The Northern Road Upgrade
The Old Northern Road to Mersey Road
Submissions report
MARCH 2013
I Executive summary

NSW Roads and Maritime Services (RMS) proposes to progressively upgrade about 15 kilometres of The Northern Road between The Old Northern Road, Narellan and Mersey Road, Bringelly (the proposal). The proposal would be undertaken within the Camden and Liverpool local government areas (LGAs) in the RMS Sydney region. The proposal does not include the upgrade of the Oran Park Link Road 1 (Peter Brock Drive) intersection, which is about 450 metres in length. A separate review of environmental factors (DPS 2012) was determined for this intersection by RMS in May 2012.

Construction of the proposal would be undertaken by or on behalf of RMS in sections as developments along The Northern Road are approved and precincts within the South West Growth Centre are developed.

The proposal has been designed to allow for future upgrade within the median to a six-lane road (three lanes each way). This would be achieved by widening into the central median.

A review of environmental factors was prepared to assess the environmental impacts of the proposal. The review of environmental factors was displayed between 1 November 2012 and 30 November 2012 at Narellan Library and Narellan Motor Registry. Staffed information sessions were held at Narellan Town Centre and Bringelly Community Hall on Thursday 15 November 2012 and Saturday 17 November 2012 respectively. The review of environmental factors was also made available for download on the RMS website. Approximately 6000 community updates were distributed to properties along The Northern Road and in the adjacent areas. Advertisements were also placed in local papers to advise of the display of the review of environmental factors.

Feedback was received from residents and government agencies. The issues raised in the submissions were analysed, grouped and responses are provided as part of this submissions report.

This submissions report relates to the review of environmental factors prepared for The Northern Road upgrade between The Old Northern Road, Narellan and Mersey Road, Bringelly, and should be read in conjunction with the review of environmental factors. A total of 15 submissions were received in response to the display of the review of environmental factors comprising five government agency submissions, three businesses, six individuals and one community group submission.

The main issues raised were in relation to:

- Noise
- Property acquisition
- Heritage
- Flooding and drainage
- Traffic
- Pedestrian and cycling access
- Future precinct development
- Biodiversity

The submissions received raised specific concerns about the proposal. Responses to these issues have been prepared as part of this report.

Some additional measures for the management of impacts during construction and
operation have been developed in response to the submissions received. These measures have been incorporated into the revised environmental management measures for the proposal.
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Appendix A

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1 Introduction and background

1.1 Purpose

This submissions report relates to the review of environmental factors prepared for The Northern Road upgrade, Narellan to Bringelly, and should be read in conjunction with that document.

The review of environmental factors was placed on public display and submissions relating to the proposal and the review of environmental factors were received by Roads and Maritime Services (RMS). This submissions report summarises the issues raised and provides responses to each issue (Chapter 2). It also details investigations carried out since finalisation of the review of environmental factors (Chapter 3), describes and assesses the environmental impact of changes to the proposal (Chapter 4), and identifies new or revised environmental management measures (Chapter 5).

1.2 The proposal

The proposal involves widening The Northern Road from a generally two-lane undivided road to a four-lane divided road (twin carriageways separated by a wide central median). The proposal would allow for an ultimate six-lane divided road, with the future lanes to be provided in the median area, if and when required. The proposal would have a sign posted speed limit of 80 km/h, a wide central median along its length, 13 intersections controlled by traffic lights, nine left in and left out T-intersections and upgrade of and/or tie in with local roads.

The proposal is needed to provide road capacity for the substantial traffic growth predicted in the South West Growth Centre due to increased residential and commercial development. The Northern Road Corridor Strategy (RTA 2009) was developed using the forecast increase in traffic growth in the South West Growth Centre and set out a vision for the upgrade of The Northern Road as a principal transport corridor.

Construction of the proposal would be undertaken by or on behalf of RMS in sections as developments along The Northern Road are approved and precincts within the South West Growth Centre are developed.

The main features of the proposal include:

- An upgrade of the existing two-lane road to a four-lane road (two lanes each way) divided by a wide central median.
- Posted speed limit of 80 km/h.
- Provision of a three metre wide off-road shared pedestrian/cyclist path on the eastern side of the proposal, with space provided on the western side of the proposal for the future construction of a path if required.
- A typical lane width of 3.5 metres (3.3 metre lanes for turning lanes) with two metre outside shoulders and 0.5 metre inside (median side) shoulders.
- Bicycle and pedestrian crossing provisions at traffic lights.
- A bus priority lane on the approach and indented bus bay on the departure side of the signalised intersections on The Northern Road.
- Upgrade and/or tie in with 20 local roads including realignment of six local roads.
- Upgrade of eight existing un-signalised intersections to seven four-way signalised intersections and a signalised T-intersection.
- Adjustment to eight un-signalised T-intersections.
- A new un-signalised T-intersection at Oran Park Link Road 3.
- Five new signalised intersections with link roads to provide for future connectivity.
- Designated turning lanes at all signalised intersections.
- U-turn facilities at Marylands Link Road 1, Lowes Creek Link Road, Belmore Road, Greendale Road and Derwent Road.
- Tie in with the existing The Northern Road at the start and end of the proposal and the Oran Park Link Road 1 (Peter Brock Drive).
- Retention of the existing bridge over Narellan Creek for the southbound carriageway and provision of a new three span bridge over Narellan Creek for the northbound carriageway.
- Retention of the existing bridge over Thompsons Creek for the southbound carriageway and provision of a new single span bridge over Thompsons Creek for the northbound carriageway.
- Realignment and upgrade of the culverts within Lowes Creek.
- Scour protection works at Narellan Creek and Thompson Creek bridges and the Lowes Creek culvert.
- Upgrade of cross drainage to meet flood immunity for a 1 in 100 year average recurrence interval (ARI).
- Provision of street lighting for the proposal.
- Seven permanent spill basins.
- Batters required for cut and fill areas.
- One major fill location and seven major cut locations.

1.3 Review of environmental factors display

Roads and Maritime Services prepared a review of environmental factors to assess the environmental impacts of the proposed works. The review of environmental factors was exhibited between 1 November 2012 and 30 November 2012 at Narellan Library and Narellan Motor Registry, as detailed in Table 1.1.

Table 1.1: Display locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narellan Library</td>
<td>Civic Place, corner of Queen and Elyard streets, Narellan</td>
</tr>
<tr>
<td>Narellan Motor Registry</td>
<td>Shop GI, Narellan Town Centre, 326 Camden Valley Way, Narellan</td>
</tr>
</tbody>
</table>

The review of environmental factors was placed on the RMS internet website and made available for download. CD and hard copies of the review of environmental factors were also available upon request. The exhibition locations and website link were advertised in the following local newspapers:

- Macarthur Chronicle on Tuesday 6 November 2012.
- Liverpool City Champion on Wednesday 7 November 2012.
- Liverpool Leader on Wednesday 7 November 2012.

A staffed shopping centre display was held at Narellan Town Centre between 2pm
and 7pm on Thursday 15 November 2012. One information session was also held at the Bringelly Community Centre between 10am and 2pm on the 17 November 2012. The locations of the staffed information sessions are detailed in Table 1.2.

Feedback was received from residents and government agencies. The issues raised in the submissions were analysed, grouped and responses are provided as part of this submissions report.

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bringelly Community Centre</td>
<td>Greendale Road, Bringelly</td>
</tr>
<tr>
<td>Narellan Town Shopping Centre</td>
<td>Narellan Town Centre, 326 Camden Valley Way, Narellan</td>
</tr>
</tbody>
</table>

During the community information sessions, the RMS project team answered questions about the proposal and received feedback.

In addition to the above public exhibition, an invitation to comment and copy of the review of environmental factors was sent directly to several identified stakeholders (Appendix A).
2  Response to issues

Roads and Maritime Services received 15 submissions, accepted up until Friday 30 November 2012, with several extension requests granted. Table 2.1 lists the respondents and each respondent’s allocated submission number. The table also indicates where the issues from each submission have been addressed in this report.

Table 2.1: Respondents

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Submission No.</th>
<th>Section number where issues are addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual submission</td>
<td>1</td>
<td>2.12.3, 2.15.1, 2.17.10</td>
</tr>
<tr>
<td>Individual submission</td>
<td>2</td>
<td>2.17.2</td>
</tr>
<tr>
<td>Individual submission</td>
<td>3</td>
<td>2.17.2</td>
</tr>
<tr>
<td>Community group</td>
<td>4</td>
<td>2.17.7</td>
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<tr>
<td>Individual submission</td>
<td>5</td>
<td>2.3, 2.12.2</td>
</tr>
<tr>
<td>Business submission</td>
<td>6</td>
<td>2.15.4</td>
</tr>
<tr>
<td>Agency submission Camden Council</td>
<td>8</td>
<td>2.2, 2.4, 2.5, 2.6, 2.7.1, 2.7.2, 2.8.1, 2.8.2, 2.8.4, 2.8.5, 2.9.1, 2.11.1, 2.11.2, 2.12.1, 2.12.3, 2.13.1, 2.13.2, 2.13.3, 2.13.4, 2.13.5, 2.13.6, 2.13.8, 2.15.2, 2.16.1, 2.16.2, 2.16.3, 2.17.3, 2.17.4</td>
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<tr>
<td>Business submission</td>
<td>9</td>
<td>2.9.2, 2.15.5, 2.17.4, 2.17.5, 2.17.8, 2.17.9, 3.1, 4.2</td>
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<td>2.4, 2.7.1, 2.7.2, 2.8.2, 2.8.3, 2.8.4, 2.9.1, 2.9.4, 2.9.5, 2.10, 2.13.2, 2.13.3, 2.13.5, 2.13.7, 2.13.8, 2.14, 2.17.1, 2.17.4, 2.17.6, 2.17.7</td>
</tr>
<tr>
<td>Agency submission Department of Planning &amp; Infrastructure (DP&amp;I)</td>
<td>11</td>
<td>2.5, 2.8.3, 2.14, 2.15.4, 2.17.4</td>
</tr>
<tr>
<td>Individual submission</td>
<td>12</td>
<td>2.15.3</td>
</tr>
<tr>
<td>Individual submission</td>
<td>13</td>
<td>2.17.7</td>
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<tr>
<td>Agency submission Heritage Council</td>
<td>14</td>
<td>2.13.1, 2.13.3, 2.13.8</td>
</tr>
<tr>
<td>Agency submission Endeavour Energy</td>
<td>15</td>
<td>2.14</td>
</tr>
</tbody>
</table>

2.1  Overview of issues raised

A total of 15 submissions were received in response to the exhibition of the environmental assessment comprising five government agencies, three from
businesses, one from a community group and six from the community. Of the submissions received, two submissions (13 per cent) objected to specific aspects of the proposal, but did not object to the overall proposed upgrade.

Each submission has been examined individually to understand 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, only one response has been provided. The issues raised and Roads and Maritime Services response to these issues forms the basis of this chapter.

The majority of the submissions did not offer a position on the proposal.

The main issues raised by the Liverpool Council included:
- Heritage impacts, specifically at Bringelly Public School, Farmstead and Homestead.
- Noise impacts.
- Contamination and salinity potential.
- Biodiversity impacts.
- Potential flooding and drainage impacts.
- Future development of the South West Growth Centre.

The main issues raised by the Camden Council included:
- Heritage impacts.
- Noise impacts.
- Contamination and salinity potential.
- Biodiversity impacts.
- Potential flooding and drainage impacts.
- Future development of the South West Growth Centre adjoining The Northern Road and side roads.
- Traffic and access.
- Land acquisition for road purposes.

The main issues raised by the Department of Planning and Infrastructure (DP&I) are related to:
- Consistency with the South West Growth Centre Structure Plan.
- Integration with the Oran Park Precinct Plan.
- Biodiversity certification and securing offsets.
- Services co-ordination.
- Consultation.

The main issue raised by the Heritage Council related to:
- Approvals required for State listed heritage items and relics.

The main issue raised by Endeavour Energy related to:
- Allowance for a future high voltage power line near Oran Park.

The main issues raised in the individual submissions related to property impacts such as land acquisition, noise, heritage, potential traffic impacts and air quality.
2.2 Aboriginal heritage

Submission number 8

Issue description
Camden Council concurs with the Aboriginal heritage assessment of the review of environmental factors and the recommendations contained within it.

Response
It is noted that Council accepts the Aboriginal Heritage Assessment (Artefact 2012) and the recommendations detailed in section 11 of that report.

2.3 Air quality

Submission number 5

Issue description
The respondent expressed concerns regarding an increase in air pollution generated by the proposal affecting the Camden area.

Response
The proposal would increase the capacity of The Northern Road to suit current volumes of traffic as well as accommodating forecast traffic growth from future planned urban expansion in order to reduce congestion and improve potential air quality. This increase in traffic however, would impact on local air quality through vehicle emissions.

An air quality assessment was undertaken as part of the review of environmental factors (refer to section 6.11). The assessment was based on air dispersion modelling undertaken for 2016 and 2026 scenarios. The assessment identified that by 2026, air pollutant concentration levels would be below the Office of Environment and Heritage (OEH) assessment criteria 20 metres away from the roadway.

The proposal incorporates public transport facilities such as bus stops and a bus priority lane at signalised intersection which support the efficiency, and therefore increase the attraction, of bus travel. The proposal also incorporates a shared pedestrian and cycle pathway which would provide a healthy and non-polluting means of transport for users of The Northern Road.

RMS is committed to improving emission quality by effectively managing the New South Wales roads and traffic system. RMS is working on a range of cleaner air initiatives to improve vehicle and fuel standards, reduce vehicle emissions and to promote greener transport alternatives. Emission cleanliness has improved over the last 20 years and we will continue to work towards reducing vehicle emissions and supporting initiatives that help keep our air clean. Information on these initiatives can be found on the RMS website.
2.4 Construction activities

2.4.1 Ancillary facilities and approvals

Submission numbers 8 and 10

**Issue description**

1) Approval is required from Camden Council for all proposed toilet and wash facilities within construction work compounds.
2) Liverpool City Council land should not be entered or occupied for the purpose of construction without prior written consent.
3) Temporarily occupied Council land should be identified for consideration by Liverpool City Council.
4) The detailed design should identify proposed haulage routes in consultation with Liverpool City Council and gain approval as required.

