 28 days
- recommendation that alternative housing should be provided for the microbats before they are excluded at night from their current bridge housing.

Response

The proposal would develop an appropriate planting strategy to complement the fauna connectivity design and enhance the effectiveness of connectivity structures, which would include consideration of Koala feed trees. The limited available space and challenging steep topography surrounding the Heathcote Road bridge and its approaches may limit the ability to achieve the suggested 1:1 ratio for tree planting (one tree planted for every tree removed). However, Transport for NSW will adopt a goal to maximise opportunities for replanting and use of Koala feed trees in the species selection in consultation with specialist input including ecologist advice.

All fauna sightings during construction of the proposal would be entered into BioNet within 28 days as suggested, which aligns with standard practice.

3.2.3 Alternative housing for microbats would be provided before they are excluded from their current bridge housing in accordance with standard practice. The preferred option and specific methodologies for this would be determined by a specialist microbat expert during

preparation of the Microbat Management Plan and would be tailored to the needs of the species and proposal location. Traffic and transport mitigation measures

Issue description

NPWS commented that as Heathcote Road is a high-profile main road, all required notifications should be provided to Police, Emergency Services, Sutherland Shire Council and road users prior to works commencing.

Response

Emergency Services, Sutherland Shire Council and the community will be notified in advance of any road closures and the likely disruptions to access in accordance with the Community and Stakeholder Engagement Plan. Adequate advisory and warning signage will be provided to inform motorists of the road conditions ahead including any road closure and/or detour route.

3.2.4 Fauna connectivity features

Issue description

NPWS commends Transport for NSW for considering and including crossing for koalas and other wildlife in the proposal and have suggested that wing fencing could be considered to assist with funnelling wildlife towards the structure.

Response

Transport for NSW has noted the support from NPWS regarding the fauna connectivity features proposed for the proposal for koalas and other native fauna.

Transport for NSW also acknowledges the use of fencing as an important consideration in effective fauna connectivity design to ensure the target fauna species are directed to use the crossing structures.

Transport for NSW is currently considering options to provide fencing as part of detailed design in consultation with specialist ecological advice. This would also include evaluation of the best type of fencing to be used including consideration of wing fencing among other fencing types. It is noted that the steep topography would make it difficult to install effective fences in some areas. Recognising this, the proposal has sought knowledge from the recent Pacific Highway Upgrade, which included provision of fauna connectivity and fencing within similar topography, to identify potential design solutions such as fencing connected to bridge abutments to prevent access to the road corridor. Transport for NSW will provide an update to NPWS on the preferred design of the fauna crossing structures and associated fencing once this has been further refined during detailed design.

3.3 Department of Primary Industries Fisheries

3.3.1 Statutory planning framework

Issue description

DPI Fisheries raised the following comments relating to their statutory role and the requirements for permits under the *Fisheries Management Act 1994* (FM Act):

- DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend
- DPI Fisheries ensures that developments comply with the requirements of the FM Act, namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, as well as the associated *Policy and Guidelines for Fish Habitat Conservation and Management* (2013)
- Woronora River and Heathcote Creek are mapped as Key Fish Habitat
- As no marine vegetation is to be harmed in this proposal, a section 205 permit under Part 7 of the FM Act is not required
- Under section 219(5)(a) of the FM Act, any work that is permitted under the FM Act turns off the requirement for a section 219 permit to block fish passage, therefore a section 219 permit is not required for the proposal
- An initial consultation response to Transport for NSW was issued by DPI Fisheries on 21/10/2020 regarding the proposed dredging and reclamation activities.

Response

Transport for NSW appreciates the advice provided by DPI Fisheries on the requirements for the proposal under the FM Act, including the confirmation that a permit under sections 205 or 219 of the FM Act is not required for the proposal.

3.3.2 Water quality and soil mitigation measures

Issue description

DPI Fisheries raised the following comments relating to mitigation measures to manage water quality and soil impacts from the proposal:

- Erosion and sediment mitigation devices are to be erected in a manner consistent with currently accepted Best Management Practice (i.e. *Managing Urban Stormwater: Soils and Construction 4th Edition* Landcom, 2004) to prevent the entry of sediment into the waterway prior to any earthworks being undertaken. These are to be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal.
- Any material removed from the waterway that is to be temporarily deposited or stockpiles on land is to be located well away from the waterway and to be contained by appropriate sediment control devices.
- DPI Fisheries (1800 043 536) and the Environment Protection Authority (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the Environment Protection Authority for the works to proceed.

Response

The mitigation measures suggested by DPI Fisheries have been incorporated into the safeguards and management measures for the proposal (refer to Section 5.2) and would be implemented during construction of the proposal, as required.

3.3.3 Request for additional consultation

Issue description

DPI Fisheries requests to be consulted when 50% detailed designs are available to discuss in-water structures and abutment engineering to ensure they meet best practise as published in *Policy and Guidelines for Fish Habitat Conservation and Management* (2013).

Response

Transport for NSW acknowledge this request and confirm plans for continued consultation with DPI Fisheries during detailed design of the proposal to discuss the temporary waterway crossing and other relevant structures, including an opportunity for DPI Fisheries to review the 50% detailed design plans.

3.4 Heritage NSW

3.4.1 Non-Aboriginal heritage impacts

Issue description

Heritage NSW raised the following comments relating to non-Aboriginal heritage impacts from the proposal:

- the proposal involves widening a Section 170 (s170) heritage registered item, the Woronora River Bridge (RTA Bridge no. 152), using headstock extensions and steel box girders on either side of the existing bridge
- Heritage NSW recognises the Heathcote Road bridge forms part of a key traffic corridor and is supportive of the thoughtful adaption that will allow the significant bridge to remain an active part of the road network
- the proposed works are small scale, low intensity and the widening elements have been carefully designed to minimise visual impacts to the bridge.

Response

Transport for NSW appreciates Heritage NSW's review of the proposal and support regarding the proposed bridge design, which has been developed in consideration of the heritage significance of the bridge and the need to minimise heritage impacts including visual changes.

3.4.2 Non-Aboriginal heritage mitigation measures

Issue description

Heritage NSW supports the recommendations made in the Statement of Heritage Impact prepared for the proposal including:

- Recommendation 1 Staged heritage review of detailed design.
- Recommendation 2 Conservation Management Plan
- Recommendation 3 Reduce impacts to heritage significance of Woronora River Bridge
- Recommendation 4 Reduce impacts to other heritage items
- Recommendation 5 Archival recording
- Recommendation 6 Construction Heritage Management Sub-Plan

Response

Transport for NSW notes Heritage NSW's support regarding the recommendations to minimise non-Aboriginal heritage impacts that have been adopted as safeguards and management measures for the proposal (refer to Section 5.2).

3.5 Sutherland Shire Council

3.5.1 Proposal design and construction

Need for physical barrier between lanes

Issue description

Sutherland Shire Council raised several comments regarding the need for a physical barrier between lanes, including that:

- the proposal does not provide a central median safety barrier to separate the bidirectional travel lanes and therefore does not properly address the most significant safety risks for road users, the risk of head-on collisions with serious injury to fatal consequences
- the need for physical separation is a reason to advocate for bridge duplication as structural constraints restrict the extent to which the existing bridge can be widened, which limits the potential to provide median separation between opposing traffic and only minimum standard lane and shoulder widths can be met
- the current design deviates from the NSW Government 'safe systems approach', as the incidence of head on crash trauma is not satisfactorily addressed and as such is not considered a 'safe road'
- the REF acknowledges the need for the proposal has been driven by the poor crash history record on the bridge and its approaches, with a disproportionate number of head-on crashes leading to fatal and casualty type crashes
- Austroads Guide to Road Design Part 3; Geometric Design states that: "Divided roads are provided where traffic volumes are high and it is necessary to provide motorists with a satisfactory level of service or where a section of road has an unacceptable number of crashes, particularly head-on crashes."
- Austroads (2010c) showed that casualty crash rates were 1.6 times higher on undivided rural roads than on divided rural roads and that the severity of crashes on undivided roads was generally higher, which was likely due to the occurrence of high speed head-on crashes on undivided roads
- while the widened bridge will provide some additional clearance between opposing traffic, any mitigation of head-on risk is potentially offset by the likely increase in speed on approach to and across the bridge.

Response

The proposal addresses the key proposal objectives as it provides a design solution that can be implemented in the short term to improve road safety and network reliability. In particular, it would directly address the safety hazard of the narrow lanes and improve the road geometry of the approaches to the bridge to meet current road design standards.

Analysis of crash history statistics within 500 metres of the Heathcote Road bridge between 2009 and 2019 shows that the most common type of crash was rear end collisions (44 per cent of crashes), followed by crashes involving hitting an object (28 per cent of crashes) and head-on collisions (24 per cent of crashes).

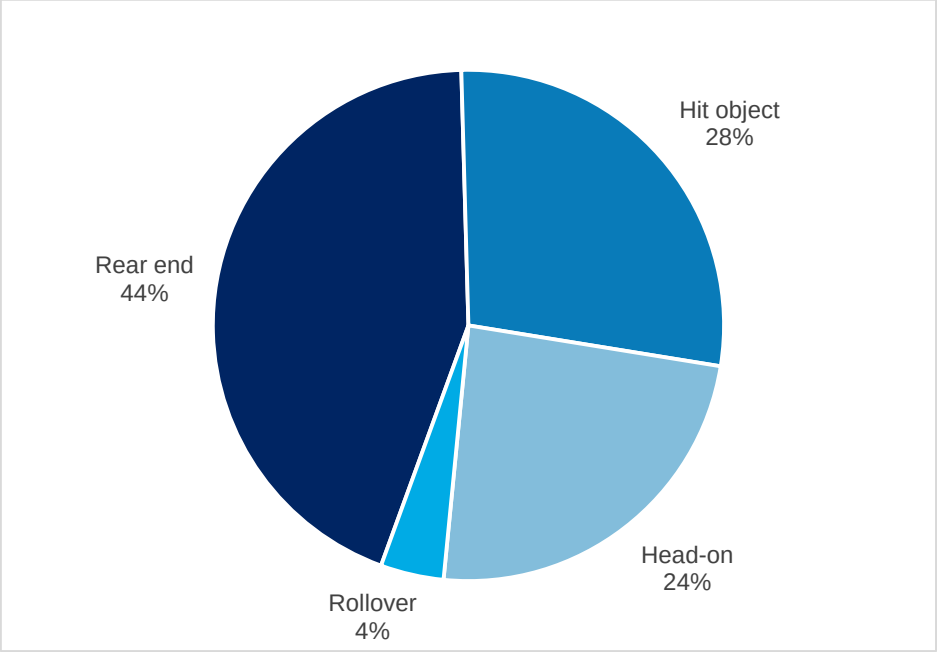

Figure 3-1 Frequency of crash types along Heathcote Road bridge and its approaches

Most of the head-on collisions currently observed on the Heathcote Road bridge and its approaches are considered to be a result of the narrow lanes reducing the room for error for vehicles, which can cause vehicles to easily cross into the oncoming lane of traffic. This risk is expected to be minimised through the widening of the Heathcote Road bridge and its approaches. Widening and improving the alignment of the approaches to the bridge is expected to reduce the potential for vehicles to hit objects (e.g. the steep rock cuttings on either side of the road). The potential for rear end collisions is also likely to reduce as vehicles are less likely to need to stop or slow at the approach to the bridge to wait for vehicles to pass, which can cause vehicles to brake hard or stall.

During the early strategic phase of the proposal, options to provide physical median barriers (with or without bridge widening) were also investigated, to determine if they could improve road safety in the short-term. These barriers were not considered feasible to implement on the existing bridge structure due to several engineering and safety issues. The proposal doesn't include a barrier because of load limits and structural engineering capacity of the bridge structure; the need to core into the bridge deck and lack of space for barrier deflection (as discussed further in Section 2.3.1). However, the proposal does not prevent a physical median barrier being considered as part of investigations into a potential longer-term solution (such as bridge duplication) to continue to improve the road safety of Heathcote Road in the future (refer to Section 2.2.1).

Should the proposal proceed into detailed design, Transport for NSW would further investigate the feasibility of refining the proposal design to implement a wide painted median for separation between traffic lanes on the bridge. This would require slightly narrowing the proposed shoulders on the bridge. This wide painted median would be similar to the arrangement on Heathcote Road at Deadmans Creek Bridge, which is located north-west of the proposal on Heathcote Road at Sandy Point (refer to Figure 3-2). Deadmans Creek Bridge is surrounded by similar challenging topography to the proposal and was successfully widened by Roads and Maritime Services in 2015 to improve road safety.

