New England Highway bypass of Singleton
Review of Environmental Factors
Transport for NSW | December 2019
New England Highway bypass of Singleton
Review of Environmental Factors
Transport for NSW | December 2019

Prepared by AECOM Australia Pty Ltd and Roads and Maritime Services

On 1 December 2019, Roads and Maritime Services and Transport for NSW (TfNSW) joined together to create one integrated TfNSW to deliver better outcomes for customers and communities across NSW. All Roads and Maritime Services functions and responsibilities are transferred to TfNSW and any references to Roads and Maritime Services now legally mean TfNSW.

Copyright: The concepts and information contained in this document are the property of NSW Roads and Maritime Services. Use or copying of this document in whole or in part without the written permission of NSW Roads and Maritime Services constitutes an infringement of copyright.
Document controls

Approval and authorisation

<table>
<thead>
<tr>
<th>Title</th>
<th>New England Highway bypass of Singleton review of environmental factors</th>
</tr>
</thead>
</table>
|Accepted on behalf of NSW Roads and Maritime Services by: | Joel Rosendahl  
                  Project Development Manager |
| Signed: | |
| Dated: | |

Document status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Date</th>
<th>Prepared by</th>
<th>Reviewed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final 0</td>
<td>20 Nov 19</td>
<td>AECOM Australia Pty Ltd</td>
<td>Roads and Maritime</td>
</tr>
<tr>
<td>Final 1</td>
<td>11 Dec 19</td>
<td>AECOM Australia Pty Ltd</td>
<td>Roads and Maritime</td>
</tr>
</tbody>
</table>
Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) proposes to build a New England Highway bypass of Singleton (the proposal). The proposal is located to the west of Singleton and connects the New England Highway to the north and south of Singleton. Key features of the proposal include:

- About eight kilometres of new highway (the bypass) with a single lane in each direction
- Connection with the New England Highway at the southern end of the bypass (the southern connection) including a southbound entry ramp and northbound exit ramp
- A 55 metre long bridge over the bypass at the southern connection
- A 1.7 kilometre long bridge over the Main North railway line, the Doughboy Hollow and Hunter River floodplain, Army Camp Road and Putty Road (bridge over the floodplain)
- Connection to Putty Road including a northbound entry ramp and southbound exit ramp (the Putty Road connection)
- A 40 metre long bridge over the entry ramp at the Putty Road connection
- A 100 metre long bridge over Rose Point floodway
- A 205 metre long bridge over the Hunter River
- A 40 metre long bridge over the New England Highway west of the existing Main North railway line overbridge (known as Gowrie Gates)
- Connection with the New England Highway at Gowrie Gates consisting of a southbound entry ramp and northbound exit ramp. The northbound exit ramp would connect to the New England Highway via a new roundabout intersection at Maison Dieu Road
- A 1.7 kilometre northbound climbing lane between Gowrie Gates and the northern connection
- Connection at Magpie Street including providing access to the nearby industrial area (the northern connection), consisting of a southbound entry ramp, southbound exit ramp and northbound entry ramp
- A 60 metre long bridge over the bypass at the northern connection.

Timing for construction of the proposal has not been confirmed and is subject to approval and funding availability. Construction would take around three years to complete.

Need for the proposal

The New England Highway is a major freight and commuter route forming part of the Sydney to Brisbane Corridor of the National Land Transport Network and the primary route connecting the Upper Hunter with Maitland and Newcastle. The highway currently passes through Singleton forming the main access route through town. The traffic flow along this route currently experiences delays and congestion, notably for extended morning and afternoon peak periods, with heavy vehicle movements adding further delays and congestion.

The capacity of the route will be put under further pressure as regional growth continues, with longer delays and increased traffic congestion predicted. The ability of road users to continue their journey on a bypass would reduce the volume of heavy freight vehicles and road users travelling through Singleton.