**Response**

As identified in section 3.4 of the review of environmental factors, a number of ancillary facilities would need to be established during construction. These facilities would include construction compound sites and stockpile sites. The location of ancillary facilities has not been confirmed. This is because the construction staging is currently unknown, due to the difficulties of anticipating how the South West Growth Centre would be developed near the proposal and how that development would influence the availability of land that is suitable for ancillary facilities.

As indicated in section 4.1.1 of the review of environmental factors, clause 94 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) permits development on any land for the purpose of a road or road infrastructure facilities carried out by or on behalf of a public authority without consent. As the proposal is for a road and is to be carried out by or on behalf of RMS, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent from Council would not be required. Ancillary facilities (including toilet and wash facilities) are part of the construction activities therefore approval from Council would not be required. However RMS would consult with Council about the use of Council land for construction purposes.

Section 3.3.5 of the review of environmental factors identifies that designated access routes for construction vehicles would be along the arterial road network where practicable. Roads likely to be used for access and haulage include:

- Narellan Road.
- Camden Valley Way.
- Hume Highway.
- Bringelly Road.
- Elizabeth Drive.
- Western Motorway M4.
- Great Western Highway.
- Badgerys Creek Road.

Some construction traffic, including delivery trucks, may require the use of local roads in order to access the site. A traffic management plan would be developed.
prior to construction to identify haulage routes. Details of all routes used for access and haulage during construction would be developed in consultation with the relevant Council. Where required, approval from councils would be obtained for use of local roads as haulage routes.

2.5 Consultation

Submission numbers 8 and 11

Issue description
1) No formal notification about the display of the review of environmental factors was sent to Department of Planning and Infrastructure (DP&I). DP&I requested that relevant consultation is undertaken in the future.
2) Further consultation is required with utility providers during the detailed design phase and construction stages.
3) Councils requested ongoing consultation during detailed design to facilitate planning and integration with adjacent precincts.
4) Camden Council requested consultation regarding the potential impact the proposal will have on the ability of Council to construct a future water body on land adjacent to Narellan Creek.

Response
Consultation with the community and Government agencies was carried out during the development of the proposal. RMS is committed to maintaining the level of communication between state agencies. However, RMS acknowledges that formal notification was not sent to DP&I and that the department was made aware of the display of the review of environmental factors through informal discussions. RMS will ensure that formal notification of project updates are communicated to DP&I in the future.

As indicated in section 5.7 of the review of environmental factors ongoing consultation with the DP&I, Liverpool City Council, Camden Council, utility providers, Transport for NSW and other stakeholders would be undertaken during detailed design and construction as required. Consultation with Camden Council would take place about the potential impact the proposal may have on council’s ability to construct a future water body, and to ensure that the integration of the proposal with adjacent precincts is adequately considered.

2.6 Proposal delivery

Submission number 8

Issue description
1) Camden Council requests a clear commitment from the State Government for the funding and timing of the upgrade of The Northern Road from Narellan to Bringelly.
2) The upgrade should be undertaken all at once and not in a piecemeal fashion.
3) RMS should not wait for adjoining developments to be responsible solely for the construction of independent and disconnected sections of the ultimate road form.
4) Where urban development of land adjoining the corridor proceeds ahead of the RMS’ works program, opportunities for delivery of appropriate road upgrading works by developers should be facilitated.
5) RMS should consider an implementation strategy in partnership with the DP&I, Camden Council, Liverpool City Council, key developers and stakeholders to upgrade The Northern Road in a timely manner.

Response

As mentioned in section 2.1 of the review of environmental factors, the proposed upgrade of The Northern Road is being planned and developed in parallel with the development of the South West Growth Centre.

The Northern Road would be upgraded in sections in conjunction with precinct development in the South West Growth Centre. The timing of construction of the proposal would largely be dependent on future land releases and the allocation of funding by the State Government and/or developers of the South West Growth Centre. Construction of the proposal would therefore be carried out in sections, as determined by the release of adjacent development rather than as the entire 15 kilometres at one time.

Funding for the detailed design or construction of the proposal has not been allocated. Funding from the State Government for the proposal would be sought as adjacent precincts are released for development and traffic demand increases.

The traffic analysis showed that widening of the full length of The Northern Road upgrade would not be required until precincts within the South West Growth Centre are released and developments along The Northern Road are approved.

Although the proposal would be constructed in sections, the development strategies are consistent as per the design provided in the review of environmental factors. RMS would also seek to ensure that the order of road upgrade sections is appropriate and produce a safe outcome.

2.7 Design criteria

2.7.1 Street lighting

Submission numbers 8 and 10

Issue description

1) Liverpool City Council requested that lighting to be designed to current industry standards including sufficient lighting on local roads approaching the intersections.
2) Lighting should comply with the Traffic Route Lighting Subsidy Scheme (TRLSS).

Response

All street lighting provided as part of the proposal would comply with appropriate
Austroads Standards and Australian Standard AS1158. Consideration would be given to Traffic Route Lighting Subsidy Scheme’s eligibility during detailed design. The final design, style and location of street lighting would be developed during the detailed design stage. Energy-efficient lighting would be utilised wherever appropriate in the detailed design stage.

2.7.2 Bridge works

Submission numbers 8 and 10

**Issue description**

1) Bridges and major waterway crossings should be designed to AS5100 and provide adequate safety for pedestrians.
2) The existing bridge at Narellan Creek would require significant and extensive work to ensure that it meets required road safety standards for an increase to 80 km/h posted speed limit.

**Response**

Section 3.2.1 of the review of environmental factors outlines the design criteria that were adopted for the concept design proposal. These criteria include requirements such as bridges being designed to AS5100 and a 1 in 100 year flooding immunity.

The proposal would also provide an off-road shared path on the eastern side of the proposal, including on bridges, with space on the western side of the proposal for the future construction of an off-road shared path if required.

As identified in section 3.3.1 (page 69) of the review of environmental factors, works to the existing Narellan Creek Bridge would include:

- Removal of the existing traffic barrier and kerb on the western side of the existing bridge.
- Construction of footings for the off-structure barriers at either end of the existing bridge.
- Construction of new in-situ concrete barriers on the existing bridge and approaches with safety barriers and wire rope transitions for the off-structure concrete barriers.
- Removal of the existing footpath, traffic barrier and kerb on the eastern side of the existing bridge.
- Construction of a new slab (comprising precast prestressed planks and an in-situ reinforced concrete deck) on the western side of the existing bridge to accommodate the new shared pedestrian/cyclist path.

The upgrade to the existing bridge would be in accordance with road safety standards to accommodate a speed limit increase to 80 km/h.

During the detailed design phase, a review of the bridge design would be undertaken to confirm the bridge refurbishment requirements.
2.8 Flora and fauna

2.8.1 Fauna connectivity

Submission numbers 7 and 8

Issue description

1) Bridge structures should be designed to enable the migration of fauna along the waterway corridor. Consideration should be given towards replacement of existing bridge structures and not just augmentation, where possible.

2) What provisions have been made at chainage 1170 near Hillside Drive for terrestrial faunal passage and connectivity?

Response

As stated in section 2.6.3 of the review of environmental factors, the existing fauna connectivity across The Northern Road is provided at the major creeks and bridges ie Thompsons Creek, Lowes Creek and Narellan Creek. These corridors would be used by a range of fauna including small, medium and large mammals as well as birds, bats and reptiles.

The proposal includes the duplication of the existing bridge structures at major waterways at Thompsons Creek and Narellan Creek. As the existing bridge structures provide for fauna connectivity along the waterways, the upgrade would maintain the existing fauna corridor connectivity. The upgrade of the culverts in Lowes Creek includes eight of 2400 millimetres x 2100 millimetres in the main channel and 25 of 1800 millimetres x 900 millimetres box culverts over the floodplain. The Lowes Creek culvert upgrade is likely to provide additional fauna connectivity. RTA Summary of Fauna Underpass report (2009) states that most fauna will use culverts 2400 millimetres x 2100 millimetres in size.

Fauna connectivity in this area would not substantially benefit from the replacement of the existing bridge structures, and the construction of these would have additional costs and environmental impacts.

A reinforced concrete boxed cell culvert (2 x 3000 x 1500 mm) would provide informal fauna passage for small mammals and reptiles. Narellan Creek Bridge is located about 70 metres south of this location and would provide fauna connectivity. Section 6.2 of the review of environmental factors indicated that fauna movements across the landscape would generally be hindered by the extensive amount of clearing and subsequent fragmentation of woodland.

The design of creek and waterway crossings would be in line with guidelines to maintain adequate fish passage (Fairfull and Witheridge 2003).
2.8.2 Hollow bearing trees

Submission numbers 8 and 10

Issue description

1) Liverpool City Council recommends that nest boxes are used to compensate for the loss of hollow bearing trees with an appropriate number being placed outside of the road reserve in areas that are appropriately zoned for the long term conservation of native species.

2) Camden Council also recommends that a nest box plan and habitat replacement program for the loss of tree hollows is clearly identified and enacted well before construction begins.

Response

Section 6.2.3 of the review of environmental factors identifies that about 65 hollow bearing trees would be removed during construction of the proposal. During detailed design a nest box plan would be prepared by a suitably qualified ecologist in consultation with OEH and councils. The plan would determine the most appropriate locations for the installation of roost/nest boxes to mitigate potential impacts on microbats and arboreal fauna due to the removal of hollow bearing trees for that stage of construction. In accordance to RMS Biodiversity Guidelines – Guide 8 Nest Boxes, the roost/nest boxes would be installed at least three to six months prior to removal of vegetation, where feasible.

2.8.3 Biodiversity Offsets

Submission numbers 10 and 11

Issue description

1) Liverpool City Council recommends that the location of the offset site for River-flat Eucalypt Forest be secured prior to a determination being made.

2) RMS must prepare a Biodiversity Offset Strategy as part of the review of environmental factors which:
   - Identifies a suitable offset in accordance with the requirements of RBM 8 of the certification. As a first preference, offset areas should be found in the growth centres (North West and/or South West).
   - Provides details on the timing for securing offsets. Ideally, DP&I would prefer the offsets to be found and secured before determining the review of environmental factors but definitely secured prior to the impact occurring.
   - Provides details on how the offsets will be protected in perpetuity, including its long term management.

3) The Biodiversity Offset Strategy needs to be developed in consultation with both the Strategies and Land Release Unit of DP&I and OEH.

Response

As outlined in the review of environmental factors and the Biodiversity Assessment
The proposal will involve the clearing of 0.1 Ha of existing native vegetation (ENV) comprising River-flat Eucalypt forest in non-certified areas of the growth centres. The growth centres Biodiversity Certification (certification) requires a minimum of 2000Ha of high and medium quality native vegetation (referred to as 'existing native vegetation') to be retained and protected.

Section 6.24 of the review of environmental factors identifies a safeguard which states:

"An offset plan would be developed for the 0.1 hectares of ENV to be removed from non-certified areas. This plan would be developed in consultation with OEH. Offsets would be in accordance with relevant biodiversity measure 11 of the Biodiversity Certification. Offsets would be developed in consultation with DP&I and OEH."

An offset plan is only required for the impacts to non-certified ENV mapped vegetation as part of the Biodiversity Certification. RMS would ensure that the proposal is consistent with the biodiversity certification. However, it is not possible to identify the offset sites or prepare the offset plan/strategy prior to the determination of the review of environmental factors as the area of impact may change during detailed design. Any changes to the impacted non-certified ENV vegetation during detailed design would need to be taken into consideration for the overall size, quality and location of the offset site and plan.

RMS is currently in the process of developing an overall offset strategy for all current RMS road upgrades within the South West and North West Growth Centres. This strategy would provide for a combined value for all RMS’ road off set requirements and land allocation, as opposed to lots of small offset strategies. This strategy is being developed in consultation with the Strategies and Land Release Unit of DP&I and Office of Environment and Heritage/ Environment Protection Agency (OEH/EPA). Where possible the offset plan would provide for offset areas to be located within the South West Growth Centre in accordance with RBM 8 of the Biodiversity Certification.

The safeguard identified above as part of the proposal provides for the appropriate offset to be provided prior to the start of construction.

2.8.4 Relocation strategy

Submission numbers 8 and 10

Issue description

1) Section 7.2.1 of the Biodiversity Assessment (Appendix D) recommends a translocation management strategy or replanting program be developed to replace lost individuals of the Cumberland Plain Snail. Liverpool City Council requests the strategy should be implemented by a suitably qualified and experienced person, with the ownership and zoning of the recipient sites being appropriate for the long term conservation of this species.

2) Section 7.2.2 of the Biodiversity Assessment (Appendix D) recommends a translocation management strategy or replanting program be developed to replace lost individuals of the Marsdenia viridiflora subsp. Viridiflora (Native Pear) species. Camden Council requests the strategy should be located outside of the
road reserves in areas that are appropriately zoned to ensure the long term conservation of this species.

3) Both translocation strategies should also consider the Cumberland Plain Recovery Plan (DECCW 2010) and any applicable threatened Species Priorities Action Statement (PAS). The recipient sites should be identified before construction begins and include similar soils and aspects, and suitable recipient habitat. A translocation program needs to include an appropriate timelines to ensure translocation conservation outcomes are enacted before construction begins.

Response

Section 6.2.4 of the review of environmental factors identifies the safeguards for the proposal that would be implemented to manage and mitigate potential impacts to flora and fauna. The safeguards and management measures identified in Table 6-19 do not include the implementation of a translocation strategy for the Cumberland Plain Snail and *Marsdenia viridiflora subsp. Viridiflora* (Native Pear).

During detailed design a translocation management strategy for the Cumberland Plain Snail and *Marsdenia viridiflora subsp. Viridiflora* (Native Pear) would be prepared by a suitably qualified ecologist in consultation with OEH, DP&I and councils to replace lost individuals of the Cumberland Land Snail and Native Pear.

The translocation management strategy for the Cumberland Plain Snail would include:
- Identification of recipient sites.
- Collection of Cumberland Land Snails.
- Relocation to recipient sites.
- Record keeping.