Figure 3-2 Example of a similar bridge structure at Deadmans Creek bridge

Speeding is not considered to be a major factor contributing to the current risk of crashes at the Heathcote Road bridge and its approaches (refer to Section 2.2.4). However, in the case that increased road user speed for is observed during operation of the proposal and may increase the risk of crashes, Transport for NSW may choose to conduct a speed zone review of Heathcote Road. This review would assess whether changes to the posted speed limits are required based on a number of factors including the crash history, road geometry, road environment and traffic volumes. Transport for NSW would also consult with the NSW Police Force during operation of the proposal to discuss traffic management and enforcement of speed limits, as required.

3.5.2 Proposal need and options

Need for bridge duplication and/or additional lanes

Issue description

Sutherland Shire Council raised several comments regarding the need for a bridge duplication or provision of additional lanes, including that:

- Sutherland Shire Council, Wollongong City Council and Liverpool City Council's position is that duplication of the bridge is required to properly address safety risks and ensure that this key road link can meet the current and future needs of a growing city and region. It is also noted that these councils represent over 700,000 residents who are the principal users of this road corridor
- Council's preference is for a modern four lane bridge with dividers, which in their opinion is the best value solution for the community and should be delivered as soon as possible
- Council opposes the decision to widen the approaches and bridge without increasing the number of lanes on the bridge
- Council has explored several avenues for engagement with the government, key stakeholders and the community to advocate for their position and preferences regarding the proposal
- the recent announcement regarding the $35 million investigation for the Heathcote Road duplication adds further weight that a more strategic and long-term view is required
- bridge duplication allows road closures to be minimised compared to the current proposal, which would reduce impacts related to night-time noise, extended detour routes, traffic delays and emergency situations
- the crash history for the road within the Sutherland LGA supports the need to prioritise a long-term solution
- Council needs to have confidence that a medium to long term solution will be developed and implemented in a reasonable timeframe and notes the REF does not establish a clear timeframe for this, although a timeframe is discussed in the recent Heathcote Road projects fact sheet.

Response

As discussed in Sections 2.2.1 and 2.2.2, there are several reasons why the bridge widening option (with one wider lane in each direction) was chosen as the preferred option for the proposal over bridge duplication or providing additional lanes, which included that:

- the need to improve road safety along the Heathcote Road bridge and its approaches was prioritised over the need to improve the capacity of the Heathcote Road bridge to cater for future traffic growth, as this is not an immediate concern
- it is not considered possible to build a bridge duplication or additional lanes within the short-term due to the substantial additional time (compared to the widening option) that would be required to complete construction, property acquisition, environmental assessment and approval processes
- bridge duplication would result in very similar safety and traffic flow benefits to a bridge widening in the short-term as the main issues currently appear to be as a result of vehicles navigating the narrow lanes of the Heathcote Road bridge, which acts as a 'pinch point'
- the additional cost, complexity, timeframe and environmental impacts associated with the bridge duplication option would only be justified if a significant growth in traffic volumes or continued higher than average crash risk is experienced in the future

The feasibility of a new four-lane bridge with dividers to be built along Heathcote Road in the future would be investigated as part of the separate Heathcote Road duplication project, which had $35 million in funding announced in November 2020. However, the preferred option and timeframe for this potential longer-term solution is currently unknown as investigations are still in the early stages.

Support need for safety improvements

Issue description

Sutherland Shire Council raised several comments regarding the need for safety improvements including that:

- Heathcote Road bridge and its approaches has a significant and unacceptable crash history with 357 injury or fatality type crashes resulting in 556 injuries and 23 fatalities since 1996 in the section of road within Sutherland LGA alone
- head-on collisions are overrepresented in the crash history due to the inadequate road design, including the frequency and severity of crashes
- thirteen crashes on the road in 2019 including three fatalities was unacceptable and more lives will be lost if this regionally significant project is delayed
- Sutherland Shire Council has been advocating for major improvements to Heathcote Road for some time and considers Heathcote Road as the most dangerous road in its local government area
- safety is Council's most important issue on this project and Council demands that the safety of road users should be prioritised ahead of financial considerations
- notes that the bridge and its approaches (built in 1943) are in urgent need of repair.

Response

Transport for NSW acknowledges Sutherland Shire Council efforts to advocate for road safety improvements. Transport for NSW also acknowledges the proposal is one part of a larger suite of road safety improvement works that have completed or are in planning for the Heathcote Road corridor and surrounding road network, as outlined in the response in Section 2.2.3.

In particular, Transport for NSW agrees that the crash history and ongoing risk of road incidents along the Heathcote Road bridge and its approaches is unacceptable and needs to be addressed as soon as possible, as well as the need to prioritise safety ahead of financial considerations. This is a key reason why the proposal involves a safety upgrade in the short term, which would be delivered through widening the Heathcote Road bridge and its approaches, instead of an upgrade that may not be able to be delivered for several more years. Regardless of this, the development of the proposal has been designed to consider the potential long term needs of the corridor to improve value for money for the two separate upgrades of the Heathcote Road bridge and its approaches, if required due to significant growth in traffic volumes in the future.

As discussed in Section 3.5.1, head-on collisions featured in 24 per cent of crashes recorded within 500 metres of the Heathcote Road bridge between 2009 and 2019. The increased width of the road lanes and shoulders during operation of the proposal would provide increased room for error for vehicles navigating the bridge, which is expected to reduce the risk of vehicles crossing into oncoming lanes and causing head-on collisions. The proposal would also increase the lane and shoulder widths and re-align the curve and gradient of the bridge approaches to achieve compliance with current Austroads road design guidelines and improve road safety.

The proposal also includes repair and maintenance work to improve the condition and increase the life of the existing bridge structure and avoids the need to replace the Heathcote Road bridge and approaches. This includes replacement of all bridge bearings and expansion joints, repairing areas of concrete cracking and spalling and application of an anti-carbonation coating on the bridge to improve concrete durability.

Need for business case to support proposal justification

Issue description

Sutherland Shire Council raised several comments regarding the business case for the proposal, including that:

- the absence of a compelling business case, which compares the proposed short-term $73M bridge widening option to a more expensive but safer and futureproof bridge duplication project, is not considered in the REF
- Transport for NSW is expected to have followed the NSW Treasury Document “NSW Government Business Case Guidelines TPP 18-06 August 2018”, which indicates a good business case should “convince through arguments that are optimally supported by hard data, including accurate costing of alternatives and expected benefits” and therefore it is assumed that alternative options must have been considered as part of a business case that preceded the REF
- the REF only considers the bridge widening in detail and other options such as bridge duplication and and/or an entire new road network are only briefly referred to
- Transport for NSW has not provided a cost estimate for the alternative of duplicating the bridge
- Council asks how, via the NSW Treasury business case process, the current preferred option of widening was selected and whether it optimises value for money
- comment that the release of the business case by Transport for NSW would assist Council and the community’s understanding of Transport for NSW’s position.

Response

Transport for NSW is currently developing a final business case for the proposal, which will be reviewed in accordance with the NSW Government Business Case guidelines and other internal Transport for NSW guidelines. Final business case documents are not typically released for public information or review, as they contain a high amount of commercial-in-confidence information. Nonetheless, Transport for NSW would continue to engage with Sutherland Shire Council to provide updates on the proposal as it progresses.

The REF outlines strategic options that have been developed and assessed in line with the proposal objectives to deliver improved road safety and network reliability within an as quick as possible timeframe. As discussed in Section 2.2.1, widening the Heathcote Road bridge and its approaches was considered to be the only strategic option that could improve safety within the short-term due to several site specific issues and constraints.

As discussed in Section 2.2.2, alternative strategic options (such as providing additional lanes or a new bridge structure) would be more challenging to design, take longer to construct and would have greater potential environmental impacts. These options would also result in very similar safety and traffic flow benefits to a bridge widening in the short-term as the main issues currently observed appear to be as a result of vehicles navigating the narrow lanes of the Heathcote Road bridge, which acts as a ‘pinch point’.

As there is no existing preferred design for an option that would provide additional lanes or a new bridge structure, there was no cost estimate available for a direct quantitative cost comparison to the current bridge widening design option. However, a qualitative cost comparison is considered valid, as the large scale of additional infrastructure and acquisitions required for these alternative strategic options alone would result in significantly greater costs. Therefore, the current proposal (Heathcote Road - bridge widening) is considered to be the strategic option that is best able to achieve the proposal objectives and deliver value for money for the community. Further discussion on the selection of the preferred option, including the strategic options assessed and value for money considerations, is provided in Section 2.4 of the REF.

Justification of proposal benefits compared to costs and impacts

Issue description

Sutherland Shire Council raised several comments regarding the justification of the proposal benefits compared to its cost and impacts:

- Council acknowledges that the bridge widening project will improve safety over the current bridge configuration, however Council believes it will not satisfactorily address the incidence of head-on crashes or achieve value for money given the high costs and limited safety improvements
- Council does not want to unreasonably delay actions to improve safety at this location, however queries whether it represents a safety improvement proportionate to the size of the investment or whether these funds would be better spent contributing to the fast tracking of an improved solution such as bridge duplication
- it would assist Council and the community's understanding of the project if it could share more detailed information, particularly on how long a short-term option should last.

Response

As discussed in Section 2.2.2, the proposal would reduce the risk and severity of road incidents along the Heathcote Road bridge and its approaches by:

- increasing the lane and shoulder widths and re-aligning the curve and gradient of the bridge approaches to achieve compliance with current Austroads road design guidelines
- providing additional room for error for vehicles using the bridge, which is likely to reduce the risk of head-on collisions caused by larger vehicles crossing into the oncoming lane.

The proposal would also result in other notable benefits including improvements to network reliability and traffic flow, the condition of the existing Heathcote Road bridge, drainage infrastructure and fauna connectivity.

The proposal is justified as these long-term benefits are considered to outweigh the expected costs and impacts of the proposal, including the temporary impacts on traffic, noise and vibration and water quality during construction. The proposal design and construction methodology are also being refined to further reduce impacts. For example, it is likely that some construction activities could be completed under night road closures to maintain access during the day and minimise traffic impacts.

Alternative strategic options would cost significantly more money, be more challenging to design, take longer to construct and would have greater potential environmental impacts than bridge widening. These options would also result in very similar safety and traffic flow benefits to a bridge widening in the short-term as the main issues currently observed appear to be as a result of vehicles navigating the narrow lanes of the Heathcote Road bridge, which acts as a 'pinch point'. Therefore, these alternative strategic options would only be justified if a significant growth in traffic volumes or continued higher than average crash risks experienced in the future. The need for these strategic options in the future will be explored further as part of the separate investigations into the long-term feasibility of the duplication of Heathcote Road from the Avenue at Voyager Point up to its intersection with the Princes Highway at Engadine. These investigations will be carried out as part of the $35 million in additional funding announced in November 2020.

The components that would be constructed as part of the widened bridge structure for the proposal have been designed to satisfy a 100 year design life. The proposal includes repair and maintenance work to improve the condition and increase the life of the existing bridge structure. This includes replacement of all bridge bearings and expansion joints, repairing areas of concrete cracking and spalling and application of an anti-carbonation coating on the bridge to improve concrete durability.

The proposal is for the purpose of safety improvements and would not generate additional traffic travelling on the bridge, therefore no adverse impacts on the traffic performance of the bridge are expected. The traffic capacity of the bridge and wider road corridor into the future would be given consideration as part of the Heathcote Road duplication investigation works being separately developed.

3.5.3 Traffic and transport

Construction impacts

Issue description

Sutherland Shire Council raised several comments regarding the traffic impacts during construction:

- requests a report on the impacts of a six-month closure of the bridge on traffic movements and the amenity of residents in the Sutherland Shire
- notes the REF refers to a worst-case scenario of needing to temporarily close Heathcote Road for a period of six months with construction and emergency vehicle access only and that the proposed detour route is 20 kilometres long with increased traffic volumes of about five to 10 per cent and increased travel times of between 25 to 35 minutes
- the REF does not quantify the increased congestion and delays that the closure will have on motorists who normally use sections of the proposed detour route, particularly at already congested intersections.

Response

Transport for NSW has developed the preferred concept design with serious consideration regarding the need to minimise traffic impacts and road closures. As such, a concept design has been developed for the proposal that is largely deliverable keeping day time road closures during peak traffic periods to a minimum, where possible.

Transport for NSW is continuing to investigate ways to refine the construction methodology to further eliminate the need for a continuous road closure during peak traffic periods to minimise traffic impacts. Transport for NSW is also consulting with the Transport Management Centre to minimise any additional cumulative traffic delays associated with other planned road upgrades along the proposed detour route or traffic delays within the wider road network.

In addition, Transport for NSW is developing performance-based initiatives that could be incorporated in the construction delivery contract to encourage innovation in the construction methodology and further reduce the likelihood of peak traffic period road closures.