The proposal is also considered consistent with the objectives of multiple Australian and State government strategic documents including the Australian Infrastructure Plan (Infrastructure Australia, 2016) and the Future Transport Strategy 2056 (Infrastructure NSW, 2018).
Proposal objectives

The objectives of the proposal are:

- Improve travel reliability on the New England Highway through Singleton, particularly for road freight supporting the Upper Hunter and the North West New England region
- Improve the amenity of Singleton by removing freight traffic
- Improve road safety for through and local traffic in Singleton
- Support future traffic growth along the New England Highway associated with planned land use in the Upper Hunter area
- Provide access for oversize over mass vehicles along the New England Highway.

Options considered

Roads and Maritime has carried out multiple investigations to identify a preferred route for a New England Highway bypass of Singleton. The initial investigations considered multiple corridors for the bypass, with subsequent investigations considering three shortlisted route options.

Selection of the preferred option took into account social, environmental and economic factors as well as community and stakeholder feedback received during a public display period. The preferred option would achieve the most beneficial improvement to traffic flow, travel times and safety on the New England Highway through Singleton by attracting the greatest volume of traffic away from the New England Highway to the proposal.

Statutory and planning framework

The proposal is for road infrastructure facilities and is to be carried out by Roads and Maritime and can therefore be assessed under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Development consent from Singleton Council is not required. This review of environment factors (REF) has examined and considered all matters affecting or likely to affect the environment by reason of the proposed activity.

A strategic assessment under Roads and Maritime’s Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) – Strategic Assessment also applies to the proposal. This REF has been prepared to meet the requirements of the EPBC Act strategic assessment approval for Roads and Maritime activities being assessed under Division 5.1 of the EP&A Act. Therefore a referral to the Australian Department of the Environment and Energy is not required.

Community and stakeholder consultation

Consultation for development of the proposal was carried out between September 2015 and October 2015, including public display of the three shortlisted options. Further consultation activities were carried out to refine the preferred option, which was selected in December 2016, and develop the concept design and REF.

During the development of this REF, Roads and Maritime has consulted with potentially affected property owners, community members, local business owners, relevant government agencies, including Singleton Council and other stakeholders. Matters raised during consultation included impacts to property and acquisition, operational traffic impacts, flooding and construction related impacts such as noise. Comments received during consultation have been considered and addressed in the REF.

Consultation with Aboriginal stakeholders has been carried out in accordance with the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011), the OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 and the requirements of Clause 60 of the National Parks and Wildlife Regulation 2009.
Roads and Maritime will continue to consult with the community and stakeholders as planning progresses. Information about the proposal is also available on the Roads and Maritime website.

Environmental impacts

The main environmental impacts and benefits of the proposal are summarised below.

Hydrology and flooding

The proposal crosses the Hunter River floodplain between the Hunter River and the southern connection, a length of approximately four kilometres. The floodplain is subject to periodic flooding during events greater than the one in five year flood (20 per cent Annual Exceedance Probability).

The proposal has been designed to achieve a one in 100 year (one per cent Annual Exceedance Probability) flood immunity on the bypass whilst minimising flooding impacts on surrounding land. The proposal would result in minor changes to the peak flood level locally around the Putty Road connection and the southern connection. The impact is localised and typically limited to rural property and the proposal area. In addition, there are reduced peak flood levels through much of Singleton and Glenridding. The proposal would provide additional flood evacuation routes and improve local accessibility during flood events up to and including a one in 20 year event.

Noise and vibration

An assessment of the potential noise and vibration impacts for the proposal was carried out for construction and the following operational scenarios, ‘Do Minimum’ (without the proposal) and ‘Design (with the proposal) in the years 2026 and 2036.

The majority of construction works would be carried out during standard hours. The assessment identified that construction noise may exceed the criteria at a number of receivers during several construction scenarios. Pavement and earthwork activities are anticipated to cause the largest number of exceedances. These impacts would be managed through the implementation of mitigation measures including consultation with the affected community where required.

The operational noise assessment recommended that noise barriers be implemented to minimise impacts. With the six proposed noise barriers in place, 89 noise sensitive receivers are considered to be eligible for the consideration of at-receiver noise treatment.

Socio-economic issues

During construction, the proposal would result in temporary amenity impacts associated with construction activities including noise and vibration, traffic, air quality and visual impacts. The construction period has the potential to benefit the local economy through direct employment, the proposals direct expenditure as well as an increase in expenditure at local businesses by construction workers.