The translocation management strategy for the Native Pear would include:
- Identification of recipient sites.
- Collection of seeds within the appropriate season.
- Propagation
- Replanting of new individual in recipient site (either along the proposal road reserves or within adjacent private property.
- Record keeping.

2.8.5 Vegetation management

Submission number 8

**Issue description**

Camden Council seeks RMS’ urgent detailed advice on the vegetation management strategy.

**Response**

Section 6.2 and 6.6 of the review of environmental factors identifies the general vegetation management that would apply to the proposal. As indicated in section 6.2 of the review of environmental factors a flora and fauna management plan would be prepared as part of the CEMP prior to construction. In accordance with the RMS
Biodiversity Guidelines the flora and fauna management strategy would include:

- Clearly defined vegetation clearing boundaries including a map representing areas that would need to be protected (including exclusion zone fencing requirements).
- Pre-clearance surveys and management measures.
- Provision for the education of all construction personnel with regards to the importance of clearing limits and remnants/individual trees of significant value.
- A procedure for clearing hollow bearing trees in line with the then RMS Biodiversity Guidelines.
- A weed management plan.

RMS would prepare a Biodiversity Offset Strategy for the removal of the existing native vegetation as mapped in the Growth Centres Conservation Plan and provide this plan to Council. Any residual land handed back to Council for future care and maintenance would have a vegetation management plan prepared.

### 2.9 Hydrology

#### 2.9.1 Flooding assessment

Submission numbers 8 and 10

**Issue description**

1) Liverpool City Council requests that a flood impact assessment be undertaken to identify the impact of the proposed works on existing flood regime across the catchments from raising the road level.

2) Sections of The Northern Road are contained within the Upper Nepean River Floodplain and several floodplain sections of South Creek. Council recommends RMS consider the Floodplain Management Plans for these two waterways in the planning and design for the upgrade of The Northern Road.

3) Storm events up to and including the probable maximum frequency need to be considered for all evacuation routes within the floodplain along The Northern Road.

4) A revised response is required regarding the flood immunity and evacuation routes in accordance with the State Government's Floodplain Development Manual and the SES requirements along the sections of The Northern Road within the floodplain.

5) The Northern Road should remain open as key transport corridor and evacuation route during emergency conditions.

6) Flood maps showing the before and after flood extents as a result of the proposal including backwater impacts from potential blockages are to be submitted to Liverpool City Council for review.

7) Need to ensure that the most up to date hydrological model of the catchment is used and assumes ultimate development.

8) All drainage channels shall be designed to fully accommodate 1% Annual Exceedance Probability (AEP) flood flows from the upstream catchments to prevent property inundation.

9) The design needs to consider impacts of flooding on upstream properties through the design of the ultimate road formation. Investigation of bridging structures is recommended to manage floodwater flows.

10) Capacity of the existing Thompsons Creek bridge should consider appropriate
blockage to ensure 1% AEP flood free status of road. All bridges and major waterway crossings shall be designed to accommodate for the shared path and future footpath.

11) Different design standards (for stormwater quantity management) exist between Camden Council, Liverpool City Council and DP&I.

Response

Flooding impacts as a result of the concept design were assessed and documented in the Drainage Design Report (SKM 2012) (refer to Appendix B of the review of environmental factors, and in Appendix F of the Bridge Concept Options Report. The report included an impact assessment of raising the road level on existing flood regimes in terms of flood storage and flood distribution across the catchments.

RMS notes that sections of The Northern Road are contained within the Upper Nepean River Floodplain and several floodplain sections of South Creek. The Upper Nepean River Floodplain Management Plan (1999) was considered during the development of the concept design. This was noted in the drainage design report (refer to Appendix B of the review of environmental factors). Council’s Upper South Creek Floodplain Management Plan (2011) has not been considered during the development of the concept design. This document would be reviewed and considered during detailed design.

The results of the hydraulic assessment found that all transverse drainage upgrades would result in lower upstream water levels for the 100 year ARI flood event than would be experienced with current cross drainage. Therefore, no adverse flooding impacts to upstream adjacent properties would be anticipated as a result of the proposal. Downstream properties impacted by increased flooding conditions (peak flows and velocity) were identified and assessed in the drainage design report. Where existing dwellings are susceptible to increased flooding, an open channel was designed to accommodate peak flows to ensure there would be no adverse impacts to dwellings. All channels would be designed to fully accommodate 1% AEP flood flows from the upstream catchments.

The management and mitigation measures as indicated in section 6.7.2 of the review of environmental factors identified that where there is an increase in peak flow rate at drainage outlets adjacent to property boundaries downstream, it would be managed by providing suitably sized drainage channels (refer to table 6-50 in the review of environmental factors for proposed drainage sizes) and outlet treatments to cater for the 100 year ARI event (with climate change considered).

The hydraulic model (HEC-RAS) used in the hydraulic assessment assumed that future development of catchments greater than 10 hectares would maintain 100 year ARI peak flows at pre-developed levels. This would be achieved by designing all transverse drainage structures (bridges and culverts) to accommodate 100 year ARI flood levels and by future developments implementing stormwater detention basins. For catchments smaller than 10 hectares the transverse drainage is designed for peak flows assuming future development of the catchment without detention basins being implemented. Any impacts were assessed and addressed to ensure pre-development flooding regime is maintained or improved.

The hydraulic assessment considered all flood events (5, 10, 100 year ARI) up to the Probable Maximum Frequency (PMF). The Northern Road was designed to be trafficable during 100 year ARI flooding events. RMS was advised by SES that this

The Northern Road upgrade, Narellan to Bringelly Submissions Report
section of The Northern Road between Narellan and Bringelly is not part of the SES flood evacuation route.

Camden Council requires any future urban development to manage their own stormwater impacts (eg detention basin) so that peak flows arriving at The Northern Road would be maintained at pre-developed levels. RMS would continue to consult with Council throughout the development of the adjacent precincts and The Northern Road detailed design to ensure that all future development does not increase peak flows arriving at The Northern Road.

Detailed flood modelling, including flood map, would be undertaken during detailed design using the most current information available at the time. The flood map would also show the flooding impact that would occur as a result of waterway crossing blockages. RMS would consult with any identified affected landowners regarding the potential drainage and flooding impacts on private properties, in order to formulate appropriate mitigation measures. RMS would provide a copy of the detailed flooding assessment for the proposal, including flood map to Council for information.

The proposal would maintain bridge waterway area at Thompsons Creek bridge so that the potential increase in the 100 year ARI upstream flood levels and increase in flood risk to existing properties is alleviated. Capacity of the existing bridge should consider appropriate blockage to ensure 1% AEP flood free status of road. This would also be revised during the detailed design.

RMS notes that there are different design standards (for stormwater quantity management) between Camden Council, Liverpool City Council and the DP&I. During the development of concept design, RMS had adopted the design criteria as per section 2.2 of the Drainage Design Report (refer to Appendix B of the review of environmental factors). Drainage works for tie-ins to local roads within Local Government Authority (LGA) boundaries have been designed to satisfy the RMS design criteria for The Northern Road, which is either consistent with LGA specifications or of a higher level of performance. Liverpool City Council notes open channels are to be designed to convey the major event, which for this road upgrade is the 100 year ARI event. This criterion has been adopted where channels are provided through private properties.

An exception to the above is the Camden Council design criteria that specifies freeboard to roads at waterway crossings. The design of tie-ins is generally limited to a short section of the local road and there is limited scope to raise the road or provide for the freeboard requirement. It is assumed that future local road upgrades associated with catchment development will upgrade local roads and drainage to fully address Camden Council requirements including freeboard.

RMS is not aware of any specific stormwater design standard by DP&I. However, it is expected that the requirements should also aligned with the LGA’s requirements.

2.9.2 Flooding impact on private land and property

Submission numbers 7 and 9

Issue description
1) Solutions to mitigate flooding impacts to private properties and local roads during
roadworks will need to be developed during detailed design.

2) Where drainage is directed through natural watercourses across private properties, the watercourses should be upgraded to receive such waters. Liverpool City Council requires evidence of the agreement between the RMS and the property owner.

3) Proposal to discharge large quantities of stormwater into local creek systems will result in increased velocities and subsequent erosion, would potentially impact on upstream and downstream properties (between road design chainage 11,370 to 14,600, within Liverpool LGA). Detailed assessment shall be undertaken as part of design process and appropriate mitigation works shall incorporate in the detailed design.

Narellan Creek (near road design chainage 1170)

4) Confirm if the existing transverse drainage crossing at chainage 1170 would be upgraded to match the new carriageway alignment?

Impact at Harrington Park

5) Catchment modelling undertaken by Brown Consulting for the development at Harrington Park (west) differs slightly with RMS modelling outlined in the REF. These differences are expected to be minor, however the respondent requests further consultation with RMS regarding these differences.

6) The increase in peak discharge downstream as a result of the culvert amplification (C2.16 and C2.65) would represent a nuisance causing loss of enjoyment to the property owner. Dandaloo objects to the proposed drainage amplification of the transitional drainage stormwater pipes unless the mitigation measures can transition the post upgrade discharge to pre-condition at the property interface with RMS. What mitigation measures are proposed to ensure there is no worsening of the current drainage conditions as a result of the proposal with regard to peak discharges, flood level, the frequency and/or duration of flooding, and flow velocities.

7) What transitional measurements are proposed between the easement at set out tags 350 and 351 in Appendix C of the review of environmental factors (south of Cobbitty Road west) and the existing watercourse to ensure no bed or bank instability occurs downstream.

Impact at Denbigh property

8) The justification for allowing increases to flood levels because no dwellings are affected is inappropriate. The land has been rezoned for residential development and an increase in flood levels will impact on the development potential of the land. RMS to revisit the drainage strategy and confirm that no additional flooding on the Denbigh property would result.

Response

A drainage design assessment was carried for the review of environmental factors by SKM (SKM 2012). A full copy of the report is provided at Appendix B of the review of environmental factors.

The aim of the drainage assessment was to develop a strategy that would improve the minimum 1 in 100 Average Recurrence Interval (ARI) flood level immunity for the proposal. The drainage design objectives and criteria used in the assessment included having no unacceptable impacts to private or public property for all events up to the 1 in 100 ARI, and transverse drainage to account for the potential effect of future climate change.
The assessment identified that the existing culverts on The Northern Road had limited capacity and caused cross catchment overflows and overtopping of the road. The proposed increased capacity of all transverse drainage (bridges and culverts) would result in lower 1 in 100 year ARI flood levels for upstream properties compared to existing conditions. In this regard all stormwater flows up to the 100 ARI flood level would be conveyed through the transverse drainage thereby improving existing conditions for upstream properties.

The enlargement of transverse drainage and the increase in impervious area would redistribute peak flows at some locations downstream of The Northern Road. Where existing properties (ie dwellings) are assessed as having increased peak flows a drainage channel was designed to accommodate flows up to the 1 in 100 ARI to avoid impact to dwellings. Where drainage would be directed through natural watercourses across private properties RMS would require property easements or purchase of land from landholders to manage flows across the property. The design of the channels on private property would be subject to consultation with landholders and Council during detailed design as part of property adjustment/acquisition negotiation.

Scour protection in the form of rock transition aprons or energy dissipation structures would be also be provided at all culvert outlets to manage the impact of culvert outlet scour. The outlet scour protection measures were designed to return the flow velocity to a level that can be withstood by a natural depression. Therefore no scoursing of waterways is expected. Further assessment on the outlets' protection measures would be carried out as part of the detailed design development.

Narellan Creek (near road design chainage 1170)
The existing under road culverts at Narellan Creek (chainage 1170) include 2 x 3000 x 1500mm reinforced concrete box culverts (RCBCs). The concept design proposes to maintain this size culvert under the road, however these would be extended to accommodate the road widening. The opportunity to retain the existing culvert structure would be reassessed at detailed design.

Impact at Harrington Park
The proposal would result in the redistribution of flows at the three Cobbitty Creek culvert (Harrington Park) crossings under The Northern Road between chainages 2150 and 2650. The limited capacity of the existing culverts causes cross catchment overflows and overtopping of the road. The upgrade of the culverts would provide The Northern Road with the required 100 year ARI flood immunity which would eliminate the cross catchment overflows and road overtopping, and cause increases in the 100 year ARI peak flow through two of the culverts and a reduction in flow through the third culvert. The three flow paths combine approximately 250m downstream (west) of The Northern Road where there would be a minor five per cent increase in the 100 year peak flow as a result of the upgrade. As identified in section 8 of Appendix B of review of environmental factors, the design of the three culverts would be reassessed in coordination with the adjacent urban development during detailed design.

Impact at Denbigh property
At road design chainages 4520, 4900, and 4950 the Denbigh property is located on the upstream side of the upgrade and would not be impacted by changes in flow regimes or velocity.

At road design chainage 3100 the Denbigh property is downstream of The Northern Road. There would be a redistribution of flow between the two culverts at chainages...
3100 and 3220 as a result of the upgrade. The flow paths combine at approximately 160m downstream (west) of The Northern Road where there would be a minor three per cent increase in the combined 100 year ARI peak flow through the two culverts.

For land currently zoned residential without a subdivision plan, further hydrologic modelling of the downstream waterways would be carried out at detailed design stage when the subdivision plan is available to minimise potential impacts to proposed dwellings. The potential impact on the site could be minimal due to the minor increase of the flow.

Where potential impacts to dwellings cannot be avoided, reasonable compensation would be investigated and discussed with the land owners/developers during detailed design stage as part of the property adjustment and acquisition process.

2.9.3 Pavement Drainage

Submission number 7

Issue description

1) The respondent queries if the purpose of the proposed drainage easement at road design chainage 170 on Hillside Drive is to drain a sag point within the Hillside Drive extension.

2) The respondent queries whether the drainage easement at 170 Hillside Drive fully encompass the tail out drainage from Hillside Drive (west). The drainage easement conflicts with water quality treatments proposed by the respondent.

Response

The proposed drainage channel on Hillside Drive (west) was developed without the benefit of having Dandaloo’s proposed stormwater and pavement drainage details. The drainage channel was designed to drain pavement run off from Hillside Drive (west). The proposed easement covers the required land to construct the drainage channel (tail out drainage) that transitions from the proposed outlet on Hillside Drive (west) to the natural surface level. As the proposed Harrington Park west subdivision project, which includes the construction of Hillside Drive, is expected to occur prior to The Northern Road upgrade, the details of the Hillside Drive pavement drainage and a potential transition to the water detention/quality basin at this location would be designed and discussed with the land owner at detailed design stage.