In the unlikely event that a continuous long term road closure is required, Transport for NSW would carry out further traffic modelling to accurately quantify these impacts and assist in the management of traffic. This would include consideration of any increased congestion and delays on sections of the proposed detour route.

Cumulative impacts

Issue description

Sutherland Shire Council commented that it is vital that the Princes Highway, Kirrawee and the Linden Street Upgrade projects are completed prior to any peak period closures of Heathcote Road. Transport for NSW has advised they intend to do so, however, Council is concerned that the current timelines for these projects would not allow it to occur.

Response

As discussed in Section 2.4.2, Transport for NSW acknowledges that there is the potential for some construction activities for the proposal to occur at the same time as work for other nearby road upgrade projects, including the Princes Highway Upgrade, Kirrawee and Linden Street Upgrade projects.

Transport for NSW are seeking to manage the risk of cumulative traffic impacts by continuing to consult with the Transport Management Centre and project teams of nearby road upgrade projects, to identify additional management measures that can be implemented such as alternative delivery strategies or scheduling of construction work, as required. Transport for NSW are also continuing to refine the construction methodology to avoid or minimise the need for full road closures during peak traffic periods.

3.5.4 Consultation

Request for additional consultation

Issue description

Sutherland Shire Council raised several comments requesting additional consultation:

- Council's role as a key stakeholder in this project is understated in the REF
- the REF makes no reference to Council's stated position, on behalf of the local community, to have an informed debate on more significant improvements to the road and bridge
- Council is concerned that a lack of opportunity will be provided to review specific environmental impacts in more detail and for the community to be advised and consulted in an informed manner
- Council is willing to work in a collaborative manner with Transport for NSW to reduce road trauma and achieve an optimum public safety outcome for the community and looks further to further discussions regarding noise management and other environmental Impacts.

Response

Sutherland Shire Council has mention as a key stakeholder for the proposal in Section 5.5 of the REF. In addition, the REF acknowledges the *Sutherland Shire Local Strategic Planning Statement,* which was released by Sutherland Shire Council in September 2020, and discusses how the proposal aligns with the planning priorities outlined in this statement (refer to Section 2.1.3 of the REF).

Transport for NSW arranged a briefing meeting with Sutherland Shire Council on 1 February 2020 during public display of the REF to provide Council representatives the opportunity to ask questions to the project team for the Heathcote Road bridge widening and discuss any concerns regarding the proposal. The feedback raised during this meeting has and will continue to be considered during development of the proposal, with an aim to achieve a positive outcome for the local community.

Transport for NSW will maintain communication with Sutherland Shire Council during future stages of the proposal on the key issues that Council have identified, including provision of updates as required.

3.5.5 Biodiversity

Mitigation measures

Issue description

Sutherland Shire Council queried whether the Vegetation Offset Guide (DMS-SD-087 V2.1), which is typically used where 'statutory' offsets are not incurred, applies for the proposal.

Response

Transport for NSW has committed to offset the biodiversity impacts of the proposal in accordance with the most recent *Guideline for Biodiversity Offsets* (Transport for NSW, 2016), which is the most relevant biodiversity policy guide applicable to this proposal. The Vegetation Offset Guide is a separate sub-procedure that is often applied to rail activities.

Further detail on the offset strategy for the proposal, including the species for which offset would be provided, is provided in Section 2.5.5.

3.5.6 Noise and vibration

Construction impacts

Issue description

Sutherland Shire Council raised several comments regarding the noise and vibration impacts during construction of the proposal, including that:

- noise is recognised as a high priority for management
- noise levels are predicted to range up to 50 dBA to 70 dBA in adjacent residential areas, which is up to a 15 dBA to 25 dBA increase or a more than doubling of the existing noise perceived by residents in the area at night
- it is noted in the REF that vibration levels will not reach maximum levels for residents situated at least 500 metres away, however, Figure 6.9 shows vibration levels will still be above preferred levels for night time operations
- while Council welcomes the proposed approach to use night-time road closures from 8.30 pm to 5.00 am to minimise traffic impacts, this approach also raises concern that noise impacts on surrounding residents will be worsened and impact would potentially exceed guideline thresholds.

Response

The Heathcote Road bridge is surrounded by steep cliffs, due to its location within the Woronora River valley, and has limited visibility to the surrounding residential areas. The nearest residence to the proposal is around 390 metres in Fairview Avenue, Engadine and at higher elevations.

The potential noise impact of key construction activities used the *Noise Estimator Tool,* which is a conservative approach as it is based on a 2D distance between a receiver and construction activity (the 'true' distance would generally be further due to the topography) and does not account for noise attenuation due to dense bushland or different elevations. Therefore, the noise levels experienced in reality by surrounding residents are likely to be lower than predicted. The noise assessment would also be further refined during pre-construction as part of the development of the CEMP. This would incorporate specific information on construction programming, plant and methodologies and would be used to develop detailed noise management measures within the Noise and Vibration Management Plan.

Construction noise would be managed in accordance with the *Construction Noise and Vibration Guideline* (CNVG; Roads and Maritime Services, 2016), which specifies several standard mitigation measures as well as the need to consider additional mitigation measures for sensitive receivers who are predicted to experience noise levels that would exceed the adopted criteria. Construction verification monitoring would be carried out to confirm accurate construction noise levels and assess the performance of the implemented mitigation measures.

The vibration assessment in the REF also applied conservative assumptions. Due to the substantial distance to residential receivers from the main construction activities, vibration impacts to surrounding residences are considered unlikely in reality. The potential for vibration related impacts would be confirmed as part of the Vibration Risk Assessment, which would include further review of the ground strata, the specific location of works and incorporating changes in elevation. The Vibration Risk Assessment would provide recommendations on feasible and reasonable mitigation measures such as validation monitoring, specific notifications and alternative construction equipment or methodologies.

Mitigation measures

Issue description

Sutherland Shire Council queried what measures will be applied to monitor impacts of ground vibration during works on Aboriginal heritage sites.

Response

The specific measures to be implemented to minimise the potential for vibration impacts on heritage sites would be confirmed in the Vibration Risk Assessment. This would involve a review of opportunities to use less vibration intensive construction equipment, locate construction activities further away from sensitive sites and/or implement validation monitoring during construction.

3.5.7 Water quality and soil

Construction impacts

Issue description

Sutherland Shire Council raised several comments regarding the water quality and soil impacts expected during construction of the proposal including that:

- there is huge potential for irreversible harm to be done to the aquatic habitats of the Woronora River given the level and duration of construction proposed
- Council has concerns on potential impacts to the aquatic and terrestrial food webs
- the construction, design and deconstruction details of the temporary access is lacking in the REF and more details are requested to be provided including details on the likely impacts on the flow of water, measures to prevent erosion of the creek bed and walls, physical and engineering specifications and methods of removal and rehabilitation.

Response

As discussed in Section 2.6.1, the design and construction methodology for the proposal has been developed in consideration of the need to minimise surface water quality impacts, particularly any long-term impacts on the aquatic habitats of the Woronora River.

This included preliminary calculations in accordance with the Revised Universal Soil Loss Equation (refer to Appendix F of the REF), that were prepared by a water quality specialist, to inform the assessment of potential water quality and soil risks and mitigation measures.

The biodiversity assessment included consideration of the potential construction and operational impacts on aquatic habitat. This included preparation of assessments of significance for protected aquatic species such as the Macquarie Perch, Australian Grayling and Sydney Hawk Dragonfly, which concluded that the proposal is not expected to result in significant impacts to aquatic species or their habitats. The need to avoid long-term impacts on the Woronora River is a key reason for the selection of the preferred widening methodology using headstock expansion with supports connected the existing bridge piers as this would not require any new permanent structures within the Woronora River and minimises the amount of construction work above waterways. During operation, the proposal would also provide new and improved drainage infrastructure within the proposal area.

The requested detail on the temporary access track design would be developed as part of the detailed design and pre-construction phase of the proposal. The detailed design of the temporary waterway crossing will continue to be developed in consultation with DPI Fisheries as well as specialist ecologist and soil conservation experts. The design would include appropriate pipe outlets, scour protection and flood immunity to minimise impacts on the Woronora River. Any potential impacts on aquatic habitats would be

temporary, as the waterway crossing structure would be removed and the access track and laydown area would be rehabilitated after construction to return the disturbed areas to pre-existing conditions.

Impacts on water quality and soil associated with construction of the proposal would also be managed in accordance with the Soil and Water Management Plan, which would be developed by a suitably qualified soil conservationist and include erosion and sediment control measures, specific measures for the rehabilitation of the temporary access, progressive soil stabilisation plans as well as any mitigation measures recommended by DPI Fisheries (refer to Section 3.3.2). Ecologists would also be present during certain phases of construction to contribute to best practice in accordance with the TfNSW Guideline, '*Biodiversity Guidelines for protecting and managing biodiversity on RMS projects, 2011*'.

Mitigation measures

Issue description

Sutherland Shire Council raised several comments regarding the water quality and soil mitigation measures proposed including that:

- there are no specifics given for any surface water monitoring in the REF such as the frequency, sample locations or proposed methods
- the proposed upper limit for salinity is 2200 µS/cm, which is considerably higher than the average electrical conductivity for the Woronora River at this location calculated from the last five years of data from Council's water quality monitoring program at 170 µS/cm
- given the sensitive nature of the construction site, the potential presence of threatened species and the area being listed as key fish habitat, a detailed water quality monitoring program should be made public prior to commencement
- Appendix E of the REF has a set of water quality objectives, however no information is provided on how Transport NSW plans to monitor to ensure those objectives are met
- the REF has clearly identified the potential impacts due to soil erosion, deposition and potential sources of contamination but has not provided any mitigation measures
- Council would appreciate the opportunity to comment on the specific mitigation measures to be implemented.

Response

A preliminary water quality assessment was completed as part of the REF in accordance with the *NSW Soils and Construction – Managing Urban Stormwater Volume 1 "the Blue Book"* (Landcom, 2004). From this a commitment was made to complete visual water quality monitoring. Any need for more detailed monitoring and applicable criteria would be subject to further assessment and input from a soil conservationist expert during detailed design.

For the purposes of this proposal, water quality objectives (WQOs) and river flow objectives (RFOs) were adopted from the Uncontrolled Streams WQOs and RFOs for the Georges River catchment. The salinity (electrical conductivity) for lowland rivers is noted to be between 125 to 2200 µS/cm. Transport for NSW notes Council's water quality monitoring data which shows salinity to be around 170 µS/cm.

Impacts on water quality and soil associated with construction of the proposal, such as the potential for soil erosion, deposition and localised contamination, would be managed in accordance with a Soil and Water Management Plan (SWMP). The SWMP would be developed by a suitably qualified soil conservationist prior to construction and would include detailed procedures and plans to manage impacts on water quality and soil, such as Erosion and Sedimentation Control Plans (ESCPs). The SWMP would also address the following:

- *RMS Code of Practice for Water Management, the RMS Erosion and Sedimentation Procedure*

- The *NSW Soils and Construction – Managing Urban Stormwater Volume 1 "the Blue Book"* (Landcom, 2004) and Volume 2A (DECC, 2008)
- *RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011*
- *RTA Technical Guideline: Environmental Management of Construction Site Dewatering, 2011*

Transport for NSW would provide updates to Sutherland Shire Council to inform Council on the progress of detailed design for the proposal.

3.5.8 Other issues

Visual impacts

Issue description

Sutherland Shire Council commented that details are needed on how the proposed use of shotcrete and other man-made materials would be viewed against the backdrop of native vegetation and natural rock as well as how the temporary access would be remediated.

Response

Section 6.9.3 of the REF provides an assessment of the potential visual impacts of the proposal, which includes consideration of the shotcrete and man-made materials in the context of the existing bushland setting.

The potential visual impacts of these new elements would be minimised in accordance with an Urban Design Plan for the proposal, which would be prepared in accordance with relevant guidelines, including:

- *Beyond the Pavement urban design policy, process and principles* (TfNSW, 2020g)
- *Landscape Guideline* (RTA, 2008)
- *Bridge Aesthetics* (TfNSW, 2019)
- *Shotcrete Design Guideline* (Roads and Maritime, 2016b).

Aboriginal heritage impacts

Issue description

Sutherland Shire Council commented that they would like to discuss the management of Aboriginal cultural heritage with Transport for NSW and notes the sensitivities associated with this aspect.

Response

Transport for NSW made direct enquiries with Council regarding this point within their submission to clarify the issue and have directly responded to close out the query with no further action required.

Air quality impacts

Issue description

Sutherland Shire Council commented that the REF does not address potential air quality impacts, especially with respect to dusts and particulates $PM_{2.5}$ and PM_{10} generated during construction, and that the production of the Air Quality Management Plan should be given high priority.