Once operational the proposal has the potential to impact local businesses within Singleton due to the diversion of traffic around the town. Surveys of local businesses and commuters carried out as part of investigations for the proposal identified that the overall impact to businesses is likely to be minor. The surveys identified that a large portion of highway traffic does not stop in Singleton despite travelling through. With this through traffic removed, amenity impacts in Singleton may improve due to reduced vehicle volumes in town. Singleton would remain visible from the bypass, with signage encouraging traffic to continue to stop in town to access local businesses.

The proposal would result in substantial potential benefits for freight vehicle movements. Improvements in the efficiency and reliability of these transport networks would likely result in increased productivity, reduced costs and broader economic benefits.
**Biodiversity**

The proposal area has been subject to a history of clearing and disturbance primarily as a result of agricultural activities. South of the Hunter River the floodplain is used extensively for cropping activities and the area to the north of the Hunter River has historically been used for grazing. The main area of native vegetation within the proposal area occurs around the northern connection where patches of native vegetation of varying quality exist.

The proposal will result in a loss of around 15.2 hectares of vegetation listed under the *Biodiversity Conservation Act 2016* (BC Act). About 16.9 hectares of the Central Hunter Valley eucalypt forest and woodland, listed as critically endangered under the EPBC Act will also be impacted. This would result in a reduction of habitat, including hollow-bearing trees, for a range of birds and mammals including threatened species, and loss of fauna habitat connectivity. An aerial fauna crossing over the New England Highway would be provided to help reduce potential impacts.

An assessment of significance has been carried out for threatened species and ecological communities that are likely to occur in the proposal area. The assessment found that the proposal is unlikely to have a significant impact on all matters listed under the BC Act. It was found that the proposal is likely to have a significant impact on Central Hunter Valley eucalypt forest and woodland listed as critically endangered under the EPBC Act. Roads and Maritime’s strategic assessment has been applied to the proposal.

**Aboriginal heritage**

The proposal is anticipated to impact 16 Aboriginal archaeological sites, with a total loss of value for 13 sites and partial loss of value for the remaining three sites. One site of cultural significance will also be impacted by the proposal, resulting in a partial loss of value. An Aboriginal heritage impact permit would be sought for the proposal.

In order to manage the impact of the proposal on the identified Aboriginal cultural heritage values of the study area, a number of recommendations have been made.

**Non-Aboriginal heritage**

The proposal identified a number of listed heritage items within or adjacent to the proposal area. Three locally listed heritage items would be impacted by the proposal. These are the Former Pumping Station, Bebeah and the Woolpack Inn. Direct impacts would occur to the Former Pumping Station resulting in its complete removal. Bebeah and the Wooplack Inn were identified as being directly impacted by the proposal, with works occurring within the curtilage of these two items but not directly impacting the heritage significance of the listed buildings. Measures have been identified to mitigate these impacts through the archival recording and salvaging of material where appropriate.

**Justification and conclusion**

The proposal is recommended as it would best address the objectives for the New England Highway bypass of Singleton. The proposal is consistent with Government strategic planning at Commonwealth, State and regional levels. While there would be some adverse impacts to the local environment and community, they have been avoided or minimised wherever possible through design and site-specific safeguards.

The proposal is justified because it would help reduce existing congestion and delays along the New England Highway in Singleton, improve access and connectivity within Singleton, improve road safety and meet future traffic needs.
Display of the review of environmental factors

This REF is on display for comment between Monday 16 December 2019 and Sunday 1 March 2020. You can access the documents in the following ways:

**Internet**


**Printed copies**

The documents can be viewed at the following locations:

- Singleton Council Civic Centre, 12 Queen Street, Singleton
- Singleton Library, 8-10 Queen St, Singleton.

**Copies by request**

Printed and electronic copies are available by contacting Joel Rosendahl on 1800 991 254, noting that there may be a charge for hard copies, CD or USB.