2.9.4 Farm dams

Submission number 10

Issue description

Any modification to existing farm dams should be referred to the Dam Safety Committee (DSC) and approval shall be obtained prior to undertaking the works. Letter of approval from DSC should be submitted to Council.
Response

Section 6.7.2 of the review of environmental factors identifies that a number of farm dams are located adjacent to the proposal area and may be impacted by the construction of the proposal. The concept design for proposal provides conservative easements for potential impacts to farm dams. Therefore, there may be opportunity to reduce the impacts to farm dams during detailed design. Farm dams would be maintained where possible.

During detailed design any modifications, restructuring or redesign of farm dams would be in accordance with industry standards and the requirements of relevant authorities and in consultation with land owners. None of the farm dams to be impacted are listed under Schedule 1 of the *Dams Safety Act 1978*, for which the Dams safety committee are responsible. Therefore referral to the NSW Government Dam Safety Committee would only be undertaken if required. If any consultation with the NSW Government Dam Safety Committee is required, any approvals would be forwarded to local councils for their information.

2.9.5 Maintenance

Submission number 10

Issue description

1) Liverpool City Council does not accept the ongoing maintenance of drainage channels on private properties at this stage.
2) To address ongoing maintenance of drainage channels a plan should be submitted to Council showing all assets that are to become Council’s maintenance responsibility.
3) Appropriate access is to be provided for the cleaning and maintenance of drainage channels.

Response

Following the construction of the proposal, a number of road side and infrastructure assets (including drainage structures) would be handed back to local councils for ongoing maintenance. A plan outlining these assets would be provided to, and discussed with Council during detailed design. Future maintenance of road side assets and infrastructure would be agreed to with local councils prior to handing over the maintenance responsibility.

The design of any proposed drainage channels (or other water quality treatment devices) would consider access and maintenance issues for the asset. Standards relevant to the design of drainage channels would be included in the detailed design for the proposal and would take into account cleaning and maintenance requirements. RMS would continue to minimise the size and number of drainage channels required, and would consult with Council regarding ongoing maintenance responsibilities.
2.9.6 Channel impact on services crossings

Submission number 7

Issue description
1) Have proposed services crossings been considered when assessing the proposed inlet and outlet invert levels for this culvert crossing at the Hillside Drive (west)?
2) Does that drainage channel at chainage 1390, Hillside Drive, cross over a sewer main?

Response
Existing and proposed utility services have been considered in the development of the concept design and would be confirmed during the detailed design of the proposal. The proposed culvert outlet treatment (such as scour protection) requires an easement from the private property.

The drainage channel at chainage 1390 (Hillside Drive) does cross over the existing sewer main. The preliminary services investigation indicated that the sewer is located at a depth that would not be impacted by the proposal. Existing and proposed utility services have been considered in the development of the concept design and would be confirmed during the detailed design of the upgrade.

2.10 Land use

Submission number 10

Issue description
1) The review of environmental factors does not address the proposed land use envisaged for the South West Growth Centre.
2) The review of environmental factors does not assess the impacts of the proposal on adjoining future land uses, or what constraints future land uses may have on the design of the road, eg need for service roads, increase in pedestrian movements and number of access points.
3) There is little mention of future land uses adjoining The Northern Road.
4) Clarification is sought on the future interaction between proposed road works and the future adjoining land uses.

Response
The South West Growth Centre Structure Plan identifies the future land uses adjacent to The Northern Road. The Northern Road upgrade is based on this structure plan. These land uses have been considered throughout the review of environment factors and identify the main purpose of the proposed upgrade of The Northern Road. In particular sections 2.1, 2.3, 5.5, 6.1and 6.8 of the review of environmental factors refers to the need of the proposal to accommodate future land uses. RMS has also been in discussion with DP&I to refine the proposed road
network to cater for future development. This road network includes Bringelly Road, Camden Valley Way and current and anticipated local road connections.

The traffic assessment at intersections of The Northern Road has taken into account the proposed speed limit, the proposed link roads, anticipating future local connections and pedestrian crossings at all legs of intersections.

Existing land uses adjacent to The Northern Road would be retained until precincts are released and developed as part of the South West growth centre. Changes from rural residential, agricultural or public recreation areas to rural residential and residential areas would be expected as this land is developed. The proposal would facilitate and provide access to the existing and future planned areas of the South West Growth Centre. Approved development applications were considered during concept development.

2.11 Landscape character and visual impact

2.11.1 Urban design

Submission numbers 8 and 10

Issue description

1) Camden Council strongly suggests that RMS adopts an urban design strategy similar to Camden Valley Way.
2) All existing bus shelters should be replaced with a modern equivalent, which are to be approved by Liverpool City Council.

Response

A landscape character and visual impact assessment was prepared for the proposal (Spackman Mossop and Michaels 2012). A complete copy of the report is available in Appendix I of the review of environmental factors, and a summary of the findings is provided in Section 6.10 of the review of environmental factors.

Section 9 of the landscape character and visual impact assessment identifies that the basic elements of this proposal are consistent with other RMS projects within the South West Growth Centre including Cowpasture Road and Camden Valley Way. The recommendations in the landscape report also identify the urban design vision, objectives and principles which underpin the concept design. These would continue to be applied throughout detailed landscape design.

The design of replaced bus shelters would be in accordance with the RMS document Beyond the Pavement (RTA 2009) and the overall urban design strategy for the South West Growth Centre.
2.11.2 Character of the road corridor

Submission number 8

Issue description

No details on how the vegetation corridor will be managed, retained and/or offset to maintain the existing vegetative character of The Northern Road.

Response

As outlined in section 6.2.3 of the review of environmental factors, the proposal would require clearing a total of 59 ha of roadside vegetation. The majority of vegetation (58.4ha) occurs within certified areas. A small portion of land would require clearing of vegetation in non-certified land.

Sections 2.6 of the review of environmental factors notes that several design refinements were made to the concept design to avoid impacts to native trees within the road boundary. During construction existing trees would be retained in the road corridor where feasible. In section 6.2 of the review of environmental factors mitigation measures have been provided to minimise vegetation removal including the development of a flora and fauna management plan which would include defining vegetation clearing boundaries. Vegetation clearing boundaries would be limited to areas needed for actual construction purposes and not be defined by the assessed area identified in the review of environmental factors. Where possible areas within the assessed areas that do not need to be cleared to provide for construction activities would be included as part of the exclusion areas and fenced accordingly.

Section 6.10.4 of the review of environmental factors indicates that the detailed design would be undertaken according to the urban design vision, objectives and principles which underpin the concept design and incorporate the urban and landscape design master plan requirements from section 8 of the landscape character and visual impact assessment (refer to Appendix I of the review of environmental factors for the master plan). Mitigation measures included in the urban design report include retention of road side trees where possible to provide visual screening of views of the road and design of a landscape plan to enhance the visual experience for road users and mitigate the potential visual impact on people living, working, shopping and participating in recreation activities in areas adjoining the road corridor.

2.11.3 Roadside maintenance

Submission number 10

Issue description

1) The area between the shared paths and the kerbs should be planted with ground cover and shrubs and should not be turfed to ensure these areas can be safely maintained by Liverpool City Council.

2) Batter slopes shall be treated with mass plantings to eliminate the need for intensive maintenance.
Response

A landscape character and visual assessment report was prepared for the proposal (SM&M 2012). A complete copy of the report is available in Appendix I of the review of environmental factors, and a summary of the findings is provided in Section 6.10 of the review of environmental factors. The report provides a framework and general principles for the landscape design.

The final landscape design would be prepared at the detailed design stage and would determine the landscaping and mass plantings required. All landscape plans would take into consideration any ongoing and future maintenance requirements. Landscape plans and requirements would be prepared in consultation with the relevant Council and/or land manager for that area.

2.12 Noise and vibration

2.12.1 Noise assessment guidelines

Submission number 8

Issue description

1) There is no recognition in the acoustic assessment report that RMS has an adopted Environmental Noise Policy (ENP) that endorses the application of the NSW EPA's Environmental Criteria for Road Traffic Noise (ECRTN) in the Camden LGA.

2) The proposal would increase the operational road noise for receivers in Harrington Park, however given RMS' application of the NSW Road Noise Policy (RNP), which doesn't recognise external amenity, Council is concerned that no safeguards are proposed to mitigate increased noise levels for residential backyards.

Response

The ECRTN guideline was superseded in July 2011 by the NSW Road Noise Policy (RNP). The ECRTN is therefore no longer a valid tool for road traffic noise impact assessment. The RNP guideline has a similar approach to the assessment of traffic noise. The criteria for the assessment of road traffic noise outlined in the RNP (DECCW 2011) are supplemented with “interim approaches” developed by RMS to implement the new policy provisions. These interim approaches outline how the provisions in the Environmental Noise Management Manual (ENMM) (RTA 2001) apply to the recently released RNP. These documents work together to assist in developing feasible and reasonable noise mitigation options where the noise levels associated with the proposed activity exceed the RNP assessment criteria.

The RNP requires the consideration of external amenity by reference to the noise criteria for new or redeveloped road projects. Where these criteria cannot be met by road design measures, mitigation is recommended in accordance with the ENMM.

A noise and vibration assessment was prepared by SKM (refer to Appendix K of the review of environmental factors). A summary of the assessments findings was provided in section 6.5 of the review of environmental factors. The operational traffic
noise impacts were predicted for receivers for 2016 and 2026 using forecast traffic volumes in the area. As outlined in section 6.5.3 of the review of environmental factors, there would be an increase in noise as a result of the proposal.

Noise impacts arising as a result of the proposal would be managed through the appropriate application of noise treatments. Those receivers identified as potentially requiring consideration for treatment to mitigate noise impacts are outlined on pages 59 to 91 of Appendix K of the review of environmental factors (33 receivers in total). These receivers would be subject to further investigation during the detailed design to identify feasible and reasonable noise treatments. Receivers in Harrington Park have not been identified as requiring noise mitigation as the proposal is not predicted to increase road noise levels above criteria set out in the RNP and ENMM. Management measures specific to this proposal were discussed in section 6.5.4 of the review of environmental factors, and would be further developed during the detailed design and construction phases.

2.12.2 Noise assessment

Submission number 5

Issue description

1) Location 2 (note that location 2 is near George Bransby Circuit) is not representative of traffic noise levels following Sydney Water works that removed trees adjacent to properties along the eastern side of The Northern Road. The removal of trees has increased the road traffic noise in addition to increased vehicles (including heavy vehicles) over the past 12 months.

Respondent queries the statement that the traffic noise levels at Location 1 and Location 2, although closer to the road than the other monitoring locations, were lower due to the shielding from the existing noise mounds and boundary fences that surround the estates at Harrington Park. The land from the existing The Northern Road (on the eastern side) has a gentle slope up to the fence line and although this is considered by the respondent to provide some attenuation of the traffic noise levels. The respondent stated that there is definitely no noise mound that the respondent is aware of, unless the mounds are to be installed during the upgrade.

2) The respondent requested a change in the design to include a lower grade between CH 140 to CH 1750 (Harrington Park estate) to reduce noise levels.

Response

A noise and vibration assessment was prepared (SKM 2012) in accordance with noise and vibration criteria presented in the RNP, ‘Interim Construction Noise Guideline’ (ICNG) (2010) and RMS’ (ENMM) (2001). A summary of the assessment is provided in Section 6.5 of the review of environmental factors and the full report is provided at Appendix K.

Section 6.5.1 of the review of environmental factors identified six sensitive receiver locations to carry out noise monitoring. Noise monitoring at the sensitive receiver locations measured ambient noise levels to characterise the existing environment.
The locations were representative across the alignment and were selected to validate traffic noise based on proximity to the existing road, properties that had minimal shielding from local terrain effects and those properties that maximise the probability that measured levels were directly attributable to road traffic noise. Monitoring was undertaken between 28 November and 5 December 2011 which was before the vegetation was removed by Sydney Water for the pipeline. The monitoring locations have been incorporated in the predictive noise model for the proposal to account for all affected receiver locations. While monitoring was not undertaken in George Bransby Circuit, specialist noise advice is that there would be no change in the noise environment or the predicted levels in this area as the result of the removal of trees along the eastern side of The Northern Road fence line adjacent to Crain Court and George Bransby Circuit. The primary reason being, vegetation provides about one dB(A) reduction per 10 metres of dense vegetation (RTA 2001), and to the human ear the change would need to be three dB(A) to be perceptible. Although screen plantings have visual and privacy benefits, it provides only minor acoustic attenuation and would not achieve the necessary noise mitigation. Terrain can have an impact on noise attenuation. For example embankments can have some noise attenuation and influence noise deflection and distance transmitted. However, the influence terrain has on noise attenuation is dependent on the proximity of sensitive receivers to the terrain component. As indicated in Appendix K the traffic noise levels at Location 1 and Location 2, although closer to the road than the other monitoring locations, were lower due to the shielding from the existing embankment (gentle slope) and boundary fences that surround the estates at Harrington Park. From The Old Northern Road to Fairwater Drive and from Hillside Drive north to the last properties in Crain Court, earthen embankments are located between The Old Northern Road and the nearby residential receivers. While the landform varies for these embankments, they have been generally described as “mounds”, a description that is appropriate, particularly south of Fairwater Drive where monitoring was undertaken.

Sydney Water has advised RMS it is planning to reinstate the trees removed as part of their works in 2012.

Traffic data surveyed from 6 to 12 June 2011 was used in conjunction with land use planning to predict traffic volumes on The Northern Road for the year 2016 and 2026. Increases in traffic volumes (including heavy vehicles) from the time of the traffic survey have been accounted for in the predicted future traffic volumes. The noise impact assessment has considered noise levels based on the predicted future traffic volumes for the area, against project specific noise criteria. The monitoring locations are representative of residential locations in the Harrington Park area and the predicted noise levels at these locations would be confirmed during compliance monitoring subject to project approval.