Response

Section 6.11.1 of the REF provides an assessment on potential air quality impacts from the proposal, including consideration of generation of dust and gaseous emissions from construction activities. However,

these impacts would be minor, localised and unlikely to be noticeable at surrounding receivers given the large distance from the construction footprint to sensitive receivers and lack of public access to the construction site. Further quantitative assessment of the $PM_{2.5}$ and PM_{10} concentrations generated by construction activities or prioritisation of the Air Quality Management Plan over other environmental issues is not considered to be required.

Cumulative impacts

Issue description

Sutherland Shire Council commented that the community would incur similar impacts to the current proposal when the long-term solution is implemented and that the cumulative impacts may be greater than if only the long-term solution was implemented.

Response

It is acknowledged that there may be additional impacts on surrounding residences and road users if the longer-term solution (i.e. bridge duplication) goes ahead and requires a separate further upgrade of the Heathcote Road bridge. However, any additional cumulative impacts associated with this two-staged approach are considered justified given the greater need to deliver a safety upgrade of the Heathcote Road bridge and its approaches as soon as possible.

Environmental management framework

Issue description

Sutherland Shire Council raised several comments regarding the proposed environmental management framework for the proposal, including that:

- Council is generally satisfied that the environmental assessment has identified all the key environmental impacts and has proposed a framework for these impacts to be minimised, managed and mitigated, however the lack of detail currently available and to the deferral to future management plans means proper review is difficult at this time. Specific examples of the lack of detail provided in the REF includes:
    - noise management measures proposed - what type and where, and on whose land?
    - artificial habitat is to be created for microbats - what type, where and on whose land?
    - how further communication with the community would be undertaken - by what media and what frequency?
- the validity of the conclusions of the environmental assessment relies on the identified impacts being successfully managed
- management actions may also come with their own unintended impacts, such as noise mitigation measures that may compromise fauna movement and have biodiversity impacts
- the development of some management plans relies on further environmental assessment that is yet to be undertaken such as the Ground Vibration Management Plan which requires a further Vibration Risk Assessment to be carried out
- development of the management plans should be an integrated body of work and follow an overall environmental risk assessment so that the implementation of one plan does not compete or interfere with another plan and unintended environmental damage, delay and cost can be avoided
- Council has extensive local knowledge and would appreciate an opportunity to review an initial environmental risk assessment for the proposal
- Council has queries on what will be done, where, and for how long to manage impacts in accordance with the proposed management plans
- draft management plans that outline the broadly proposed measures should be provided as appendices to the REF so that more purposeful comments on the plans can be provided
- Council wants to provide input regarding the required contents of the proposed management plans prior to the REF being finalised.

Response

The REF provides the function of the environmental risk assessment for the proposal. Specific detailed risks and mitigation measures would be captured as part of the CEMP and associated sub plans. The role of the REF is to outline the broad management measures and best practice guidelines that would be adopted to manage potential environmental impacts and risks. The multiple specialist sub-plans would all be captured and guided by an overarching CEMP. The Transport for NSW Environment Manager would review all plans prepared to ensure that they do not provide conflicting advice and consider the management of impacts holistically. This would aim to minimise any potentially unintended impacts that may result from implementation of management measures.

The REF has assessed the potential construction and operational impacts of the proposal and concluded that significant impacts are unlikely. The REF assessment has been based on ‘worst case’ scenarios for some environmental issues to provide a conservative assessment of potential impacts and provide flexibility for ongoing design and construction methodology refinement.

The request for individual management plans, further details on how specific impacts are to be managed and specific construction methods relate to content that is not yet available as it is developed during the subsequent phases of development over detailed design and pre-construction stages. The individual

construction environmental management plans and sub-plans would be developed by a construction contractor and would incorporate further detail on the mitigation measures outlined in the REF and this submissions report. As such, draft plans were not prepared for the REF and are not available to include in this report. In particular, further detail on construction noise management measures would be outlined within the Noise and Vibration Management Plan (NVMP).

The REF includes a commitment for a Microbat Management Plan (MMP) to be prepared and implemented. The MMP is to be developed during detailed design with input from an ecologist that specializes in bats. As such, the requested details on the bat habitat would be subject to the specialist advice and the final solution would be outlined within the MMP. This would include details on the proposed number, locations, materials, and placement of artificial habitat as well as any monitoring and management required.

Sutherland Shire Council and the community would continue to be informed as the proposal progresses. This would include updates that would be provided via the project website, social media, email updates for registered stakeholders and local area letterbox notifications.

An initial assessment of vibration risks was prepared as part of the REF, which was based on conservative assumptions and a desktop review of geology and surrounding receivers. A more detailed vibration risk assessment would be carried out during pre-construction as part of the CEMP development once more design and construction details are confirmed. This would inform the preparation of a Ground Vibration Management Plan.

4. Environmental assessment

4.1 Biodiversity

4.1.1 Summary of additional study and consultation

The biodiversity assessment report prepared for the REF recommended further consultation with relevant experts and a targeted survey to determine the presence of *Hibbertia woronorana* within the proposal area. This recommendation is considered a precautionary approach, as this species is not currently listed as threatened under State or Commonwealth legislation, however there is potential for it to be listed as threatened in the future. This is because *Hibbertia woronorana* has a highly restricted distribution and limited number of records.

Accordingly, since public display of the REF, an additional targeted field survey and biodiversity assessment was carried out for the proposal by ecologists from NGH Consulting. The purpose of this field survey and assessment was to identify whether *Hibbertia woronorana* is present within the proposal area and/or the broader biodiversity study area, and if so, assess any potential impacts on this species.

4.1.2 Methodology

The additional targeted field survey and biodiversity assessment involved:

- background research to inform the survey methodology and better understand the descriptive features, habitat and ecological requirements for *Hibbertia woronorana,* which included reviewing:
    - *Notes on Hibbertia (Dilleniaceae) 8. Seven new species, a new combination and four new subspecies from subgen. Hemistemma, mainly from the central coast of New South Wales* (Toelken & Miller, 2012)
    - PlantNET
    - Lucid central
    - Atlas of Living Australia
    - BioNet database
- a targeted survey for *Hibbertia woronorana,* which was completed by two ecologists on 17 December 2020 and involved walking 10 metre transects of suitable habitat within the study area to collect field data and samples for botanical identification.

Figure 4-1 shows the survey effort carried out within the study area and proposal area. As per previous survey efforts for the proposal, the top of the high-rock cuttings along the Heathcote Road bridge approaches were unable to be safely accessed for survey.

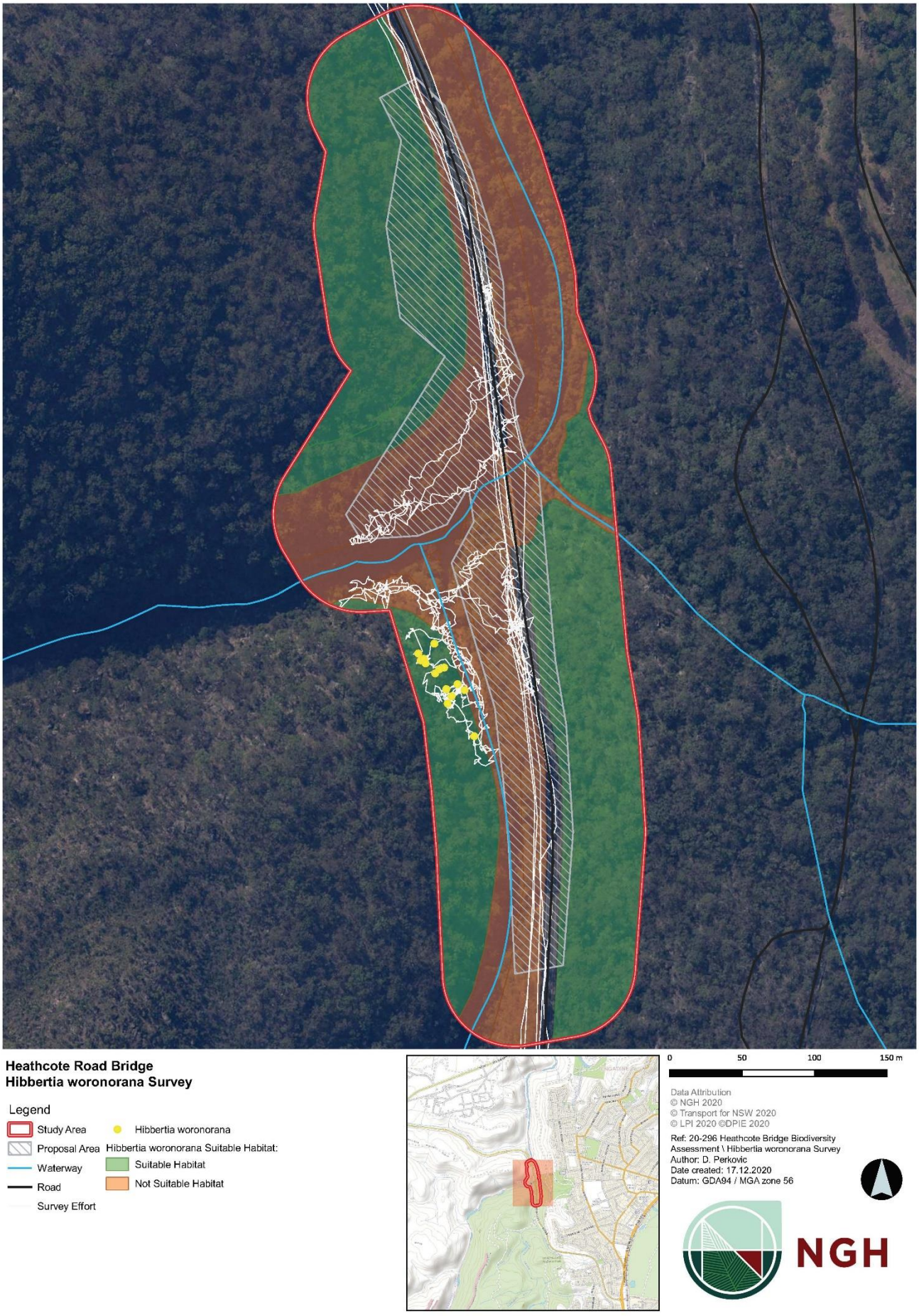

Figure 4-1 Summary of survey effort and results for *Hibbertia woronorana* survey

4.1.3 Description of existing environment

Hibbertia woronorana is in the Dilleniaceae family and is a multi-branched shrub that grows up to one metre tall (PlantNET 2011). The main branches and stems are stiff and woody with wiry branches. It flowers between September and December and produces singular, terminal flowers along the main shoots. The samples were found to have a glabrous calyx, a glabrous lamina <10 mm long and <1 mm wide, revolute margins, pungent bristle, and decurrent leaf bases. These features distinguish it from the more common and superficially similar *Hibbertia acicularis*. Figure 5-3 shows a photo of this species. *Hibbertia woronorana* has a restricted distribution around the mid and lower reaches of the Woronora River, south of Sydney.

The targeted field survey identified the presence of 44 individuals of *Hibbertia woronorana* within the biodiversity study area, which were all located on the opposite side of Heathcote Creek to the proposal (refer to Figure 4-1). No individuals of *Hibbertia woronorana* were identified within the proposal area itself.

All individuals were recorded on exposed, rocky sandstone slopes in thin sandy soils that were within vegetation mapped as PCT 1250: Sydney Peppermint-Smooth-barked Apple-Red Bloodwood Shrubby Open Forest on Slopes of Moist Sandstone Gullies, Eastern Sydney Basin (referred to as Coastal Sandstone Gully Forest). Figure 5-3 shows a photo of suitable habitat that was observed within the study area. This is consistent with the habitat description detailed within Toelken and Miller (2012).

Figure 4-1 above shows areas within the biodiversity study area that were assessed as suitable habitat for *Hibbertia woronorana* as well as areas that were surveyed and are not considered suitable habitat, such as the batters on the northern and southern approach.

All vegetation mapped as PCT 1250 within the study area was considered to be suitable habitat for *Hibbertia woronorana* due to the high condition of the vegetation resulting from low levels of weed invasion and disturbance. Vegetation mapped as PCT 1292 Water Gum-Coachwood Riparian Scrub Along Sandstone Streams, Sydney Basin, PCT 781 - Coastal Freshwater Lagoons of the Sydney Basin and South East Corner or exotic vegetation is not considered to be suitable habitat.

Figure 4-3 Photo of *Hibbertia woronorana*

Figure 4-3 Photo of suitable habitat for *Hibbertia woronorana*

4.1.4 Potential impacts

No individuals of *Hibbertia woronorana* were identified within the proposal area. All individuals identified in the study area occurred outside the proposal area and would not be impacted due to construction or operation of the proposal. However, due to access constraints, not all areas of potential habitat within the proposal area could be surveyed. Additional individuals of *Hibbertia woronorana* have the potential occur within the proposal area on top of the road cuttings either side of Heathcote Road bridge, which has conservatively been assessed as suitable habitat.