**Staffed displays**

Community information sessions will be held at Quest Hotel Singleton at 5-7 Civic Ave, Singleton at the following times. A formal presentation will not be given so please drop in at any time:

- Thursday 30 January 2020, 10.30am to 1.30pm
- Thursday 30 January 2020, 4pm to 7pm
- Thursday 6 February 2020, 10.30am to 1.30pm
- Thursday 6 February 2020, 4pm to 7pm
- Thursday 11 February 2020, 10.30am to 1.30pm
- Thursday 11 February 2020, 4pm to 7pm

**How can I make a submission?**

To make a submission about this proposal, please send your written comments to:

Roads and Maritime Services
Writing: Joel Rosendahl
Locked Bag 2030
Newcastle 2300

Email: singleton.bypass@rms.nsw.gov.au

Submissions must be received by 5pm Sunday 1 March 2020. Submissions will be managed in accordance with the Roads and Maritime Services Privacy Statement which can be found here [https://www.rms.nsw.gov.au/about/access-to-information/my-privacy.html](https://www.rms.nsw.gov.au/about/access-to-information/my-privacy.html) or by contacting privacy@rms.nsw.gov.au for a copy.

**What happens next?**

Roads and Maritime will collate and consider the submissions received during public display of the REF. After this consideration, Roads and Maritime will determine whether or not the proposal should proceed as proposed and will inform the community and stakeholders of this decision.

If the proposal is determined to proceed, Roads and Maritime will continue to consult with the community and stakeholders prior to and during construction.
Contents

Executive summary ................................................................................................................................................................. i

1. Introduction .............................................................................................................................................................................. 1
   1.1 Proposal identification .......................................................................................................................................................... 1
   1.2 Purpose of the report ........................................................................................................................................................... 4

2. Need and options considered .................................................................................................................................................. 5
   2.1 Strategic need for the proposal ........................................................................................................................................... 5
   2.2 Existing infrastructure .......................................................................................................................................................... 8
   2.3 Proposal objectives and development criteria .................................................................................................................... 10
   2.4 Alternatives and options considered ................................................................................................................................ 11
   2.5 Preferred option ................................................................................................................................................................. 16
   2.6 Design refinements ............................................................................................................................................................ 17

3. Description of the proposal ...................................................................................................................................................... 18
   3.1 The proposal ........................................................................................................................................................................ 18
   3.2 Design .................................................................................................................................................................................. 26
   3.3 Construction activities ........................................................................................................................................................ 33
   3.4 Ancillary facilities ............................................................................................................................................................... 43
   3.5 Public utility adjustment ......................................................................................................................................................... 48
   3.6 Property acquisition .............................................................................................................................................................. 48

4. Statutory and planning framework ......................................................................................................................................... 53
   4.1 Environmental Planning and Assessment Act 1979 ............................................................................................................ 53
   4.2 Other relevant NSW legislation .......................................................................................................................................... 55
   4.3 Commonwealth legislation .................................................................................................................................................. 59
   4.4 Confirmation of statutory position ......................................................................................................................................... 60

5. Consultation .............................................................................................................................................................................. 61
   5.1 Consultation strategy ............................................................................................................................................................ 61
   5.2 Community involvement ....................................................................................................................................................... 61
   5.3 Aboriginal community involvement .................................................................................................................................... 63
   5.4 ISEPP consultation ............................................................................................................................................................... 64
   5.5 Government agency and stakeholder involvement ............................................................................................................. 66
   5.6 Consultation during the public display of the REF ............................................................................................................. 71
   5.7 Consultation following public display of the REF ................................................................................................................ 71

6. Environmental assessment ......................................................................................................................................................... 72
   6.1 Biodiversity ............................................................................................................................................................................ 72
   6.2 Surface water, hydrology and flooding ................................................................................................................................ 92
   6.3 Ground water ........................................................................................................................................................................ 109
   6.4 Soils ........................................................................................................................................................................................ 114
   6.5 Traffic and transport ........................................................................................................................................................... 119
   6.6 Noise and vibration .............................................................................................................................................................. 135
   6.7 Aboriginal heritage ............................................................................................................................................................. 156
   6.8 Non-Aboriginal heritage ...................................................................................................................................................... 171
   6.9 Air Quality ............................................................................................................................................................................. 181
   6.10 Landscape character and visual impacts ......................................................................................................................... 193
Tables