The proposed road cannot be lowered from CH 140 to Ch 1750 (Harrington Park Estate) as the proposed The Northern Road needs to satisfy the 1 in 100 year flood immunity. Excavation of the road at this location may potentially reduce noise levels due a topographic barrier, however, the noise and vibration assessment identified that noise levels would not exceed the RNP criteria when safeguards are applied. Therefore excavation of the road at this location would not be considered appropriate or needed.
2.12.3 Noise impacts

Submission numbers 1, 7 and 8

Issue description

1) Noise impacts during construction from out of hours activities in the vicinity of Avon Road.
2) Would the proposal affect acoustic measures included within the subdivision layouts near Harrington Park?
3) The acoustic measures provided as part of the Harrington Park subdivision would become ineffective with the future increase in road traffic levels.
4) Council is concerned that newly approved residential subdivisions adjoining The Northern Road have not been considered in the review of environmental factors or acoustic assessment. In addition the acoustic measures required for these subdivisions were based on the existing road configuration and traffic volumes.

Response

A noise and vibration assessment was carried out for the review of environmental factors by SKM in October 2012 (SKM 2012). A full copy of the report is provided in Appendix K of the review of environmental factors.

Section 3.3.6 of the review of environmental factors states that wherever possible, most of the construction activities would be undertaken during standard working hours. Therefore construction would be mainly conducted between 7am to 6pm Monday to Friday and 8am to 1pm on Saturday.

Should work be undertaken outside of the standard working hours measures would be undertaken to minimise traffic impacts. Works that may need to be undertaken outside standard working hours include:

- Construction and utility adjustment works requiring road occupancy.
- Construction of tie-ins with adjoining sections.
- Placement of asphalt wearing course.
- Intersection construction activities.

A preliminary assessment of typical noise levels for night time paving and asphalting was carried out to assess the potential noise impacts associated with out of hours work. The assessment has been summarised in section 6.5.3 of the review of environmental factors and provided at Appendix K. This assessment was based on noise catchment areas. It was predicted that if paving and asphalting works were undertaken out of hours, all assessed receiver locations within all noise catchment areas, would experience noise levels exceeding the night time noise management level (NML). From the information provided in the submission, it would appear that the submission relates to noise catchment area 7. If out of hours works is proposed in noise catchment area 7, all of the assessed receivers in this catchment were predicted to exceed the night time noise management level, of which eight would be highly affected. Highly noise affected was considered to be 75 dB(A) or above in accordance with the Interim Construction Noise Guideline.

As construction of the proposal is dependent on the rate of development in the South West Growth Centre the detailed construction methodology including construction
activities and out of hours work is unknown. Therefore the construction methodology would be reviewed during detailed design and prior to construction. Where out of hours works are required, they would be subject to further assessment of potential noise impacts, which would be carried out in consultation with the community and OEH. Should any works be required outside the standard working hours, such as night works, the procedures contained in the RTA’s Environmental Noise Management Manual 2001 ‘Practice Note vii – Roadwork’s outside of normal working hours’ would be followed. This would include notifying the local community of any works planned to be undertaken outside the standard construction hours. Where residents are highly noise affected (above 75 dB(A)) additional safeguards including respite periods would be considered in consultation with the affected community.

The review of environmental factors identified a number of management measures and safeguards to mitigate the potential noise impacts from construction activities. A Construction Noise and Vibration Management Plan (CNVMP) would be prepared during the detailed design phase after the construction methodology has been finalised, to identify noise mitigation measures for sensitive receivers. The CNVMP would include but not be limited to:

- A noise assessment in accordance with the Interim Construction Noise Guideline (DECC2009).
- Identification of potentially affected properties and residences.
- A risk assessment to determine potential risk for discrete work elements/activities likely to affect residents.
- A map indicating the locations of likely potential impacts.
- Mitigation measures to reduce excessive noise during construction activities including those associated with truck movements in accordance with the ICNG.
- Noise monitoring program during construction.
- A process for assessing the performance of the implemented mitigation measures.
- A process for resolving issues and conflicts.
- Where residents are highly noise affected (above 75 dB(A)) additional safeguards including respite periods would be considered in consultation with the affected community.

The main traffic noise impacts arise as the result of the increased traffic due to the increased population from the subdivisions in the area. In accordance with the RNP, the noise assessment included in the review of environmental factors (refer to section 6.5) assessed each scenario for the year of opening (2016) and the design year (2026). The assessment was for the “build” and “no build” options for the proposal. These scenarios included a considerable increase in traffic numbers from the current year of operations due to the expected growth within the South West Growth Centre.

The noise and vibration assessment considered the potential impacts to all existing receivers and on any individual residential dwelling with an approved development application for the construction. Where the proposal is predicted to increase noise levels RMS would consider all reasonable and feasible noise mitigation measures.

Development application approved following determination of the proposal, or any subdivision development for residential areas, has not been considered in the noise and vibration assessment. In accordance with the RNP, these developments are responsible for providing noise mitigation for sensitive receivers within their development. Ideally, these mitigation measures would include the cumulative impact of future traffic noise increases generated by each individual development as well as
other developments using the road network, and not just the existing traffic noise levels. Where the effect of a network wide increase in noise has been considered for each of these developments by the developer, the assessment outcomes would be expected to be the same as those in the review of environmental factors.

2.13 Non-Aboriginal heritage

2.13.1 State listed item

Submission numbers 8 and 14

Issue description

1) The RMS must apply to the Heritage Council for a formal reduction in the listed curtilage of Orielton to match the new alignment of The Northern Road.
2) A section 60 approval should be sought for all works in the curtilage of Orielton.
3) Based on the proposed impacts the works would have on the heritage significance of State listed items an exemption or exception is not an appropriate approval pathway.
4) Council requires RMS to acknowledge Denbigh as a State heritage item on the State Heritage Register (SHR). The Hook Driveway and gateposts on The Northern Road to the Denbigh property, while outside of the SHR curtilage, are assessed in the Denbigh Conservation Management Plan as having exceptional significance.
5) Council requires RMS to acknowledge the conditions placed on the development consent for Denbigh’s Hook Driveway intersection with The Northern Road. No acoustic walls are allowed at the intersection, and only mounding and an opening at the intersection are allowed.
6) Prior approval is required from the Heritage Council for all State heritage listed items and works on relics likely to be disturbed.

Response

A non-Aboriginal cultural heritage assessment was carried out for the proposal by Artefact in October 2012. A full copy of the report can be found at Appendix E of the review of environmental factors.

Section 6.2.3 of the review of environmental factors identified seven heritage items within the proposal. Of these, the heritage curtilage of four items fall within the proposal. These include the historic properties of Orielton SHR Maryland, the Bringelly Public School Group and the cottage at 1186 The Northern Road, Bringelly.

The Hillside Drive extension would have an impact on the setting of Orielton and views towards the homestead. However this link road has already been approved as part of the Harrington Park West project and heritage approvals have already been approved by the NSW Heritage Council for the link road works. This includes a section 60 approval granted for the Harrington Park West subdivision and an exemption notification for the construction of the link road. To minimise impacts on the views and settings of Orielton, the concept design was modified to align with the Harrington Park West project link road approved by the Heritage Council in 2010. Based on these modifications to the concept design the assessment found that the proposal would have a minor additional impact on the rural vista associated with
Orielton. Therefore it is RMS understanding that an exemption would be sought from the NSW Heritage Branch for Orielton before any impacts occur to the site, including impacts to archaeological deposits associated with the site. Further consultation with the Heritage Council would be carried out to determine whether an exemption is appropriate.

As identified in 6.4.2 of the review of environmental factors, RMS identified that the Denbigh estate is listed on the SHR and the Register of National Estate as an item of state significance. Figure 6.7a of the review of environmental factors shows the location of this listed estate and its curtilage, which is outside of the proposal area. The section of The Northern Road in which the gate posts are located is just outside the study area and would not be impacted by the proposal. The Hook driveway is to the west of these gate posts and therefore is also not affected. The section of The Northern Road where the gate post located is within the limits of works for Peter Brock Drive intersection constructed by others. The review of environmental factors for Peter Brock Drive intersection had previously been approved.

Section 6.4.4 of the review of environmental factors notes that consultation with the Heritage Council regarding the SHR listed item and items of archaeological potential would be undertaken. The RMS would ensure that relevant approvals from the Heritage Council for all work on State Heritage Listed items and all works likely to disturb relics are obtained prior to construction.

2.13.2 Link road impacts

Submission numbers 8 and 10

Issue description

1) The design must consider relocating Marylands Link Road 3 as it impacts on Maryland setting and views.
2) Screening with suitable vegetation at Marylands is only acceptable as a last resort.
3) The batter should be moved from the south gate post at Marylands.
4) The detailed design should include consideration to move the stub road at Mersey Road and Derwent Road to avoid impacts.
5) Camden Council and Liverpool City Council strongly advocate and stress that consideration and all effort should be made to relocate stub roads to avoid impacts and conserve the existing structures during the detailed design.

Response

The proposal requires the widening of The Northern Road and the construction with several link roads diverging from it. Most of the impacts to heritage items resulting from the proposal relate to the link roads.

Impact on Maryland

The concept design of Marylands Link Road 3 was extended to provide an indicative capacity required for the road only as the precincts plan is not yet available. The actual capacity of the side roads would be reassessed by Council and RMS when proposed development is confirmed as part of the Development Application assessment. In terms of the potential impacts to the gate posts, section 6.4.4 of the review of environmental factors states that an exclusion zone would be created for
the northern and southern gateposts and gatehouse at the entrance to Maryland. Detailed design of The Northern Road upgrade would consider steepening the batter to minimise potential impact.

In addition, the non-Aboriginal heritage report stated that "It would be preferable for the northern link road stub to be relocated outside curtilage of Maryland. If the road cannot be moved, impacts should be mitigated by planting screening vegetation along the sides of the road, in keeping with the aesthetic of the nineteenth century rural estate". As per section 6.4 of the review of environmental factors, screening vegetation would be planted along the road boundary of The Northern Road in order to alleviate any impacts on views from Maryland homestead.

Impact on House at Lot1 DP234403
The proposal includes a new link road, roughly opposite Mersey Road. The construction of the link road, as currently plan, would require the demolition of an historic house and kitchen building at Lot 1 DP234403, and removal of any archaeological deposits beneath or around the building. Alteration to the Mersey Road location would be considered during the detailed design phase to avoid impact to the historic house and as part of future residential development. Should alteration to the concept design not be possible archival recording would be conducted prior to any works being carried out.

Impact on Farmstead Complex (Lots 141 & 142 DP 625519)
The proposal involves constructing a link road through Lots 141 and 142. The road as currently planned would require demolition of a dam, historic fence lines, a stockyard and two farm buildings. During the detailed design consideration would be given to relocating the Derwent link road near the Farmstead complex (Lots 141 & 142, DP 625519) so as to avoid impacts to the farm buildings. If this is not feasible then archival recording would be conducted prior to any works being carried out.

2.13.3 Tree retention and screening

Submission numbers 8, 10 and 14

Issue description
1) Retain as many existing trees as possible at the Cottage No. 1186 The Northern Road.
2) Confirm impact on old Araucarian pine trees. The design must consider retaining the pine trees and establishing vegetation along the Northern Road and Marylands Link Road 2.
3) Screening vegetation must be planted along the length of the link roads to mitigate the visual impacts that the proposal has on the rural character of the area, particularly where the impacts intrude into significant heritage views or properties such as Orielton and Maryland. Screening vegetation should consist of species native to the Cumberland Plain, in informal clumps and drifts (rather than in any formal layout) as well as exotic species previously recorded as growing on the sites involved, such as on Orielton and Maryland.
4) Screening vegetation must be planted along the length of The Northern Road to mitigate the visual impacts the proposal has on the rural character of the area.
5) The existing street trees are an important part of the landscape and should be retained wherever feasible. A planting strategy is encouraged to assist with mitigating the removal of street trees.
Response

The retention of vegetation was a consideration during the concept design development. Several design refinements were made during the development of the concept to retain native trees within the road boundary. Section 2.6 of the review of environmental factors noted several design refinements made during the development of the concept design to save the native trees within the road boundaries.

The proposal would widen The Northern Road and would unfortunately reduce the curtilage of the cottage at 1186 The Northern Road, including the removal of existing trees.

The old Araucarian pine trees are located in the Marylands gardens which are near the homestead, away from The Northern Road. Vegetation near The Northern Road that is to be removed as part of the proposal is not considered to be part of the heritage plantings.

In section 6.2 of the review of environmental factors mitigation measures have been provided to minimise vegetation removal including the development of a flora and fauna management plan which would include clearly defining vegetation clearing boundaries according to the Biodiversity Guidelines (RTA 2011a). In addition section 6.10.4 of the review of environmental factors indicates that the detailed design would be undertaken according to the urban design vision, objectives and principles which underpin the concept design and incorporate the urban and landscape design master plan requirements from section 8 of the landscape character and visual impact assessment (refer to Appendix I of the REF for the master plan). Mitigation measures described in the urban design report include retention of road side trees where possible to provide visual screening of views of the road, design of a landscape plan to enhance the visual experience for road users and mitigate the potential visual impact on people living, working, shopping and participating in recreational activities in areas adjoining the road corridor.

2.13.4 Heritage Inventory sheets

Submission number 8

Issue description

Council requests inventory sheets to be forwarded to the NSW Heritage Office for inclusion in the Heritage Database.

Response

RMS will forward all newly identified items and archaeology to NSW Heritage Office, Camden Council, and Liverpool Council for inclusion in Heritage database and applicable DCP.
2.13.5 Impact on Bringelly items

Submission numbers 8 and 10

**Issue description**

1) Camden Council considers that the road widening would impact on the amenity and setting of Bringelly Public School by reducing the buffer between structures and the road, reducing the amount of landscape screening, and increasing impact of the road. Consideration should be given to what mitigating measures could be employed to lessen the impact of noise and the loss of the buffer area, including further landscaping.

2) Design must reconsider demolishing the Bringelly structures as these contribute to the significance of the Bringelly Township group.

**Response**

The Northern Road proposal widens the carriageway on the eastern side. The proposed kerb line for the upgrade generally follows the existing kerb line with the exception of the replacement bus bay. There is no impact on the current vegetation or buffer zone between the heritage buildings and the roadway.