Up to 0.73 hectares of potential habitat for *Hibbertia woronorana* (PCT 1250) would be directly impacted during construction of the proposal. However, it is noted that the vegetation within PCT 1250 located closest to the existing road is likely to contain weeds and be of lower quality habitat. Indirect impacts such as erosion and sedimentation and the invasion and spread of weeds also have the potential to occur as a result of the proposal.

A Test of Significance for potential impacts to *Hibbertia woronorana* has been carried out in accordance with the BC Act (refer to Appendix B). This has concluded that, should individuals of the species be impacted by the proposal, the impact is not considered likely to be significant as extensive areas of suitable habitat occur within the locality (including a known population of the species occurring within the study area that would not be impacted). The potential for impacts would also be minimised through implementation of mitigation measures such as further targeted surveys, erosion and sediment management and the control of weeds.

4.1.5 Revised safeguards and management measures

Table 4-1 outlines the additional safeguards and management measures that have been recommended for the proposal as a result of the additional biodiversity field survey and assessment.

Table 4-1 Additional safeguards and management measures for biodiversity

Impact	Environmental safeguard	Responsibility	Timing	Reference
Potential impacts to *Hibbertia woronorana* and unrecorded threatened species	Targeted biodiversity surveys will be conducted prior to vegetation clearance within areas that were unable to be previously surveyed due to access restrictions, including within and above the high rock cuttings. These surveys will focus on confirming the presence or absence of *Hibbertia woronorana* and other threatened species within proposal area, and if present, record the number and location of individuals present. If individuals are recorded within the proposal area, the design and construction methodology will be reviewed to avoid or minimise impacts, where feasible and reasonable.	Transport for NSW / Contractor	Detailed design / Construction	Additional safeguard
Potential spread of weeds	Declared priority weeds (if detected) will be managed according to the requirements of the *Biosecurity Act 2015*. To fulfil this requirement all priority weeds requiring removal will need to be disposed of at a registered waste management facility.	Contractor	Construction	Additional safeguard

5. Environmental management

The REF for the Heathcote Road bridge widening identified the framework for environmental management, including safeguards and management measures that would be adopted to avoid or reduce environmental impacts (Chapter 7 of the REF).

After consideration of the issues raised in the submissions and additional biodiversity assessment carried out for the proposal, the safeguards and management measures have been revised. This includes revisions to the mitigation measures relating to:

- Traffic and transport, including more detail regarding the commitment to minimise road closures during peak traffic periods and consultation with additional stakeholders regarding access changes
- Biodiversity, including specific requirements to conduct targeted biodiversity surveys within areas that were unable to be previously accessed and to review opportunities to reuse felled timber and a commitment to offset the biodiversity impacts in accordance with the *Guideline for Biodiversity Offsets* (Transport for NSW, 2016)
- Soil and water, including more specific requirements for the management of stockpiles and erosion and sedimentation controls during construction as well as the need to notify DPI Fisheries and the Environmental Protection Authorities in the case of any fish kills
- Hydrology and flooding, including the need to consider flood risks to the proposal as well as to consult further with DPI Fisheries during the detailed design of the temporary water crossing
- Land use and property, including the need to consult with directly affected residents
- Hazards and risk, including the need to consider bushfire resilience during detailed design
- Cumulative impacts, including the commitment to consult with the project teams for the Linden Street Upgrade and Princes Highway Upgrade, Kirrawee and consider opportunities for alternative delivery methods.

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

5.1 Environmental management plans (or system)

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

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

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by 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 *G39 Soil and Water Management (Erosion and Sediment Control Plan),* QA Specification *G40 – Clearing and Grubbing* and QA Specification *G10 – Traffic Management.*

5.2 Summary of safeguards and management measures

The REF for the Heathcote Road bridge widening 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 proposal (refer to Chapter 7 of the REF) have been revised. Should the proposal proceed, the environmental management measures in Table 5-1 would guide the subsequent phases of the proposal.

Additional and/or modified environmental safeguards and management measures to those presented in the REF have been **underlined** and deleted measures, or parts of measures, have been **struck out**.

Table 5-1: Summary of environmental safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • any requirements associated with statutory approvals • details of how the project will implement the identified safeguards outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.	Contractor/ Transport for NSW project manager	Pre-construction/ detailed design	Core standard safeguard
GEN2	General - notification	All businesses, residential properties and other key stakeholders (e.g. schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor/ Transport for NSW project manager	Pre-construction	Core standard safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular 'toolbox' style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include*:* • areas of Aboriginal and non-Aboriginal heritage sensitivity • threatened species habitat • noise and vibration management	Contractor/ Transport for NSW project manager	Pre-construction/ detailed design	Core standard safeguard
TT1	Traffic and transport impacts	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the *Traffic Control at Work Sites Manual* (Transport for NSW, 2020) and *QA Specification G10 Control of Traffic* (Roads and Maritime, 2008). The TMP will include: • confirmation of haulage routes and any Transport Management Centre requirements • measures to maintain access to local roads and properties and minimise the potential for 'rat-runs' to form on local roads during road closures • site specific traffic control measures (including signage) to manage and regulate traffic movement • measures to maintain pedestrian and cyclist access • requirements and methods to consult and inform the local community of impacts on the local road network • access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • a response plan for any construction traffic incident	Contractor	Detailed design / pre-construction	Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• 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.			
TT2	Travel time impacts	Transport for NSW will investigate alternative construction methodologies and design innovations **to minimise the need for road closures during peak traffic periods (including school drop-off and pick-up periods). Transport for NSW will also seek to** minimise the duration of **continuous full** road closures required during construction.	Transport for NSW	Detailed design	Additional safeguard
TT3	Changed traffic conditions	**Emergency Services, Sutherland Shire Council and** the community will be notified in advance of any road closures and the likely disruptions to access in accordance with the Community and Stakeholder Engagement Plan. Adequate advisory and warning signage will be provided to inform motorists of the road conditions ahead including any road closure and/or detour route.	Contractor	Construction	Additional safeguard
TT4	Emergency vehicle and key stakeholder access	Access will be maintained for **private properties,** emergency response vehicles, NPWS staff and utility providers at all times, where possible. **This will include maintaining access to the Pipeline and Scouters Mountain fire trails, as required.** If a stage of the work restricts access along Heathcote Road, alternative arrangements will be developed in consultation with the relevant stakeholders in advance.	Contractor	Construction	Additional safeguard
TT5	Road closures and detours	Temporary traffic diversions and road closures will be implemented in consultation with and in accordance with the Transport Management Centre requirements.	Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
TT6	Road closures and detours	Prior to any proposed road closures Transport for NSW will consult with ANSTO to provide early notification of works and to investigate collaborative efforts to minimise impact to nuclear medicine deliveries.	Transport for NSW	Pre-construction	Additional safeguard
TT7	**Enforcement of speed limits**	**Transport for NSW will consult with the NSW Police Force to discuss traffic management and enforcement of temporary / permanent speed limits, as required.**	**Transport for NSW**	**Construction / operation**	**Additional safeguard**
TT8	**Road closures**	**Transport for NSW will consider incorporating performance-based initiatives in the construction delivery contract to encourage innovation in the construction methodology and reduce the likelihood of peak traffic period road closures.**	**Transport for NSW**	**Pre-construction**	**Additional safeguard**
TT9	**Traffic impacts of road closures**	**In the event that a continuous long term road closure is required, Transport for NSW would undertake further traffic modelling to accurately quantify these impacts and assist in the management of traffic. This would include consideration of any increased congestion and delays on sections of the proposed detour route.**	**Transport for NSW**	**Pre-construction**	**Additional safeguard**
TT10	**Traffic impacts on Shire Christian School**	**Transport for NSW will consult with Shire Christian School prior to implementation of the proposed detour route in relation to traffic impacts and identify additional safeguards and management measures, as required.**	**Transport for NSW**	**Pre-construction / construction**	**Additional safeguard**

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV1	Noise and vibration impacts	A Construction Noise Management Plan (CNMP) would be prepared as part of the CEMP. This plan would include but not be limited to: • a map indicating the locations of sensitive receivers including residential properties • a quantitative noise assessment based on the detailed design of the proposal in accordance with the EPA *Interim Construction Noise Guidelines* (DECC, 2009) • management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of EPA *Interim Construction Noise Guidelines* (DECC, 2009), including specific mitigation measures for truck movements • a risk assessment to determine potential risk for activities likely to affect receivers (for activities carried out during and outside of standard working hours) • a process for assessing the performance of the implemented mitigation measures such as a program of noise monitoring for sensitive receivers • a process for documenting and resolving issues and complaints • a construction staging program • a process for updating the plan when activities affecting construction noise and vibration change • an outline of the content for toolbox talks regarding noise management	Contractor	Detailed design/ pre-construction	Standard safeguard Section 4.6 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV2	Noise and vibration impacts	All sensitive receivers (i.e. local residents) likely to be affected will be notified at least seven days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • the project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information	Contractor	Detailed design / pre-construction	Noise and vibration
NV3	Vibration impacts	During detailed design and pre-construction, a Vibration Risk Assessment is to be completed and as a minimum will involve: • identifying construction ground vibration criteria, including applicable criteria for Aboriginal and Non-Aboriginal heritage features and ANSTO • identifying the ground type and topography in the vicinity of the works location (in terms of its susceptibility to ground vibration) • identifying and describing the potentially affected properties and heritage features which may be impacted by ground vibration during construction • consulting with ANSTO to confirm the location of any vibration sensitive equipment • identifying the types of activities to be carried out, the machinery and equipment to be used, including the predicted vibration emission levels from each plant and their corresponding buffer distances • reviewing the construction methodology and identifying discrete work activities with the potential to affect identified buildings or heritage features	Transport for NSW / Contractor	Detailed design/ pre-construction	Standard safeguard Section 4.6 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• assessing the potential vibration impacts on building structures and heritage features. • reviewing predicted vibration emissions against construction criteria • providing a map indicating the heritage features / buildings on adjacent properties considered likely to be impacted by ground vibration • detailing which features of the natural and built environment require condition inspections • identifying mitigation measures to be incorporated during construction to address ground vibration impacts including assessment of 'at-source' mitigation measures • evaluating the potential reductions that could be achieved with the application of recommended measures • evaluating the use of a fixed vibration monitoring system which would appropriately warn plant operators (i.e. flashing light, audible alarm, SMS) when vibration levels approach established criteria limits			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NV4	Vibration impacts	A Ground Vibration Management Plan is to be prepared incorporating outcomes of the Vibration Risk Assessment and incorporated into the CEMP. As a minimum the plan must include: • identification of all potentially affected properties or features of the natural/built environment and show on a map • identification of all vibration generating tasks, duration and predicted vibration levels • a schedule of properties or features of the natural/built environment where condition inspections are required to be undertaken (based on the Vibration Risk Assessment) • locations and types of management measures to be implemented to reduce excessive ground vibration such as: o maximising the offset distance between high vibration plant items and nearby buildings o substitution by alternative equipment, plant and processes o screening or enclosures o restricted times when work is being carried out; o increased work setback distances o consultation with affected receivers; o orienting equipment away from vibration-sensitive areas o specific physical and managerial measures for controlling ground vibration to comply with the relevant OEH guidelines and best practice • a vibration trial to determine the dominant frequency of vibration	Transport for NSW/ Contractor	Pre-construction/ construction	Standard safeguard Section 4.6 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• vibration monitoring, reporting and response procedures including a short and long term ground vibration monitoring program to assess compliance with the identified criteria • procedures for notifying any residents or business premises about vibration-generating activities likely to affect buildings on their property • contingency plans to be implemented in the event of non-compliances and/or vibration complaints • procedures for regularly reviewing the effectiveness of the Vibration Management Plan including specific review in response to any exceedance events and when activities affecting construction vibration change • outline of the content for toolbox talks regarding vibration management			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B1	Biodiversity	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* (Roads and Traffic Authority NSW (RTA), 2011) and implemented as part of the CEMP. It will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • requirements set out in the *Landscape Guideline* (RTA, 2008) • pre-clearing survey requirements • **requirements for supervision of vegetation clearing activities** • procedures for unexpected threatened species finds and fauna handling, **including entering all fauna sightings during construction into BioNet within 28 days** • 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. • procedures for retention and reuse of felled timber • identification of trees to be cut to base to avoid grubbing • an outline of the content to be included in toolbox talks including exclusion zones and stop work procedures • a procedure to routinely review and update the plan	Contractor	Detailed design/ pre-construction	Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B2	Biodiversity	A Microbat Management Plan is to be developed by a suitably qualified microbat ecologist in consultation with Transport for NSW Biodiversity Officer. The Microbat Management Plan would be incorporated into the Flora and Fauna Management Plan. As a minimum, the plan is to include: • demonstrated consideration of the roosting and breeding season requirements of the target species • pre-clearing requirements for artificial habitat during pre-construction • requirements for changes to artificial habitat during each phase of bridge work • a detailed methodology for pre-clearing surveys to identify microbats within the bridge structure • a protocol for identification, capture, and relocation of microbats • a protocol for microbat exclusion **and provision of alternative housing for microbats during construction** • references to examples to demonstrate proven effectiveness of proposed management measures • reporting requirements including species identification, number, relocation actions, exclusion methods • a protocol to routinely review and update the plan	Transport for NSW	Detailed design/ pre-construction	Additional safeguard
B3	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal (including design refinements to retain hollow bearing trees) will be investigated during detailed design.	Contractor	Detailed design/ pre-construction	Additional safeguard
B4	Biodiversity	Transport for NSW will consult with relevant experts within DPIE to develop a site specific management plan for the newly described but as yet unlisted *Hibbertia woronorana*.	Transport for NSW	Detailed design/ pre-construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B5	Biodiversity/ fauna connectivity	During detailed design, the design of fauna connectivity features including arboreal fauna furniture, tie-in fencing **(including consideration of wing fencing, floppy-top and steel top fencing types)**, and landscape species selection would be further refined in consultation with suitably qualified ecologist, **DPI Fisheries** and Transport for NSW Biodiversity officer. Design is to include consideration of ~~**landscaping,**~~ refuge areas, **maximise opportunities for replanting, use of Koala feed trees in the landscape species selection** and natural substrates. **Transport for NSW will provide an update to key stakeholders (including NPWS, Sutherland Shire Council and relevant environmental organisations) with more detailed information on the design of the proposed fauna connectivity features, once the design has been refined.**	Transport for NSW	Detailed design/ pre-construction	Additional safeguard
B6	Biodiversity	The applicability of Koala signage within the local road corridor would be subject to further review during detailed design in consultation with Transport for NSW Biodiversity Officer.	Transport for NSW	Detailed design/ pre-construction	Consultation with NPWS