Table 2-1: Existing road infrastructure on the New England Highway within Singleton ......................................................... 9
Table 2-2: Existing road infrastructure on Putty Road near Singleton .................................................................................. 10
Table 2-3: Key design refinements ........................................................................................................................................ 17
Table 3-1: Road and bridge standards relevant to the design ............................................................................................. 26
Table 3-2: Design Criteria ................................................................................................................................................... 27
Table 3-3: Indicative plant and equipment to be used during the construction period .......................................................... 38
Table 3-4: Indicative earthwork quantities .......................................................................................................................... 40
Table 3-5: Source and quantities of materials required for the proposal ............................................................................... 40
Table 3-6: Indicative construction vehicle movements ...................................................................................................... 42
Table 3-7: Summary of construction activities at ancillary facilities .................................................................................. 47
Table 3-8: Property acquisition for the proposal ................................................................................................................ 48
Table 3-9: Road and bridge standards relevant to the design .............................................................................................. 55
Table 3-10: Key design refinements ..................................................................................................................................... 55
Table 3-11: Indicative plant and equipment to be used during the construction period .......................................................... 63
Table 3-12: Indicative earthwork quantities .......................................................................................................................... 65
Table 3-13: Source and quantities of materials required for the proposal ............................................................................... 65
Table 3-14: Indicative construction vehicle movements ...................................................................................................... 67
Table 3-15: Summary of construction activities at ancillary facilities .................................................................................. 67
Table 3-16: Property acquisition for the proposal ................................................................................................................ 68
Table 3-17: Road and bridge standards relevant to the design .............................................................................................. 75
Table 3-18: Key design refinements ..................................................................................................................................... 75
Table 3-19: Indicative plant and equipment to be used during the construction period .......................................................... 75
Table 3-20: Indicative earthwork quantities .......................................................................................................................... 77
Table 3-21: Source and quantities of materials required for the proposal ............................................................................... 77
Table 3-22: Indicative construction vehicle movements ...................................................................................................... 79
Table 3-23: Summary of construction activities at ancillary facilities .................................................................................. 79
Table 3-24: Property acquisition for the proposal ................................................................................................................ 80
Table 3-25: Road and bridge standards relevant to the design .............................................................................................. 87
Table 3-26: Key design refinements ..................................................................................................................................... 87
Table 3-27: Indicative plant and equipment to be used during the construction period .......................................................... 88
Table 3-28: Indicative earthwork quantities .......................................................................................................................... 88
Table 3-29: Source and quantities of materials required for the proposal ............................................................................... 89
Table 3-30: Indicative construction vehicle movements ...................................................................................................... 89
Table 3-31: Summary of construction activities at ancillary facilities .................................................................................. 90
Table 3-32: Property acquisition for the proposal ................................................................................................................ 91
Table 3-33: Road and bridge standards relevant to the design .............................................................................................. 98
Table 3-34: Key design refinements ..................................................................................................................................... 98
Table 3-35: Indicative plant and equipment to be used during the construction period .......................................................... 99
Table 3-36: Indicative earthwork quantities .......................................................................................................................... 99
Table 3-37: Source and quantities of materials required for the proposal ............................................................................... 100
Table 3-38: Indicative construction vehicle movements .................................................................................................... 100
Table 3-39: Summary of construction activities at ancillary facilities .................................................................................. 100
Table 3-40: Property acquisition for the proposal ................................................................................................................ 101
Table 3-41: Road and bridge standards relevant to the design .............................................................................................. 108
Table 3-42: Key design refinements ..................................................................................................................................... 108
Table 3-43: Indicative plant and equipment to be used during the construction period .......................................................... 108
Table 3-44: Indicative earthwork quantities .......................................................................................................................... 109
Table 3-45: Source and quantities of materials required for the proposal ............................................................................... 109
Table 3-46: Indicative construction vehicle movements ...................................................................................................... 110
Table 3-47: Summary of construction activities at ancillary facilities .................................................................................. 110
Table 3-48: Property acquisition for the proposal ................................................................................................................ 111
Table 3-49: Road and bridge standards relevant to the design .............................................................................................. 118
Table 3-50: Key design refinements ..................................................................................................................................... 118
Table 3-51: Indicative plant and equipment to be used during the construction period .......................................................... 118
Table 3-52: Indicative earthwork quantities .......................................................................................................................... 119
Table 3-53: Source and quantities of materials required for the proposal ............................................................................... 119
Table 3-54: Indicative construction vehicle movements ...................................................................................................... 119
Table 3-55: Summary of construction activities at ancillary facilities .................................................................................. 120
Table 3-56: Property acquisition for the proposal ................................................................................................................ 121
Table 3-57: Road and bridge standards relevant to the design .............................................................................................. 128
Table 3-58: Key design refinements ..................................................................................................................................... 128
Table 3-59: Indicative plant and equipment to be used during the construction period .......................................................... 128
Table 3-60: Indicative earthwork quantities .......................................................................................................................... 129
Table 3-61: Source and quantities of materials required for the proposal ............................................................................... 129
Table 3-62: Indicative construction vehicle movements ...................................................................................................... 130
Table 3-63: Summary of construction activities at ancillary facilities .................................................................................. 130
Table 3-64: Property acquisition for the proposal ................................................................................................................ 131
Table 3-65: Road and bridge standards relevant to the design .............................................................................................. 138
Table 3-66: Key design refinements ..................................................................................................................................... 138
Table 3-67: Indicative plant and equipment to be used during the construction period .......................................................... 138
Table 3-68: Indicative earthwork quantities .......................................................................................................................... 139
Table 3-69: Source and quantities of materials required for the proposal ............................................................................... 139
Table 3-70: Indicative construction vehicle movements ...................................................................................................... 139
Table 3-71: Summary of construction activities at ancillary facilities .................................................................................. 140
Table 3-72: Property acquisition for the proposal ................................................................................................................ 140