2.13.6 Impact on Badgerys Creek Road old alignment

Submission number 8

**Issue description**

Clarification on figure 10.6 in relation to the impacts on Badgerys Creek Road (former road surface).

**Response**

Page 117 of Appendix E Non-aboriginal assessment stated that “The proposal would not directly impact the former road surface area identified near Denbigh (Figure 105), and only minor impacts to that between Badgerys Creek Road and Derwent Road (Figure 106). These former road surfaces all date from the mid-twentieth century and do not possess significant heritage value. However, it is possible that evidence for 19th century road surfaces survives beneath the 20th century bitumen and this evidence would be of State heritage significance.

The visible remains of the road are of low significance as they are mid 20th century and considering that there is a low chance that 19th century road surface would be present, impacts were not considered to be significant.

2.13.7 Acoustic walls

Submission number 10
Issue description

Acoustic walls are not considered appropriate due to the adverse visual impact on heritage items and on rural views.

Response

RMS notes Liverpool Council preference for noise treatments. Further investigation of all feasible and reasonable noise mitigation measures would be considered during detailed design for the affected receivers to reduce traffic noise levels at residences. Affected landholders would be consulted about their individual needs for a suitable solution.

2.13.8 Heritage recommendations

Submission numbers 8, 10 and 14

Issue description

1) Camden Council concurs with the following
   - The non-Aboriginal heritage assessment and the recommendations contained within it.
   - The review of environmental factors recommendations in regarding to heritage Bringelly School group.
   - The review of environmental factors recommendations in regarding to heritage of Bringelly church.
   - The review of environmental factors recommendations in regarding to structures at Lot 3 DP 590913.
   - The review of environmental factors recommendations in regarding to Princes of Wales Inn.
   - The review of environmental factors recommendations in regarding to Former Narellan Army Camp (potential archaeology remains).
   - The non-Aboriginal heritage recommendations for Orielton.
2) Liverpool City Council concurs with the Aboriginal heritage report.
3) The Heritage Council strongly recommends that all of the 27 recommendations presented in the non-Aboriginal heritage assessment be adopted.

Response

It is noted that Camden City Council and Liverpool City Council accept the non-Aboriginal heritage assessment and the recommendations detailed in that report.

All safeguards outlined in section 6.4.4 of the review of environmental factors would be implemented in order to mitigate impacts to non-Aboriginal heritage. The recommendations contained in this section of the review of environmental factors were based on the recommendations provided in chapter 9 of the Non-Aboriginal Heritage Assessment by Artefact (dated 2012).
2.13.9 History

Submission number 8

Issue description
There are two conflicting dates for TC Barker's death and clarification is sought.

Response
The differing dates of death for TC Barker's death relate to the father and son of the Barker's family. The father, Thomas Barker died in 1875. Thomas Charles (or T.C.) Barker was his son, and died in 1940. Further information has been provided in Appendix E of the review of environmental factors.

2.14 Public utility adjustment

Submission numbers 10, 11 and 15

Issue description
1) RMS should confirm the need for relocating services at this stage.
2) Endeavour Energy request consideration to revise the concept design to accommodate a future 132kV line without impact on an approved Development Application (DA) at Oran Park.
3) Road boundaries are to be adjusted to ensure that public assets are fully contained within dedicated public roads.

Response
Section 3.5 of the review of environmental factors provides details of the services within the proposal that would likely require relocation. These requirements have been developed and detailed as much as possible at the concept design stage. These plans have been developed in discussions with the primary utility providers to make every effort to ensure that all utilities can be provided within the proposed road corridor. The specific details for utility relocation cannot be fully undertaken until the detailed design stage. RMS would continue to consult and liaise with all primary utility agencies throughout the detailed design of the proposal and would work together to develop a plan for the necessary relocations.

RMS has investigated an option to move the alignment towards the east adjacent to Oran Park (west) to accommodate the relocation of power infrastructure which may assist in minimising and/or avoiding impacts on the adjacent approved DA. This option has proven to be possible. RMS has revised the property adjustment plan accordingly. Please refer to section 4 of this report and Appendix C for the revised property impacts.

RMS would contain all road assets within the road corridor. Utility and other public assets would be relocated within the road corridor where possible.
2.15 Socio-economic

2.15.1 Construction lighting impact on adjacent properties

Submission number 1

Issue description

Concern raised regarding lighting impacts during construction.

Response

Section 3.3.6 of the review of environmental factors states that wherever possible, most of the construction activities would be undertaken during standard working hours. Therefore construction would be mainly conducted during 7am to 6pm Monday to Friday and 8am to 1pm on Saturday.

However, should work be undertaken outside of the standard working hours it would be to minimise traffic impacts and may include:

- Construction and utility adjustment works requiring road occupancy.
- Construction of tie-ins with adjoining sections.
- Placement of asphalt wearing course.
- Intersection construction activities.

Where night works are required, consideration would be given to the location and direction of any lighting to minimise impacts on residents. Lighting would be oriented to minimise light spill outside of the proposal area.

Section 3.4 of the review of environmental factors identifies that the location of any compound or stockpile sites for construction would be located away from residential dwellings where possible. The location and direction of lighting for construction compound and stockpile sites would take into consideration light spillage into adjacent residents, where applicable.

2.15.2 Proposed sport facility near Harrington Park

Submission number 8

Issue description

1) The land required for acquisition in Narellan on the west side of The Northern Road, north of the intersection with Porrende Street, particularly Lot 8 DP 1132349 is planned to accommodate a sporting facility. The developer is currently in negotiation with Camden Council and the expected delivery is by 2017.

2) Consultation with Camden Council and the developer is required in relation to the proposed sporting facility at Porrende Street to ensure the facility is considered by the road design to ensure that the impact of the road upgrade is minimised and the ability of the developer to meet obligations of the Voluntary Planning Agreement is not compromised.

3) Further consideration should be given to proposed floodlights servicing the
sporting complex and the impact on the passing traffic. Particular attention should be given to the finished levels of the road and the floodlight height.

Response

The review of environmental factors identifies that Lot 8 DP 1132349 (north of the intersection with Porrende Street) would be impacted as part of The Northern Road upgrade. The impacts include for batters, grassed drainage channels. Potential layout plans for the general location of facilities and access for the sporting facility were provided with the submission. These indicated that access for this facility would be from the Porrende Street roundabout and not from The Northern Road which is the RMS preferred access route.

RMS would consult with Council regarding this future development and the potential property acquisition requirements for The Northern Road upgrade. Council should keep RMS up to date on any further development for this site as it occurs.

The installation of any flood lighting from the proposed Porrende Street sporting facility would need to meet industry standards to ensure that it does not pose a safety risk to road users of any adjacent road, including the upgraded The Northern Road.

2.15.3 Property impacts on existing land uses

Submission number 12

Issue description

1) The need for property acquisition of a property for the proposal would impact on the ability of the land owner to continue to train horses on the property.
2) The proposal would impact on the value of any potential sale in the future.

Response

The construction of the upgrade for The Northern Road would be undertaken in stages and is likely to coincide with the release of adjacent land for the urban development of the South West Growth Centre precincts. The proposal allows for the progressive upgrade of The Northern Road over the next 20 to 30 years. Therefore the current land uses and businesses would be able to continue to operate until urban development commences in each area. This urban development is likely to have changed the adjacent land uses by the time property acquisition for the upgrade is required.

Section 2.4 of the review of environmental factors identifies that the upgrade of The Northern Road was included in the original planning for the overall South West Growth Centre. The planning identified upgrading and widening of the current road alignment. Upgrading the existing alignment was favourable as the dedicated existing road corridor is about 45 metres wide. This provides for the widening to occur primarily within the existing corridor, minimising impacts on adjacent properties while providing for the predicted future growth within the South West Growth Centre.

Section 3.6 and Appendix C of the review of environmental factors identifies the indicative property acquisition that would be required for the proposal. It identifies
that three properties would require full acquisition and a further 148 properties would require partial acquisition. Most of this partial acquisition is strip acquisition of private properties running parallel to the proposed road upgrade. Given most of the properties along the proposal route are larger agricultural or market garden properties this option was considered to have the least impacts on adjacent properties, while providing the opportunity for businesses to continue to operate until the urban development of the South West Growth Centre occurs.

Specific quantities of property acquisitions required would be determined during detailed design, and impacts to adjacent properties would be minimised where possible. All property acquisition would be undertaken in accordance with the provisions of the RMS’ Land Acquisition Policy and the Land Acquisition (Just Terms Compensation) Act 1991. Considerations for compensations under the Land Acquisition (Just Terms Compensation) Act 1991 are extracted below:

“In determining the amount of compensation to which a person is entitled, regard must be had to the following matters only (as assessed in accordance with this Division):

(a) the market value of the land on the date of its acquisition;
(b) any special value of the land to the person on the date of its acquisition;
(c) any loss attributable to severance;
(d) any loss attributable to disturbance;
(e) solatium;
(f) any increase or decrease in the value of any other land of the person at the date of acquisition which adjoins or is severed from the acquired land by reason of the carrying out of, or the proposal to carry out, the public purpose for which the land was acquired.”

2.15.4 Property impacts on approved development applications

Submission numbers 6 and 11

Issue description

1) The proposal is generally consistent with the Oran Park precinct plan, and the proposed intersection arrangements are consistent with the traffic modelling undertaken as part of the precinct planning and is generally supported by DP&I.

2) The proposal impacts on new residential subdivisions recently approved in the Oran Park precinct. Ongoing consultation by RMS with the developers of the Oran Park precinct will be required to ensure the interface between development and the road is appropriately addressed.

3) Respondent objects to property acquisition to two current subdivision development applications (DAs) at Oran Park (west) as it would cause undue delay, cause financial impacts and detrimentally affect efficiency of the lot layout. Acquisition is not necessary and is only included to enable future cut batters on the western side of The Northern Road.

Response

RMS notes the support of DP&I for the consistency between the Oran Park precinct plan and The Northern Road upgrade proposal.
As noted in section 2.14 of this report, RMS has adjusted the proposed alignment at this location to remove the impact on the approved DAs at Oran Park (west). Please also refer to section 4 of this report and Appendix C for the revised property drawings.

2.15.5 Clarification on property acquisition boundaries

Submission numbers 7 and 9

Issue description

1) Does the proposal boundary shown on the maps in Appendix C represent land to be acquired by RMS?
2) Camden Council requests details of the proposed alignment and widening required to facilitate the upgrade of The Northern Road and also recommends that the RMS advance the design process of The Northern Road Upgrade to facilitate the planning and integration with adjacent precincts.

Impact at Harrington Park

3) Clarification is required in relation to the area of land requiring acquisition between road design chainage 1600 to 2300 from property acquisition maps.
4) Define the terms ‘property impact boundary’ and ‘proposal boundary’ and in doing so, state the difference between them.
5) Would the proposal require the acquisition of land at Precincts L, M and O at Harrington Grove. Respondent seeks to enter into discussion with RMS about property acquisition.
6) The inlet and outlet works for the transverse drainage at chainage 2160 located in Harrington Park appear to be located on private land.
7) Is the tail-out conveyance at the proposed transverse culvert (chainage 1390) within land under the ownership and control of the RMS or within private property under private ownership.

Impact at Oran Park Link Road 2 (west)

8) Concern regarding property acquisition near Oran Park Link Road 2 in regard to the extent of the land required as part of the upgrade. Extent of property acquisition at Oran Park Link Road 2 should be adjusted to the limit of proposed works. The area of property acquisition in the review of environmental factors is vastly different to the land shown in the community newsletter for Oran Park Link Road 2.

Response

The proposal boundary in Appendix A of the review of environmental factors and the proposed impact boundary noted on Appendix C demonstrate the same boundary. This includes the indicative property acquisition boundary at the concept design stage.

The proposal boundary/ proposed impact boundary is shown as a red line in Appendix A and dashed black line in Appendix C. It generally identifies the extent of
the impact area that construction of the proposal is likely to have. This boundary is generally fairly lenient so that RMS can fully assess all the potential environment issues within that boundary, and therefore the worst case scenario of what the potential impacts may be. This boundary was used to identify the preliminary property acquisition quantities at the concept design stage. This is not necessarily the area that would require acquisition for the proposal. Some of the land may only be temporarily impacted during construction and/or potentially only require a lease from the property owners. The final quantities of land acquisition, lease and easements would be determined during detailed and minimised as much as possible. RMS would undertake discussions and negotiations with all property owners (including developers) affected by the proposal as more specific details about the quantities of land required become available during detailed design.

All property acquisition would be undertaken in accordance with the provisions of the RMS Land Acquisition Policy and the *Land Acquisition (Just Terms Compensation) Act 1991*.

**Impact at Harrington Park**
The proposed carriageway as part of the upgrade does not impact on the approved Harrington Park precincts L and M. However, there is some property impact along The Northern Road adjacent to Precinct L relating to the provision for batters and construction access. RMS encourages the developer/landowner to adjust their ground level to the proposed road level to minimise the extent of batters required. RMS would consider other suggestions to minimise these impacts. There is also a drainage channel currently proposed along Cobbitty Road (west) that appears to impact on the proposed precinct M. This drainage channel is designed as a depressed grass swale, which could be returned to the land owner after the roadworks construction is completed if required. However the proposed service roads as part of precinct M along Cobbitty Road (west) may negate the need for the drainage channel and hence reduce the impact. As the detail of the service road is not yet available to RMS, the actual impact can not be assessed. When the detail of the service road is available, discussions can be carried out to review requirements for the drainage channel along Cobbitty Road (west).

Details of subdivision O have not been received, therefore RMS can not confirm the potential impacts. Future subdivision submissions will be considered and reviewed by Camden Council in consultation with RMS.

The proposed inlet and outlet works for the transverse drainage at chainage 2160 located in Harrington Park, as identified in Appendix A, are currently located on private property. Appendix C of the review of environmental factors has identified that partial acquisition of this property would also be required as part of the proposal to accommodate this facility.

The proposed tail-out conveyance at the transverse culvert (chainage 1390) as identified on the proposal concept plans in Appendix A of the review of environmental factors is currently located on private property. Appendix C of the review of environmental factors has identified that partial acquisition of this property would be required as part of the proposal to accommodate this facility.