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
B7	Weed management	A weed management plan would be prepared in accordance with *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011) and incorporated into the Flora and Fauna Management Plan and would: • outline the requirement for a pre-clearing inspection by an ecologist identify the weeds on site • outline weed management priorities and objectives • identify sensitive environmental areas within or adjacent to the site • identify the location of weed infested areas • provide weed control methods including machinery hygiene procedures and disposal requirements • outline a monitoring program to measure the success of weed management • requirements for communication with local Council noxious weed representative	Transport for NSW	Detailed design/ pre-construction	Additional safeguard
B8	Maintaining fish passage	Transport for NSW will consult with DPI Fisheries during the development of detailed design and notify DPI Fisheries prior to the commencement of construction of the temporary waterway crossing.	Transport for NSW / Contractor	Detailed design/ construction	Additional safeguard
B9	**Potential for impacts to *Hibbertia woronorana* and unrecorded threatened species**	**Targeted biodiversity surveys will be conducted prior to vegetation clearance within areas that were unable to be previously surveyed due to access restrictions, including within and above the high rock cuttings.** **These surveys will focus on confirming the presence or absence of *Hibbertia woronorana* and other threatened species within proposal area, and if present, record the number and location of individuals present.**	**Transport for NSW / Contractor**	**Detailed design / Construction**	**Additional safeguard**