New England Highway bypass of Singleton
Review of Environmental Factors viii
Table 6-70: Summary of mitigation measures to manage hazards and risk .................................................. 231
Table 6-71: Major projects within the potential to contribute to cumulative impacts with the proposal (major projects register) ...................................................... 232
Table 7-1: Summary of safeguards and management measures ................................................................. 236
Table 7-2: Summary of licensing and approvals required ......................................................................... 259

Figures

Figure 1-1 Location of the proposal ........................................................................................................ 3
Figure 2-1: Development of the preferred option .................................................................................... 12
Figure 2-2: Route options ..................................................................................................................... 15
Figure 3-1: Overview of the key features of the proposal ..................................................................... 20
Figure 3-2: Key features of the proposal – 1 of 5 .................................................................................. 21
Figure 3-3: Key features of the proposal – 2 of 5 .................................................................................. 22
Figure 3-4: Key features of the proposal – 3 of 5 .................................................................................. 23
Figure 3-5: Key features of the proposal – 4 of 5 .................................................................................. 24
Figure 3-6: Key features of the proposal – 5 of 5 .................................................................................. 25
Figure 3-7: Typical road cross section (measurements shown in metres) ............................................. 31
Figure 3-8: Typical bridge cross section (measurements shown in millimetres) .................................... 31
Figure 3-9: Construction ancillary facilities and haulage routes ............................................................. 44
Figure 3-10: Property acquisition ........................................................................................................ 52
Figure 6-1 CEEC mapped in the proposal area ....................................................................................... 77
Figure 6-2 EEC mapped in the proposal area ......................................................................................... 78
Figure 6-3 Fauna habitat features identified within the proposal area ................................................ 80
Figure 6-4: Watercourses within and around the proposal area ............................................................ 94
Figure 6-5: Five per cent AEP peak flood level impact ....................................................................... 102
Figure 6-6: One per cent AEP peak flood level impact ....................................................................... 103
Figure 6-7: Groundwater bore locations ............................................................................................... 111
Figure 6-8: Existing road network for the Singleton area ...................................................................... 119
Figure 6-9: B-double routes ................................................................................................................. 121
Figure 6-10: Daily traffic profile on New England Highway at Hunter River Bridge ............................ 123
Figure 6-11: Crash location and types between 2013 and 2017 ........................................................... 124
Figure 6-12: Bus routes serving Singleton and surrounding areas ....................................................... 127
Figure 6-13: Bicycle network near Singleton ....................................................................................... 128
Figure 6-14: Bypass options with and without south facing ramps at Putty Road ................................ 131
Figure 6-15: Noise catchment areas ..................................................................................................... 137