**Impact at Oran Park Link Road 2 (west)**
RMS acknowledges that there are differences in the extent of the Oran Park Link Road 2 in the community update and the review of environmental factors. RMS has provided the expected capacity for the proposed link roads with the information...
currently available. The actual configuration of the future side road beyond the limits of The Northern Road upgrade (limit of works) would need to be assessed when further information is made available as part of the development application. As a result, Appendix C of the review of environmental factors has been revised to bring the property impact boundary closer to the limits of works. Please refer to section 4 of this report and Appendix C of this report for the revised extent of property impacts. The actual areas required for acquisition would be discussed with the directly affected land owners during the detailed design phase.

2.16 Soils, landscape and water quality

2.16.1 Land management

Submission number 8

Issue description

1) Council’s Management of Contamination Lands Policy requires consent from Council for remediation works. A remediation action plan would be required as part of the application for remediation.

2) Council recommended an assessment in accordance with the EPA’s “Site Investigation for Urban Salinity” Booklet for the proposal. A suitable Salinity Management Plan may also be required to guide construction of the road upgrade.

Response

As indicated in section 6.6 of the review of environmental factors, a contaminated soils assessment was undertaken and included a background information review to assess areas of potential environmental interest (with respect to contamination), sampling during the geotechnical investigations, and analysis to quantify contamination risks associated with the identified areas of environmental interest. Based on the findings of this assessment the risk of contamination impacting upon human and environmental receptors during construction was considered to be low. As with all contaminated soil investigations, certainty cannot be provided that all contaminated sites within the proposal have been identified or whether sites on and/or adjacent to the proposal have been contaminated since completion of the investigation. Should contaminated land be suspected or found during construction, appropriate measures would be undertaken to classify and manage the contamination and ensure that it poses no or at least an acceptable level of risk to the environment and humans.

In addition, as indicated in section 4.1.1 of the review of environmental factors, clause 94 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) permits development on any land for the purpose of a road or road infrastructure facilities, to be carried out by or on behalf of a public authority without consent. As the proposal is for a road and is to be carried out by or on behalf of RMS, it can be assessed under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Development consent from Council would not be required. Therefore, if contaminated land is suspected or found during construction approval from Council would not be required. However Council would be notified if contamination is encountered during construction and Council would be advised of proposed
management measures. Appropriate measures would be undertaken to classify and manage the contamination and ensure that it poses minimal risk to the environment and humans.

As indicated in section 6.6 of the review of environmental factors, the majority of the proposal is located within areas of moderate soil salinity potential. However, there are areas that are identified as high salinity potential and known salinity potential that are mostly located in areas surrounding waterways that cross the proposal. Areas of known salinity include Thompsons Creek, Narellan Creek, and Lowes Creek. Areas of high salinity potential predominantly occur in low lying areas surrounding creeks. Results from salinity testing, undertaken as part of the geotechnical investigations, indicated that the soils were moderately saline. Therefore, excavation associated with the proposal would occur in moderate to high potential salinity areas. Mitigation measures included in the review of environmental factors to manage salinity include:

- Soil sampling to be undertaken prior to works commencing where high risk of salinity occurs, to identify the level of salinity in the soils.
- Where high saline soils are identified, salinity management options are to be considered and incorporated into the detailed design for structure protection (eg concrete cover requirements).

The soil sampling outlined above would be undertaken in accordance with the EPA’s “Site Investigation for Urban Salinity” booklet and the salinity management options would be detailed in a Salinity Management Plan. The salinity management plan would be used to guide construction of the proposal.

2.16.2 Construction water quality

Submission numbers 7 and 8

Issue description

1) Sedimentation basins are not proposed at Harrington Park despite the proposal disturbing about 0.85 ha of land at this site. Please provide a justification that no sedimentation and erosion control measures are required at this site during construction.

2) Details of stormwater management plan are requested by Council.

Response

During construction there would be potential impacts to water quality as a result of exposure of soils during earthworks, construction of the new bridges and large culverts and potential of chemical spills.

As stated in section 3.3.1 of the review of environmental factors, a preliminary drainage assessment identified the potential number and location of temporary sediment basins for the proposal. These basins were designed and positioned to control sediment within the construction area in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (LandCom, 2004) and Volume 2 (DECC, 2008), also referred to as the “Blue Book”.

The proposed location and sizing requirements for the temporary basins would be confirmed during detailed design. Construction phase catchment areas that are less than 0.85 ha would not require a sediment basin. The length of approx 1.85 km along
Harrington Park is divided into several sub catchments with less than 0.85ha and therefore would not require a sediment basin. The individual catchments of less than 0.85ha will be treated by local Erosion and Sediment Controls. This is an acceptable practice in accordance with the Blue Book (Soils and Construction 2004 and 2008). Other erosion and sediment controls would need to be used to manage sediment laden water, such as diversion of water from upstream catchments and transfer of 'clean' water through and around the construction site to minimise the amount of 'dirty' onsite water.

In addition, the safeguards and management measures for water quality identified in the review of environmental factors include preparation of a soil and water management plan and a work method statement that includes identification of areas requiring management controls (such as high risk areas including Narellan Creek, Thompsons Creek and Lowes Creek). The review of environmental factors found that with the implementation of the safeguards and management measures identified that the potential impacts to water quality could be avoided, managed and mitigated. These would be detailed in an Erosion and Sediment Control Plan that would be developed during the detail design phase.

2.16.3 Operational water quality

Submission number 8

Issue description
1) Potential impact on water quality due to the generation of additional pollutants from road widening and increased future traffic volumes.
2) The drainage design report does not contain operational water quality criteria for the grassed swales or checking dams. RMS should consider adopting the Oran Park Development Control Plan water quality objectives.

Response
Existing water quality in the receiving waterways is generally poor and impacted by neighbouring agricultural activities and urban development. Although the risk to water quality during operation of the proposal is considered low, a number of water quality improvement measures have been incorporated into the design. Sediment and attached pollutants were identified as the target pollutants, and as such grass swales would be installed to capture sediments from runoff before flowing into Narellan, Lowes and Thompson Creek's. The review of environmental factors also identified the need for permanent spill basins, which would be installed near Narellan, Lowes and Thompson Creek's and a tributary to South Creek. The spill basins are designed to contain spills in dry weather or during small storm events such as the 1 in 1 year ARI.

The water quality objective of the proposal is to minimise the potential impacts on downstream receiving waters so that the detrimental system changes to the existing water regime are the smallest amount practicable. This objective is consistent with the RMS’ Water Policy 1997 (RTA, 1997) and Code of Practice for Water Management 1999 (RTA, 1999). RMS would not adopt the Oran Park DCP water quality criteria as this DCP forms only a small portion of the entire proposal length.
A strategy to minimise water quality impacts was developed and included as part of the review of environmental factors. The strategy includes:

- Identifying the sensitivity of receiving environments.
- Identifying target pollutants (ie sediment and attached pollutants and or acute event pollutants from events such as accident spills).
- Identifying treatment measures to treat target pollutants (ie swales).
- Locating treatment measures at sensitive receivers.

2.17 Traffic and access

2.17.1 Bus stops

Submission number 10

**Issue description**

All bus stops must comply with Disability Standards for Accessible Public Transport.

**Response**

During the detailed design stage, bus stops would be designed to comply with Disability Standards for Accessible Public Transport. The bus stop location and replacement strategy would be developed in consultation with Council, bus operators and Transport for NSW. The design of replaced bus shelters would be in accordance with the RMS document Beyond the Pavement (RTA 2009) and the overall urban design strategy for the South West Growth Centre in consultation with Council.

2.17.2 Removal of slip lanes

Submission number 2 and 3

**Issue description**

1) Please explain the reason for the removal of left turn slip lanes at the upgraded intersections at Fairwater Drive/The Northern Road and Hillside Drive/The Northern Road, Harrington Park.
2) Removal of the left turn slip lanes at the above intersections would result in an increase to the time it takes to exit Harrington Park.
3) Suggests the removal of left turn slip lanes was a cost cutting exercise at the expense of motorists. Instead of existing left safely at any time onto The Northern Road (as is the case with the exits onto Camden Valley Way), motorists will have to sit and wait at traffic lights. This is in addition to having new traffic lights on The Northern Road.

**Response**

Section 2.6.4 of the review of environmental factors identifies that a number of left turn slip lanes and traffic islands originally proposed were removed during the concept design development. This includes:

- A left turn slip lane from Porrende Street onto The Northern Road heading


- A left turn slip lane from Fairwater Drive onto The Northern Road, heading south.
- A left turn slip lane from Hillside Drive onto The Northern Road, heading south.

These left turn slip lanes were removed due to the impacts they would have on adjacent property and heritage items. A review of traffic performance with these turns removed identified that the Level of Service for these intersections would be satisfactory up until 2026.

The above submissions raised concerns about the removal of the left turn slip lanes for southbound traffic exiting the Harrington Park estate. Therefore a review of the provision of these left turn slip lanes has been undertaken for the southbound turns from the Harrington Park estate. The results of this review are outlined below.

- The Fairwater Drive slip lane (southbound): There is potential for this slip lane to be reintroduced. Therefore the inclusion of a southbound left turn slip lane from Fairwater Drive would be considered during detailed design.
- The Hillside Drive slip lane (southbound): The provision of left turn slip lanes in this location would not be feasible as it would require full acquisition and potential impacts to a number of adjacent properties. The residential properties in this location are very close to the existing road. There would not be sufficient room to include a left turn slip lane and traffic island that would meet current road safety standards. As the level of service at this intersection would be acceptable without the left turn slip lane, there is not adequate justification for this level of impact to adjacent properties.

2.17.3 Access for maintenance

Submission number 8

**Issue description**

Council requests that access to stormwater quality provisions to be provided along the length of the proposal.

**Response**

Access to stormwater quality devices for maintenance has not yet been considered as part of the concept design for this proposal at this stage. During detailed design considerations for maintenance access for any water quality treatment devices would be addressed. This would be undertaken in consultation with local councils where these facilities would be handed over to Council for ongoing future maintenance.
2.17.4 Access strategy

Submission numbers 8, 9, 10 and 11

Issue description
1) DP&I confirms that a review of the concept design is generally consistent with the South West Growth Centre Structure Plan.
2) Clarification is required on the shorter term operation of the left-in, left-out of Loftus Road, Carrington Road and Belmore Road in terms of turning on stub ends at new signalised intersections within a reasonable distance.
3) Liverpool City Council and Camden Council support the pick up and drop off bay at Bringelly Public School.
4) Camden Council has concerns regarding the design of the U-turn and associated kiss and ride facilities provided along Greendale Road. Further consultation with Camden Council, Liverpool Council and Bringelly Public School are required in relation to the detailed design of the Greendale Road U-turn and kiss and ride facilities.

Response
It is noted that the DP&I confirms that the proposal is generally consistent with the South West Growth Centre Structure Plan which identified the need for existing arterial roads, including The Northern Road, to be upgraded over the next 25 to 30 years.

RMS acknowledges the general support of local councils for the provision of a kiss and ride facility at the Bringelly Public School and the concerns about the designs of this facility. During detailed design, RMS would undertake further consultation with the Department of Education, Bringelly Public School and the local councils about the development of these facilities.

The Northern Road access strategy was developed using the predicted increase in traffic growth in the South West Growth Centre to set out a vision for the upgrade of The Northern Road as a principal transport corridor. As part of the development of the South West Growth Centre strategy, the provision and location of intersections providing access to the urban development from all major arterial roads were determined, including The Northern Road were determined. The four-way signalised intersections are required to be spaced sufficiently apart to allow for efficient traffic flow along The Northern Road.

T-intersections with left in/left out only accesses have been provided at Loftus Road, Carrington Road and Robinson Road to maintain the traffic capacity as well as safety standard of The Northern Road as an arterial road. When the upgrade occurs, these intersections would be converted into left in- left out only with temporary U-turn facilities allowed for at Belmore Road (west) and Greendale Road. These facilities are within 1km of Loftus Road, Carrington Road and Robinson Road.

A four-way signalised intersection has been proposed at Belmore Road. The existing Belmore Road on the western side of The Northern Road would be realigned to this new intersection. Traffic using this intersection would be able to make all turning movements.
2.17.5 Cobbitty Road intersection

Submission number 9

Issue description
The Cobbitty Road and The Northern Road intersection should be constructed as a four-way signalised intersection to allow vehicles (including a significant proportion of large vehicles) to avoid driving through neighbourhood and town centres, past schools and along alternative routes.

Response
RMS reviewed the realignment of Cobbitty Road east and west to become a four-way intersection as suggested. The proposed realignment of the intersection would be located outside the certified area of the South West Growth Centre (refer to the attached map, 7 August 2008 to date from DP&I). Changing the configuration of this intersection would result in the removal of about 1.75 to 2.75 hectares of Cumberland Plain Woodland and fragmentation of eight to 16 hectares of Cumberland Plain Woodland outside of the certified area. Therefore, a referral under the Environmental Protection Biodiversity Conservation Act to the Commonwealth would be required.

The proposed realignment of the intersections would add an average of 100 vehicle/hr using the western link of Peter Brock during the peak period. During the off peak period this number is significantly lower.

The proposed realignment of Cobbitty Road is a logical solution, however due to the substantial impact on the Cumberland Plain Woodland outside of the certified area of the South West Growth Centre, the benefit can not be justified. Refer to section 3.1 for further information.

2.17.6 Intersection layout

Submission number 10

Issue description
1) How does the proposed intersections relate to the proposed link road shown in the South West Growth Centre Structure Plan. In particular it is unclear how Fifteenth Avenue in Austral would connect to The Northern Road.
2) The intersections of Badgerys Creek Road and The Northern Road, Derwent Road and The Northern Road as well as Mersey Road and The Northern Road are future intersections that will need to accommodate larger volumes of traffic.

Response
The proposed upgrade of The Northern Road was initially based on the South West Growth Centre Structure Plan. RMS has collaborated with DP&I to refine the proposed road network to cater for future development. This road network includes Bringelly Road, Camden Valley Way and current and anticipated local road connections. Fifteenth Avenue would be expected to connect to The Northern Road via Mersey Road and to function as an east-west Transit Boulevard. Badgerys Creek
Road would be expected to be function as a sub-arterial road with its capacity to be confirmed when further information becomes available. Badgerys Creek Road intersection with The Northern Road has been designed to allow for expected growth rates as currently planned by DP&I.