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		If individuals are recorded within the proposal area, the design and construction methodology will be reviewed to avoid or minimise impacts, where feasible and reasonable.			
B10	**Opportunities to re-use felled timber**	**Opportunities to reuse removed hollow bearing trees or other large felled timber within the proposal area will be considered in consultation with a suitably qualified ecologist.**	**Transport for NSW / Contractor**	**Detailed design/ construction**	**Additional safeguard**
B11	**Potential spread of weeds**	**Declared priority weeds (if detected) will be managed according to the requirements of the *Biosecurity Act 2015*. To fulfil this requirement all priority weeds requiring removal will need to be disposed of at a registered waste management facility.**	**Contractor**	**Construction**	**Additional safeguard**
SW1	Construction soil and water quality impacts	A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP in accordance with the requirements of RMS QA specification G38 prior to the commencement of construction. The SWMP would also address the following: • *RMS Code of Practice for Water Management, the RMS Erosion and Sedimentation Procedure* • The *NSW Soils and Construction – Managing Urban Stormwater Volume 1 "the Blue Book"* (Landcom, 2004) and Volume 2A (DECC, 2008) • *RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011* • *RTA Technical Guideline: Environmental Management of Construction Site Dewatering, 2011* The SWMP is to be developed by suitably qualified soil conservationist and would detail the following as a minimum:	Contractor	Detailed design/ pre-construction	Section 2.1 of QA *G38 Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• identification of catchment and sub-catchment areas, high risk areas and sensitive areas • sizing of each of the above areas and catchment • the likely volume of run-off from each road sub-catchment • direction of flow of on-site and off-site water • separation of on-site and off-site water • the direction of run-off and drainage points during each stage of construction • the locations and sizing of sediment traps such as sumps as well as associated drainage • dewatering plan which includes process for monitoring, flocculating, testing and dewatering water from site (i.e. sumps) • the staging plans, location, sizing and details of creek alignment and realignment controls for scour protection and bank and bed stabilisation including those used during construction and for long-term stabilisation • progressive Erosion and Sedimentation Control Plans (ESCPs) • a process to routinely monitor the weather forecast • preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather • procedure for routine visual water quality monitoring • identification of the construction water source • provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The SWMP is to identify all activities that have the potential to generate wastewater and include an assessment of the containment needs for each activity, including minimum requirements for impermeable containment setup.			
SW2	Construction erosion and sedimentation impacts	The Construction SWMP is to include preparation of Environmental Work Method Statements for all activities it has identified as high risk. The EWMS must as a minimum include: • a description of the work activity including any plant and equipment to be used • an outline of the sequence of tasks for the activity including interfaces with other construction activities • identification of any sensitive areas or exclusion zones • identification of potential environmental risks/impacts due to the work activity • specific safeguards and environmental management measures to reduce the identified environmental risk, including assigned responsibilities to site management personnel • a process for assessing the performance of the implemented mitigation measures • figures showing the work activities and proposed mitigation measures.	Contractor	Detailed design/ pre-construction	Section 3.2.4 of QA G36
SW3	Construction erosion and sedimentation impacts	An Erosion and Sedimentation Control Plan (ESCP) is to be developed by suitably qualified soil conservationist. As a minimum, the ESCP must be in accordance with the requirements of QA G38 specification, Soil and Water Management.	Contractor	Detailed design/ pre-construction	Section 2.2 of QA G38 *Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW4	Construction erosion and sedimentation impacts	A Stabilisation Plan is to be prepared and included in the SWMP. The stabilisation plan is to include but not be limited to the following: • identification and methodology of techniques for stabilisation of site • identification of area on site for progressive stabilisation • Identification of areas requiring stabilisation, including stockpiles and batters, exposed for a duration of two weeks or greater. For example covering with geotextile fabric, stabilised mulch, soil binder or spray grass. • identification of areas on site for progressive permanent stabilisation such as implementation of landscaping. Work areas are to be stabilised progressively during the works.	Contractor	Pre-construction / construction	Additional safeguard
SW5	Construction accidental spills	A site-specific emergency spill plan will be developed and included within the SWMP. This plan would be implemented during construction and include spill management measures in accordance with the Transport for NSW *Code of Practice for Water Management: Road Development 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 / construction	Section 4.3 of QA *G36 Environment Protection*
SW6	Construction accidental spills	All works directly above the waterway including on the bridge and scaffolding will be subject to an approved EWMS including details of minimum containment requirements, protocol to inspect and approve containment setup, and identification of activities requiring impermeable containment setup to prevent accidental spills into the river.	Contractor	Construction	Additional safeguard
SW7	Construction accidental spills	Emergency wet and dry spill kits would be kept on site at all times and all staff would be made aware of the location of the spill kit and trained in its use.	Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW8	Construction erosion and sedimentation impacts	All stockpiles would be designed, established, operated and decommissioned in accordance with the *Roads and Maritime Services Stockpile Site Management Guideline* (EMS-TG-10). **Any material removed from the waterway that is to be temporarily stockpiled on land is to be located well away from the waterway and be contained by appropriate sediment control measures.**	Contractor	Construction	Additional safeguard
SW9	Construction water quality impacts	A procedure for refuelling and storage of fuels, chemicals and liquids, is to be detailed within the SWMP. As a minimum this is to identify nominated storage areas, spill kit provisions including provision for aquatic spills and boom, minimum double bunding requirements, weather restrictions, flood event preparedness and visual monitoring.	Contractor	Construction	Additional safeguard
SW10	Construction water quality impacts	The crossing design and any potential cofferdam set up will be refined during detailed design to maintain fish passage through continued consultation with DPI Fisheries.	Contractor	Detailed design	Additional safeguard
SW11	Construction contamination impacts	In the event that indications of contamination are encountered (known and unexpected, such as odorous or visually contaminated materials), work in the area would cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate.	Contractor	Construction	Additional safeguard
SW12	Risk of tannins	Any mulch stockpiling is to be in accordance with *Environmental Direction – Management of Tannins from Vegetation Mulch (RMS,2012)*	Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SW13	Operational drainage, soil and water quality impacts	Detailed design will seek to minimise water quality impacts by incorporating the following design principles: • appropriate measures to mitigate any potential impacts to soil and water quality, including but not limited to scour protection, infiltration trenches, vegetated swales, geofabrics, lined channels • appropriate energy dissipation and scour prevention measures downstream of culverts and other drainage structures to minimise soil erosion.	Contractor	Detailed design	Additional safeguard
SW14	**Erosion and sediment impacts**	**Erosion and sediment mitigation controls are to be erected in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004) to prevent the entry of sediment into the waterway prior to any earthworks being carried out. Erosion and sedimentation controls are to be maintained for the duration of the works until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal.**	**Contractor**	**Construction**	**Additional safeguard – DPI Fisheries consultation response**
SW15	**Risk of impacts on fish**	**DPI Fisheries (1800 043 536) and the Environment Protection Authority (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the Environment Protection Authority for the works to proceed.**	**Contractor**	**Construction**	**Additional safeguard – DPI Fisheries consultation response**
HF1	Hydrology and flooding impacts from waterway crossing	The detailed design of the temporary waterway crossing will be developed in consultation with the Transport for NSW Senior Environmental Officer **and DPI Fisheries,** and include appropriate pipe outlets, scour protection and flood immunity to minimise impacts on hydrology and flooding. **DPI Fisheries will be provided an opportunity to review the 50% detailed design plans for in-water structures and abutment engineering.**	Transport for NSW	Detailed design	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
HF2	Hydrology and flooding	The final layout and detail of the drainage system including scour protection and operational WSUD features will be refined during detailed design in consultation with the Transport for NSW Senior Environmental Officer.	Transport for NSW	Detailed design	Additional safeguard
HF3	Hydrology and flooding impacts from waterway crossing	The Soil and Water Management Plan is to include but may not be limited to: • an outline of the works which are to occur in waterways including and temporary works • a profile of the waterways within which works are to occur e.g. ephemeral or permanent; creek or river • assessment of the flow regime of waterway such as flooding events • schedule and timing of works • work methodology including environmental controls • how Erosion and Sediment Control Plans would be managed and updated for the works in waterways	Contractor	Pre-construction/ construction	Additional safeguard
HF4	Hydrology and flooding impacts from waterway crossing	The temporary waterway crossing structure will be removed and the temporary access track and laydown areas will be rehabilitated as soon as practical to return the disturbed areas to pre-existing conditions.	Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
HF5	Flooding during construction	A flood action plan will be prepared to manage a potential flood event during construction and included as part of the CEMP. This plan will be implemented during construction and outline: • procedures to monitor rainfall and dam water releases that may influence river levels • what flood event would trigger the plan • evacuation procedures including a map indicating the area that is flood prone and the locations where to evacuate • procedures to reduce risk during a flood event including removal of all plant/equipment and stabilising exposed areas	Contractor	Pre-construction/ construction	Additional safeguard
HF6	**Flood risk**	**The detailed design of the proposal will include consideration of the potential risk of flooding events during construction and operation causing damage to infrastructure.**	**Transport for NSW and Contractor**	**Detailed design**	**Additional safeguard**
AH1	Aboriginal heritage	The Aboriginal archaeological site known as 'Scouters Mountain Engadine' (AHIMS 52-2-0742) will be clearly identified on design drawings with a five metre exclusion zone. Review of the detailed design at 80% and 100% development will be carried out in consultation with the Transport for NSW Environment Manager to confirm no encroachment within the exclusion zone.	Transport for NSW	Detailed design/ pre-construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
AH2	Aboriginal heritage	An Aboriginal Heritage Management Plan will be prepared and incorporated into the CEMP. This plan would include but not be limited to the following: • a map identifying locations of no-go areas, items or sites which are to be protected and those which are to be impacted. • identification of potential environmental risks/impacts due to the works/activities • management measures to avoid or minimise potential impacts, including any management measures identified in the Ground Vibration Management Plan. • outline of the content to be included in toolbox talks regarding management of Aboriginal heritage, including identification of no-go areas, any relevant permits and any responsibilities specified under the *National Parks and Wildlife Act 1974*. • a stop works procedure in the event of actual or suspected potential harm to a heritage feature/place. • the requirement to comply with *RMS Standard Management Procedure -Unexpected Archaeological Finds, 2012.*	Contractor	Detailed design/ pre-construction/ construction	Additional
	Aboriginal heritage	If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the Transport for NSW Aboriginal cultural heritage officer and regional environment manager contacted immediately. Steps in the Roads and Maritime *Standard Management Procedure: Unexpected Heritage Items* (Roads and Maritime, 2015) must be followed.	Contractor	Construction	Section 4.9 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NH1	Non-Aboriginal heritage - General	A Non-Aboriginal Heritage Management Plan would be prepared and included in the CEMP. This plan would include but not be limited to the following: • a map identifying locations of no-go areas, items or sites (including curtilages) which are to be protected and those which are to be impacted • identification of potential environmental risks/impacts due to the works/activities • management measures to avoid or minimise potential impacts, including any management measures identified in the Ground Vibration Management Plan. • outline of the content to be included in toolbox talks regarding management of Non-Aboriginal heritage, including identification of no-go areas, any relevant permits and any responsibilities specified under the *National Parks and Wildlife Act 1974*. • a stop works procedure in the event of actual or suspected potential harm to a heritage feature/place. • the requirement to comply with *RMS Standard Management Procedure -Unexpected Archaeological Finds, 2012.*	Contractor	Detailed design/ pre-construction/ construction	Additional
NH2	Non-Aboriginal heritage – Woronora River Bridge	Transport for NSW will continue to consult with Heritage NSW throughout the development of Heathcote Road Bridge Urban Design.	Transport for NSW	Detailed design	Additional
NH3	Non-Aboriginal heritage – Woronora River Bridge	Heritage reviews will be incorporated into the design and development process. Heritage reviews will be carried out in consultation with Transport for NSW Environment Manager at 30%, 80% and 100% detailed design stages.	Transport for NSW/ contractor	Detailed design	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NH4	Non-Aboriginal heritage – Woronora River Bridge	A Conservation Management Plan (CMP) will be prepared for the Woronora River Bridge to outline how the heritage fabric of Woronora River Bridge should be managed on an ongoing basis. This CMP will also consider the establishment of an extended heritage precinct for Woronora River Bridge, Kolara Weir and former recreation area, and the extant remains of Heathcote Creek bridge as an area of local and State heritage significance.	Transport for NSW/ contractor	Pre-construction/ operation	Additional safeguard
NH5	Non-Aboriginal heritage – Woronora River Bridge	During the detailed design process the following will be considered to limit impacts to the Woronora River Bridge: • retain as much of the original fabric of Woronora River Bridge where possible. • use of sympathetic colour shades and textures for steel paint finishes of the box girders and headstock extensions. • carry out colour and material matching for repair and maintenance works. • an appropriately qualified structural engineer to carry out an assessment of structural integrity for each element to be removed and/or replaced prior to removal as part of repair and maintenance works. Only replace elements which are at risk of failing. • salvage sandstone block facing from abutments and incorporate their use into the project or potential heritage precinct. • use of discrete fencing with hoarding or fabric for Woronora River Bridge during works.	Transport for NSW/ contractor	Detailed design/ operation	Additional safeguard
NH6	Non-Aboriginal heritage – Woronora River Bridge	Archival recording of the Woronora River Bridge and any associated infrastructure will be carried out prior to construction. To ensure total impacts are catalogued, an archival recording of the Woronora River Bridge is also recommended after the conclusion of works.	Contractor	Pre-construction/ operation	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
NH7	Non-Aboriginal heritage – Woronora River Bridge	If unexpected heritage item/s, archaeological remains or potential relics are uncovered during the works, all works would cease in the vicinity of the material/find and the *RMS Standard Management Procedure - Unexpected Archaeological Finds 2012* would be followed.	Contractor	Construction	Section 4.10 of QA *G36 Environment Protection*
LP1	Property acquisition	All property acquisition will be carried out in accordance with the *Land Acquisition Information Guide* (Roads and Maritime, 2012) and the *Land Acquisition (Just Terms Compensation) Act 1991.*	Transport for NSW	Pre-construction and construction	Standard safeguard
LP2	Property acquisition or lease of Crown Land	All property acquisition or leasing of Crown Land will be carried out in accordance with the *Crown Lands Management Act 2016* and *Crown Land Legislation Amendment Act 2017*.	Transport for NSW	Pre-construction	Additional safeguard
LP3	**Private property impacts**	**Transport for NSW will seek to consult with directly affected residents to identify their access requirements during construction and operation of the proposal.**	**Transport for NSW**	**Pre-construction and construction**	**Additional safeguard**
LP4	**Indirect impacts on Heathcote National Park**	**Transport for NSW will consider the *Guidelines for development adjacent to National Parks and Wildlife Service Lands* (National Parks and Wildlife Service, 2020) during preparation of the CEMP and associated sub-plans, including but not limited to the Noise and Vibration Management Plan, Flora and Fauna Management Plan and Soil and Water Management Plan.**	**Transport for NSW**	**Pre-construction**	**Additional safeguard**
V1	Landscape character and visual impact	The landscape and urban design strategy for the proposal will be reviewed during detailed design in consideration of the design principles and objectives as described in the *Heathcote Road Bridge Urban Design Concept* report prepared for the REF. An Urban Design Plan will be prepared to support the detailed design and will implemented as part of	Transport for NSW	Detailed design	Standard safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		the CEMP. The preparation of the Urban Design plan must involve as a minimum: • investigating opportunities to re-use sandstone features • integrating recommendations for fauna habitat and connectivity features and developing standard design drawings in consultation with the Transport for NSW biodiversity officer • refining scour protection designs • reviewing slope stabilisation works at 20, 80 and 100% detailed design in consultation with Transport for NSW Urban Design team to achieve a balance of safety and good design outcomes • investigating opportunities for incorporating WSUD features such as swales and considering their location, size and treatment so that they blend into the landform and landscape character • outlining the location and identification of existing vegetation and proposed landscaped areas, including species to be used • considering design treatments for built elements including retaining walls and bridges, shotcrete and other stope stabilisation measures and fixtures such as fencing and signs • refining staging of landscape work taking account of related environmental controls such as erosion and sedimentation controls and drainage • outlining procedures for monitoring and maintaining landscaped or rehabilitated areas.			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
V2	Landscape character and visual impact	The Urban Design Plan will be prepared in accordance with relevant guidelines, including: • Beyond the Pavement urban design policy, process and principles (Transport for NSW, 2020f) • Landscape Guideline (RTA, 2008) • Bridge Aesthetics (Transport for NSW, 2019) • Shotcrete Design Guideline (Roads and Maritime, 2016).	Transport for NSW	Detailed design	Standard safeguard
SE1	Socio-economic impact	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community and key stakeholders during construction. The CP will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions, including proposed detour routes • contact name and number for complaints. .	Contractor	Detailed design/ pre-construction	Standard safeguard
RW1	Resource use	The following resource management hierarchy principles would be followed: • avoid unnecessary resource consumption as a priority • avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) disposal would be undertaken as a last resort (in accordance with the *Waste Avoidance and Resource Recovery Act, 2001).*	Contractor	Detailed design/ pre-construction	*G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
RW2	Resource use and waste	A Resource and Waste Management Plan (RWMP) would be prepared, which would include the following (as a minimum): • the type, classification and volume of all materials to be generated and used on site including identification of recyclable and non-recyclable waste in accordance with *EPA Waste Classification Guidelines 2014* • quantity and classification of excavated material generated as a result of the proposal • interface strategies for cut and fill on site to ensure re-use where possible • strategies to 'avoid', 'reduce', 'reuse' and 'recycle' materials • classification and disposal strategies for each type of material • destinations for each resource/waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility • details of how material would be stored and treated on-site • identification of available recycling facilities on and off site • identification of suitable methods and routes to transport waste, including wastewater • procedures and disposal arrangements for unsuitable excavated material or contaminated material site clean-up for each construction stage	Contractor	Detailed design/ pre-construction	Section 4.2 of QA *G36 Environment Protection*
RW3	Waste	All waste would be managed in accordance with the *Protection of the Environment Operations Act 1997*.	Contractor	Detailed design/ pre-construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
RW4	Waste	Types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register.	Contractor	Detailed design/ pre-construction	Additional safeguard
AQ1	Air quality	An Air Quality Management Plan (AQMP) will be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: • potential sources of air pollution • air quality management objectives consistent with any relevant published EPA and/or EES/DPIE guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces.	Contractor	Detailed design/ pre-construction	Section 4.4 of QA *G36 Environment Protection*
CC1	Climate change effects	The potential impacts of climate change on the proposal, such as the increased potential for localised flooding and need for resilience against more severe and frequent extreme weather events, will be considered during detailed design.	Transport for NSW	Detailed design	Additional safeguard
CC2	Greenhouse gas emissions from material use and transport	Ways to reduce construction material requirements, source materials from local suppliers, re-use materials on-site and choose recycled materials or materials with low-embodied energies will be investigated during detailed design.	Transport for NSW / Contractor	Detailed design/ construction	Additional safeguard
CC3	Greenhouse gas emissions from equipment and vehicle use	Minimise equipment and vehicle idling and switch off when not in use to minimise unnecessary emissions and fuel consumption.	Constructor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
U1	Utilities	Prior to the commencement of work: • the location of existing utilities and relocation details will be confirmed following consultation with the affected utility owners • If the scope or location of proposed utility relocation work falls outside of the assessed proposal scope and footprint, further assessment will be carried out.	Contractor	Detailed design/ pre-construction	Standard safeguard
HR1	Hazards and risks	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks including (but not limited to): ○ weather restrictions for 'hot works' activities such as welding ○ handling and storage procedures for potentially hazardous chemicals and materials ○ measures to manage bushfire risk such as limitations on mulch stockpiling ○ procedures and adequate resources to prepare for and instantly respond to a spot fire • 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 • an Emergency Preparedness Plan that outlines contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations	Contractor	Detailed design/ pre-construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• procedures to routinely review and update the plan The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or DPIE publications.			
HR2	**Bushfire risk**	**The detailed design of the proposal will include consideration of bushfire resilience to minimise the risk of damage during operation.**	**Transport for NSW and Contractor**	**Detailed design**	**Additional safeguard**
CU1	Cumulative construction impacts	Other developers will be consulted in accordance with the Community Stakeholder and Engagement Plan to: • obtain information about project timeframes and impacts • manage the interfaces of the proposal's staging and programming in combination with the other projects occurring in the area • identify and implement appropriate safeguards and management measures to minimise cumulative impacts	Transport for NSW and Contractor	Pre-construction and construction	Additional safeguard
CU2	Cumulative traffic impacts	Transport for NSW will coordinate with the project team**s** for **nearby road upgrades including** the Linden Street upgrade **and Princes Highway Upgrade, Kirrawee,** and the Transport Management Centre, with regard to the proposed timing of the road and lane closures and **to** identify alternative routes or additional safeguards and management measures, as required. **Transport for NSW will also consider opportunities for alternative delivery methods, such as using the same contractor for nearby projects, where this may increase the ability for effective coordination between projects.**	Transport for NSW and Contractor	Pre-construction and construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
CU3	Cumulative construction impacts	The CEMP would consider potential cumulative construction impacts from known surrounding development activities (i.e. the Heathcote Road upgrade, Upgrading Linden Street, **Princes Highway Upgrade, Kirrawee,** New residential flat building at 5 Prestons Avenue Engadine and Refurbishment of Heathcote Hall) as well as new planned development activities near the proposal, as they become known. This would include a process to regularly review and update mitigation measures as new works are identified that may lead to cumulative impacts or if complaints are received due to cumulative impacts.	Transport for NSW and Contractor	Pre-construction and construction	Additional safeguard

5.3 Licensing and approvals

Table 5-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Fisheries Management Act 1994 (s199)	Notification to the Minister for Agriculture and Western NSW prior to any dredging or reclamation works.	A minimum of 28 days prior to the start of work.
Crown Land Management Act 2016 (Divisions 3.4, 5.5 and 5.6)	Lease or licence to occupy areas of Crown land.	Prior to start of the activity
Roads Act 1993 (Section 138)	A road occupancy licence would be obtained from the Transport Management Centre	Prior to start of the activity

6. References

Landcom 2004, *Soils and Construction – Managing Urban Stormwater Volume "the Blue Book.* <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/managing-urban-stormwater-soils-construction-volume-1-fourth-edition.pdf>.