Figure 6-16: Operational noise contours (1 of 5) ................................................................................ 148
Figure 6-17: Operational noise contours (2 of 5) ................................................................................ 149
Figure 6-18: Operational noise contours (3 of 5) ................................................................................ 150
Figure 6-19: Operational noise contours (4 of 5) ................................................................................ 151
Figure 6-20: Operational noise contours (5 of 5) ................................................................................ 152
Figure 6-21: AHIMS registered sites .................................................................................................. 158
Figure 6-22: Impact assessment - Aboriginal archaeological sites (northern section) ............................ 162
Figure 6-23: Impact assessment - Aboriginal archaeological sites (southern section) ............................ 163
Figure 6-24: Impact assessment - cultural sites........................................................................................ 165
Figure 6-25: Listed non-Aboriginal heritage items within the proposal area (south) .............................. 174
Figure 6-26: Listed non-Aboriginal heritage items within the proposal area (north).............................. 175
Figure 6-27: Annual 2018 Wind Roses for DPIE Ambient Air Quality Monitoring Stations in the Singleton area (DPIE 2019).............................................................................................. 183
Figure 6-28: Annual 2018 Wind Roses for DPIE Ambient Air Quality Monitoring Stations in the Singleton area (DPIE 2019).............................................................................................. 183
Figure 6-29: Landscape Character Zones Map, 1:35,000 at A3................................................................. 195
Figure 6-30: Visual Receptor Location Map, 1:35,000 at A3...................................................................... 198
Figure 6-31: Current view of Ellen Avenue (viewpoint 2). ...................................................................... 199
Figure 6-32: Indicative view of proposal at Ellen Avenue (viewpoint 2).................................................... 199
Figure 6-33: Current view of Army Camp Road (viewpoint 3)................................................................. 200
Figure 6-34: Indicative view of proposal at Army Camp Road (viewpoint 3).............................................. 200
Figure 6-35: Current view of Mitchell Avenue (viewpoint 7)................................................................... 201
Figure 6-36: Indicative view of proposal at Mitchell Avenue (viewpoint 7).............................................. 201
Figure 6-37: Land use zones within and around the proposal area.......................................................... 204
Figure 6-38: Social infrastructure within 400 metres of the proposal area (1 of 5).................................... 211
Figure 6-39: Social infrastructure within 400 metres of the proposal area (2 of 5).................................... 212
Figure 6-40: Social infrastructure within 400 metres of the proposal area (3 of 5).................................... 213
Figure 6-41: Social infrastructure within 400 metres of the proposal area (4 of 5).................................... 214
Figure 6-42: Social infrastructure within 400 metres of the proposal area (5 of 5)................................. 215

Appendices

| Appendix A | Consideration of clause 228(2) factors and matters of national environmental significance |
| Appendix B | Landscape Character, Visual Impact Assessment and Urban Design Objectives Report |
| Appendix C | Non-Aboriginal Heritage Assessment |
| Appendix D | Socio-economic Impact Assessment |
| Appendix E | Aboriginal Cultural Heritage Archaeological Report |
| Appendix F | Statutory consultation checklists |
| Appendix G | ISEPP letter responses |
| Appendix H | Air Quality Impact Assessment tables |
| Appendix I | Biodiversity Assessment |
| Appendix J | Surface and Groundwater Assessment |
| Appendix K | Contaminated Soils Phase 1 Assessment |
| Appendix L | Traffic Assessment |
| Appendix M | Noise and Vibration Assessment |