National Herbarium of NSW 2011, *Hibbertia woronorana,* PlantNet (The NSW Plant Information Network System). Royal Botanic Gardens and Domain Trust, Sydney, accessed at **<***https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Hibbertia~woronorana***>.**

NGH Consulting 2020, *Heathcote Road Bridge Widening – Biodiversity Assessment Report.*

NGH Consulting 2021, *Re:20-296 Heathcote Bridge Widening – Hibbertia woronorana survey.*

NSW Government 2018, *Road Safety Plan 2021 – Towards Zero,* accessed at: <https://towardszero.nsw.gov.au/sites/default/files/2018-02/road-safety-plan.pdf>.

NSW Government 2020, *BioNet Species Sightings,* accessed at: <https://www.environment.nsw.gov.au/wildlifeatlas/about.htm>.

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

OEH 2016, The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 VIS_ID 4489.

Queensland Department of Transport and Main Roads 2010, *Fauna Sensitive Road Design Manual* Volume 2.

Roads and Maritime Services 2016a, Construction Noise and Vibration Guideline (CNVG). https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/construction-noise-and-vibration-guideline.pdf

Roads and Maritime Services 2016b. *Shotcrete design guideline: Design guideline to improve the appearance of shotcrete in NSW,* accessed at: *<https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/centre-for-urban-design/shotcrete-design-guidelines.pdf>.*

Roads and Maritime Services 2018, *Princes Highway Upgrade, Kirrawee,* accessed at: <https://www.rms.nsw.gov.au/projects/01documents/princes-highway-acacia-oak-kingsway-president/princes-hwy-acacia-oak-kingsway-president-project-update-2018-10.pdf>.

Roads and Maritime Services 2019, *Pacific Highway Woolgoolga to Ballina Upgrade Fauna Connectivity Strategy.*

Roads and Traffic Authority NSW 2011, *Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects,* accessed at: <https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/biodiversity_guidelines.pdf>.

Toelken H. R. & Miller R. T. (2012). 'Notes on *Hibbertia* (Dilleniaceae) 8. Seven new species, a new combination and four new subspecies from subgen. *Hemistemma*, mainly from the central coast of New South Wales', J. Adelaide Bot. Gard., Vol. 25, Pp. 71–96

Transport for NSW 2016, *Guideline for Biodiversity Offsets.*

Transport for NSW 2019a, *Heathcote Road intersection improvements,* accessed at: <https://www.rms.nsw.gov.au/projects/princes-hwy-heathcote-road-engadine/index.html>.

Transport for NSW 2019b, *Heathcote Road upgrade*, accessed at: <https://www.rms.nsw.gov.au/projects/heathcote-road-upgrade/index.html>.

Transport for NSW 2019c, *Speed limit lowered on Heathcote Road,* accessed at: <https://www.rms.nsw.gov.au/about/news-events/news/roads-and-maritime/2019/190411-speed-limit-lowered-on-heathcote-road.html>.

Transport for NSW 2020a, *Benefits Realisation Paper Gateway to the South: Heathcote Road and Princes Highway, Engadine*.

Transport for NSW 2020b, Heathcote Road bridge widening Review of Environmental Factors.

Transport for NSW 2020c, *Heathcote Road projects Transport for NSW fact sheet*, accessed at: <https://www.rms.nsw.gov.au/projects/01documents/heathcote-road-bridge/heathcote-road-factsheet-2020-12.pdf>.

Transport for NSW 2020d, *Investigation work on Linden Street, Sutherland,* accessed at <https://www.rms.nsw.gov.au/projects/01documents/linden-street-sutherland/linden-street-site-investigation-notification-nov-2020.pdf>.

Transport for NSW 2020e, *Upgrades to the Princes Highway at Kirrawee*, accessed at: <https://www.rms.nsw.gov.au/projects/01documents/princes-highway-acacia-oak-kingsway-president/princes-hwy-acacia-oak-kingsway-president-letter-dec-2020.pdf>.

Transport for NSW 2020f, *Crash and casualty statistics*.

Transport for NSW 2020g, *Beyond the Pavement: Urban design approach and procedures for road and maritime infrastructure planning, design and construction.* https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/centre-for-urban-design/beyond-pavement.pdf

Transport for NSW 2021a, *M6 – Stage 1,* accessed at: <https://www.rms.nsw.gov.au/projects/f6/index.html>.

Transport for NSW 2021b, *New contractor to complete upgrades on the Princes Highway in Sutherland Shire,* accessed at <https://www.rms.nsw.gov.au/projects/princes-highway-acacia-oak-kingsway-president/index.html>.

Transport for NSW 2021c, *Upgrading Linden Street, Sutherland,* accessed at <https://www.rms.nsw.gov.au/projects/linden-street-sutherland/index.html>.

Transport for NSW 2021d, *Plans for Heathcote Road bridge upgrade powers ahead,* accessed at <https://www.rms.nsw.gov.au/about/news-events/news/members-of-parliament/2021/210412-plans-for-heathcote-road-bridge-upgrade-powers-ahead.html>.

Appendix A

Summary of community respondents and where issues are addressed

Summary of community respondents and where issues are addressed

Submission No.	Respondent	Form of submission	Section number where issues are addressed
1	Private	Individual	2.2.1, 2.2.2, **Error! Reference source not found.**
2	Private	Individual	2.2.2, 2.2.3
3	Private	Individual	2.2.1, 2.2.5, 2.3.1
4	Private	Individual	2.2.1, 2.2.5
5	Private	Individual	2.2.1
6	Private	Individual	2.2.1, 2.2.5
7	Private	Individual	2.2.2, 2.2.3, 2.2.4, 2.2.5
8	Private	Individual	2.2.1, 2.2.2
9	Private	Individual	2.2.1, 2.2.2
10	Private	Individual	2.2.2, 2.2.3, 2.2.4
11	Private	Individual	2.2.3
12	Private	Individual	2.2.1, 2.3.3
13	Private	Individual	2.2.1
14	Private	Individual	2.2.1
15	Private	Individual	2.2.1, 2.2.2, **Error! Reference source not found.**
16	Private	Individual	2.2.1
17	Private	Individual	2.2.4, 2.3.4, 2.4.1
18	Private	Individual	2.2.2
19	Private	Individual	2.2.1, 2.2.2
20	Private	Individual	2.2.1, 2.2.2, 2.2.5
21	Private	Individual	2.2.2, 2.2.3, 2.7.2
22	Private	Individual	2.2.1, 2.2.2
23	Private	Individual	2.2.1
24	Private	Individual	2.2.1
25	Private	Individual	2.5.1, 2.5.4
26	Private	Individual	2.2.2, 2.2.3, 2.2.4

Submission No.	Respondent	Form of submission	Section number where issues are addressed
27	Private	Individual	2.3.3
28	Private	Individual	2.2.1, 2.2.3, 2.2.4, 2.3.7
29	Private	Individual	2.3.5, 2.3.6, 2.4.1
30	Private	Individual	2.3.4, 2.4.1, **Error! Reference source not found.**
31	Private	Individual	2.2.2, 2.2.4
32	Private	Individual	2.2.1, 2.2.2
33	Private	Individual	2.2.1, 2.2.2, 2.2.3, 2.2.5
34	Shire Christian School	Organisation	2.4.1, 2.7.1
35	Private	Individual	2.2.1, 2.2.2, 2.4.2, 2.6.3, 2.7.1
36	Private	Individual	2.2.1
37	Private	Individual	2.2.1, 2.2.2
38	Private	Individual	2.5.1, 2.5.5
39	Private	Individual	2.2.1, 2.3
40	Private	Individual	2.2.1, 2.2.2, 2.2.4
41	Private	Individual	2.2.3
42	Private	Individual	2.2.3
43	Georges River Environmental Alliance	Organisation	2.2.3, 2.3.2, 2.5.3
44	Sutherland Shire Environment Centre, National Parks Association Southern Sydney, Rewilding Sydney's Koalas, Woronora Valley Association Southern Sydney, Sandy Point Residents Association, Friends of the Royal, Oatley Flora and Fauna Conservation Society, Georges River Environmental Alliance	Organisation	2.2.3, 2.2.5, 2.3.2, 2.5.2, 2.5.3, 2.6.1, 2.6.2

Appendix B

Test of Significance (Biodiversity Conservation Act) for *Hibbertia woronorana*

Tests of Significance

Biodiversity Conservation Act 2016 Five-Part Test

The *Biodiversity Conservation Act 2016* (BC Act) specifies a set of five factors which must be considered by decision makers in assessing the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats. These factors are collectively referred to as the 'five-part test' or Test of Significance (ToS). A ToS has been undertaken for the following:

- *Hibbertia woronorana* (Not currently listed)

a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Within the *H. acicularis* group, a new subspecies has been described. It is not listed under the BC Act, but is restricted to the mid and lower reaches of the Woronora River, New South Wales. Growing on rocky sandstone slopes in sclerophyll forest comprised of *Angophora costata, Corymbia gummifera, Eucalyptus punctata and stringybark sp. in association with Allocasuarina littoralis, Doryanthes excelsa, Banksia serrata, Dodonaea triquetra, Platysace linearifolia, Epacris pulchella, Hakea dactyloides, Grevillea buxifolia, Grevillea diffusa, Acacia linifolia, Xanthosia tridentifera*. Highly restricted small localised populations within Heathcote National Park though locally common at some sites (R.T.Miller & J.Miller 69/18.iii.2007). Extremely vulnerable to disturbances, rare and possibly endangered downstream of the Needles.

Individuals of the species were identified within the study area, outside the proposal area. Suitable habitat for the species was identified within the proposal area and areas of this habitat were unable to be surveyed due to safety constraints. Approximately 0.73 ha of suitable habitat for the species, potentially containing individuals of the species, would be impacted by the proposal. This would have the potential to impact on the life cycle of individuals within the proposal area through direct impacts, however the viable local population of the species would be considered to occur within extensive areas of habitat outside of the proposal area, with individuals of the species known to occur within the study area. As such, the proposal is not considered to adversely affect the lifecycle of the species such that a viable local population would be placed at risk of extinction.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

ii. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A

c) In relation to the habitat of a threatened species or ecological community:

i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

i. The proposal will be removing 0.73 ha of potential habitat for *Hibbertia woronorana*.

ii. The area of suitable habitat is would not become more fragmented as a result of the proposal as the existing form of the habitat is divided by an existing road corridor. The habitat will become more isolated as a result of the proposal as the distance between habitat patches will be marginally increased.

iii. The proposal would directly impact 0.73 ha of suitable habitat for the species, however given the extensive area of suitable habitat within the locality, and the presence of individuals of the species within the study area, the habitat impacted is not considered important to the survival of the species in the locality.

d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

The study area does not contain a declared area of outstanding biodiversity value.

e) Whether the proposed development or activity is part of a key threatening process or is likely to increase the impact of a key threatening process.

The following key threatening process is relevant to the threatened flora species:

- Clearing of native vegetation

The clearing of native vegetation and construction of associated infrastructure for urban development is known to directly and indirectly impact on the lifecycle of threatened flora species.

Up to 0.73 ha of habitat would be removed, which will increase the impact of the above key threatening process. The mitigation measures outlined in this report would minimise potential risks to potential viable local populations including a targeted search to ensure that potentially overlooked individuals within the study area, are accounted for, prior to clearing works.

Conclusion

Whilst this species is not currently listed as a threatened species, this assessment has been undertaken as a precautionary measure, as its highly restricted distribution suggests it has potential to be listed in the future. *Hibbertia woronorana* was recorded within the study area during targeted surveys. Individuals and suitable habitat were found on the mid slopes of the Woronora River. Approximately 0.73 ha of suitable habitat will be directly impacted by the proposal. Some of this habitat occurs along the road corridor and is likely to be impacted by disturbance from the road which would reduce its suitability. Some recommendations have been made to reduce the risk of potential indirect impacts such as introduction of weeds, and erosion and sedimentation. As extensive areas of suitable habitat occur within the broader locality, and a population of known individuals are known to occur within the study area, the proposal is considered unlikely to have a significant impact *Hibbertia woronorana*.

Appendix C

Transcript from Facebook Live session

The **Facebook Live information session transcript** is available to be viewed *at the* **Heathcote Road virtual information centre**.

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