The traffic assessment at intersections of The Northern Road has taken into account the proposed speed limit, the proposed link roads, anticipating future local connections and pedestrian crossings at all legs of intersections.

Existing land uses adjacent to The Northern Road are expected to be retained until precincts are released and developed as part of the South West Growth Centre. Changes from rural residential, agricultural or public recreation areas to rural residential and residential areas would be expected as this land is developed. The proposal would facilitate and provide access to the existing and future planned areas of the South West Growth Centre. Current DAs were considered in the development of the concept design.

2.17.7 Cycleway

Submission numbers 4, 10 and 13

Issue description

1) The detailed design should include priority at signalised crossings for shared path users. Options for consideration include cars giving way to pedestrians and cyclists and flashing orange for cyclists to cross intersections.

2) Support for the provision of the shared path as part of The Northern Road upgrade. Confirm the shared pathway will operate in a similar way to the Cowpasture Road and Hoxton Park Road pathway.

3) Design to ensure the shared pathway is both functional and safe at roundabouts and signalised intersections. Concept design does not show crossing points.

4) The respondent requested adequate space for bikes to ride on the road

5) Liverpool City Council supports the shared path on the eastern side and provision for a shared path on the western side.

Response

It is noted that Liverpool City Council supports the provision of a bikeway on the eastern side of The Northern Road with provision for one on the western side.

The proposed shared path on The Northern Road would be similar to those on Cowpastures Road and Hoxton Park Road, as it would be a three-metre wide shared pathway with provisions at intersection crossings to provide for both pedestrians and cyclists.

Provision has been made for on and off-road cycleway along both sides of the proposal. The proposal provides two metres shoulders along both sides of the carriageway which would provide adequate space for experienced cyclists to travel on road. Allowance for cyclist crossings at intersections has also been included in the proposal.

Appendix C of the review of environmental factors shows crossings are proposed at all legs of signalised intersections. The crossings of the slip turn lanes would be
designed to have a "push-button" function as part of the traffic signal control. When this function is activated, the turning traffic would get a red signal to give way to pedestrians and cyclists. As the path is used for both pedestrians and cyclists, this facility would provide a safe crossing of the turn lanes at a push of a button.

The crossing arrangements on the main carriageway and side roads would be further developed during detailed design phase. The timing for each movement would be designed to ensure a fair proportion is applied to all. Pedestrian requirements would be further considered during detailed design and ensure pedestrian amenity and safety through appropriate phasing of traffic signals. The proposal would be designed to Austroads Standards and would be reviewed by RMS road safety section prior to construction.

2.17.8 Traffic generation

Submission number 9

Issue description
Traffic population assumptions are overstated and are more likely to be in the order of 11,500. Using correct population forecasts the western leg of the Oran Park Link Road 2 can be reduced to a more appropriately sized intersection.

Response
As indicated in section 2 of the review of environmental factors, the concept design and review of environmental factors were developed based on the predicted traffic growth for the South West Growth Centre.

The study area population and employment are expected to grow by 7% - 8% per annum compounded from 2011 to 2036.

The growth factor was based on Bureau of Transport Statistics (BTS) population and employment forecasts, which were released in October 2009.

Discrepancies in the modelling forecast would be discussed with developers during the detailed design stage when further details of the proposed subdivision/s are available. The sizing required for Oran Park Link Road 2 would be determined accordingly.

2.17.9 Traffic speed limit

Submission number 9

Issue description
Oran Park Link Road speed limit should be 50km/hr as it passes school, shopping and residential zones.
Response

Oran Park Link Road 1 is local Council road. Camden Council is the road authority and would determine the speed limit for this road. RMS, as the road authority for The Northern Road, has only identified a speed limit of 80km/h for the full length of the upgrade of The Northern Road.

An indicative 80km/h speed limit was used in the traffic model for Oran Park Link Road 1 (west) to identify the worst case scenario for traffic increase on this road. RMS does not propose or recommend this road to be posted at 80km/h.

2.17.10 Property access during construction

Submission number 1

Issue description

Concern raised regarding disruption during construction due to a left turn only from Avon Road.

Response

A Traffic Management Plan would be prepared and implemented for construction and would include measures to maintain access at all local roads (including Avon Road) and properties throughout the construction period. Prior to any unavoidable disruption to access, consultation would be undertaken with the affected property and/or business owners. As stated in section 6.9.3 of the review of environmental factors, detailed design of each construction stage would provide for U-turn facilities, for vehicles including B-double trucks, with a detour length no greater than four kilometres to access local roads and properties.
3 Additional assessment

3.1 Cobbitty Road intersection assessment

3.1.1 Summary

The proposed arrangement for the intersections of Cobbitty Road (east and west) and The Northern Road was displayed to the community for comments in July 2010. The designs for these intersections were subsequently displayed in November 2011 and again in October 2012 as part of the review of environmental factors display period.

During the review of environmental factors display, there was a request to review the proposed intersections arrangement with a view to make Cobbitty Road(s) and The Northern Road into a four-way intersection. The main reason for the request was due to a recent change in legislation to remove the requirement to assess the impact of development activities on threatened species and endangered ecological communities within the certified areas under the Environment Protection and Biodiversity Conservation Act 1999. The respondent included a letter from Eco Logical Australia Pty Ltd noting that The Northern Road and Cobbitty Road are within the certified areas in biodiversity certification order. The respondent believed that the four-way intersection would improve Cobbitty Road as an east-west arterial and minimise impact on the future Oran Park Link Road 1 (west).

RMS revisited the proposed two initial four-way intersection options (refer to figure 2), which were investigated prior to the community display in July 2010.
Figure 2. Cobbitty Road four-way intersection options – extract from UBM report
Figure 3. South West Growth Centre – Biodiversity Certification 1 July 2008 to date
RMS also reviewed the current certified areas for South West Growth Centre. The current map of the certified areas for the South West Growth Centre shows both of the above options to be outside of the certified areas. Refer to figure 3 on the previous page. An assessment of the potential impact to flora and fauna undertaken by UBM in 2010 is still applicable as the Biodiversity Certification remains unchanged since 2008. The change in legislation only remove the required assessment for threaten and endangered species under the Environmental Protection Biodiversity Conservation Act within the certified areas.

In terms of ecological impact, both options would require vegetation to be removed. UBM’s assessment identified that:

- Option 1 would require about 1.75 hectares of Cumberland Plain Woodland to be removed outside the South West Growth Centre SEPP boundary and would fragment about 8 hectares of Cumberland Plain Woodland.
- Option 2 would require about 2.71 hectares of Cumberland Plain Woodland to be removed outside the South West Growth Centre SEPP boundary and would fragment about 16 hectares of Cumberland Plain Woodland.

This assessment assessed the significance of the impacts from the two options. It concluded both options would likely result in a long-term impact to the condition and function of the Cumberland Plain Woodland remnant in this location as a result of the removal and isolation of habitat that is in moderate to high condition.

In assessing the level or significance of this impact it is important to consider the long-term cumulative impacts occurring in the region and the locality associated with the proposed growth centre and The Northern Road upgrade. This area of Cumberland Plain Woodland provides habitat for threatened flora and fauna and is listed as Critically Endangered under the Environmental Protection Biodiversity Conservation Act and located outside of the South West Growth Centre certified area boundary. Further fragmentation and reduction in the size of the habitat would impact on the condition and importance of this area of vegetation for populations of dependent flora and fauna and would need to be referred to the Commonwealth Department of Sustainability, Environment, Water and Populations for approval. A copy of this assessment is attached in Appendix B to this report.

In addition to the above impact, the following potential environmental impacts were also identified:

- Aboriginal heritage: Aboriginal artefacts would be impacted by both options and would require further assessment and consultation with Aboriginal representatives.
- Non-Aboriginal heritage: The Northern Road non-Aboriginal heritage report (Artefact 2012) assessed the area to the east at the Cobbitty Road intersection as being highly disturbed and having a low potential for remains of the former Narellan army camp. Both options do not appear to impact the former Cobbitty Road alignment, however, further assessment is required. No obvious non-indigenous issues were identified, however this would need to be quantified via an assessment.
- Noise: Both options would be located in close proximity to a house on the eastern side of The Northern Road. An assessment of noise impacts would be required to quantify the potential impacts and determine the proposed mitigation measures at this location.
Based on the significant ecological impact and the potential impacts identified above, RMS assessed that the potential traffic flow improvement from off set T intersections to a four-way intersection at Cobbitty Road(s) can not be justified.
4 Changes to the proposal

4.1 Relocation of proposal boundary at Oran Park

4.1.1 Description

Endeavour Energy requested a design change to allow the placement of power poles on the western side of the proposed upgrade between road design chainage 3880 to 4280 without impacting on an approved development application. Endeavour Energy also requested a consideration to review the proposed alignment between road design chainage 4280 to 4620 to minimise impact on the adjacent property. A review of the alignment was undertaken in this area.

The review identified that it would be possible to move the proposal boundary between road design chainage 3800 and 4540 without additional impact to adjacent property on the eastern side. The design realignment removed the impact on the approved development application between road design chainage 3880 and 4280. It also slightly reduced the impact on the adjacent property between chainage 4280 and 4540. The full impact in this property can not be removed due to close proximity to Oran Park Link Road 2 intersection. The concept design has been updated between chainage 3800 and chainage 4540 to minimise the impact as noted above.

4.1.2 Environmental assessment

Relocation of the proposal boundary (approximately 3 to 4 metres to the east) at this location will reduce property impacts on the western side of The Northern Road between chainage 3800 to chainage 4540. The relocation also allows Endeavour Energy to install power poles required for future development in the South West Growth Centre. Adjustments to the property boundary have been undertaken and are shown in the drawings provided in the revised Appendix C. It also provides the revised property impact calculations.

The new area of impact has been assessed as part of the original ground surveys for the broader corridor.

4.1.3 Revised management and mitigation measures

No additional or revised management measures were identified.

4.2 Movement of proposal boundary at proposed link roads

4.2.1 Description

As noted in section 2.15.3, review of the proposed property impacted boundary was undertaken to move to these boundary closer to the 'limit of works', as opposed to the 'limit of design', as shown on the property boundary maps provided in original Appendix C of the review of environmental factors. Changes to the proposal boundary have been made for the proposed link roads located in areas with subdivision plans currently unknown. Where upgrades to existing intersections have been proposed, the proposal boundary will remain at the 'limit of design', as tie in with the existing roads is required. Where the impacted area had previously discussed with affected land owners, the proposal boundary will also remain at the 'limit of design' to maintain consistency.
Table 4.2 describes the location and length by which the proposed link roads would be reduced when the ‘limit of works’ instead of the ‘limit of design’ is used to define the proposal boundary.

Table 4.2: Changes proposed link roads proposal boundary

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Description of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oran Park Link Road 2</td>
<td>East</td>
<td>Proposed impacted boundary reduced by about 180m</td>
</tr>
<tr>
<td>Oran Park Link Road 2</td>
<td>West</td>
<td>Proposed impacted boundary reduced by about 220m</td>
</tr>
<tr>
<td>Oran Park Link Road 3</td>
<td>East</td>
<td>Proposed impacted boundary reduced by about 20m</td>
</tr>
<tr>
<td>Maryland Link Road 1</td>
<td>East</td>
<td>Proposed impacted boundary reduced by about 120m</td>
</tr>
<tr>
<td>Maryland Link Road 1</td>
<td>West</td>
<td>Proposed impacted boundary reduced by about 220m</td>
</tr>
<tr>
<td>Maryland Link Road 2</td>
<td>East</td>
<td>Proposed impacted boundary reduced by about 260m</td>
</tr>
<tr>
<td>Maryland Link Road 2</td>
<td>West</td>
<td>Proposed impacted boundary remained the same</td>
</tr>
<tr>
<td>Maryland Link Road 3</td>
<td>East</td>
<td>Proposed impacted boundary reduced by about 200m</td>
</tr>
<tr>
<td>Maryland Link Road 3</td>
<td>West</td>
<td>Proposed impacted boundary reduced by about 200m</td>
</tr>
<tr>
<td>Lowes Creek Road</td>
<td>West</td>
<td>Proposed impacted boundary reduced by about 200m</td>
</tr>
<tr>
<td>Belmore Road</td>
<td>East &amp; West</td>
<td>Proposed impacted boundary remained the same</td>
</tr>
<tr>
<td>Derwent Road</td>
<td>East</td>
<td>Proposed impacted boundary remained the same</td>
</tr>
<tr>
<td>Mersey Road</td>
<td>West</td>
<td>Proposed impacted boundary reduced by about 140m</td>
</tr>
</tbody>
</table>

RMS would continue to consult with impacted land owners regarding tie-in requirements at the proposed link road intersections as part of the property acquisition process during detailed design.

4.2.2 Environmental assessment

Relocation of the proposal boundary would result in a reduction in property impacts as described in Section 3.6 and Appendix C of the review of environmental factors. Appendix C also provides the revised property impact calculations.

Although the property impacted boundary has changed, the limits of the review of environmental factors remain unchanged. Therefore there is no additional environmental assessment required.

4.2.3 Revised management and mitigation measures

No additional or revised management measures were identified.
5 Environmental management

The review of environmental factors for The Northern Road between The Old Northern Road, Narellan and Mersey Road, Bringelly identified the framework for environmental management, including management and mitigation measures that would be adopted to avoid or reduce environmental impacts (section 7 of the review of environmental factors).

After consideration of the issues raised in the public submissions and changes to the proposal, the management and mitigation measures for the following have been revised:

- Socio-economic.
- Proposed property impacted boundary.

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

5.1 Environmental management plans

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 Project Environmental Management Plan (PEMP) and a Contractors Environmental Management Plan (CEMP) would be prepared to describe safeguards and management measures identified. These plans would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The plans would be prepared prior to construction of the proposal and be reviewed and certified by environment staff, Sydney region, prior to the commencement of any on-site works. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP would be developed in accordance with the specifications set out in the:

- RMS QA Specification G38 – Soil and Water Management (Soil and Water Plan).
- RMS QA Specification G40 – Clearing and Grubbing.

5.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 5-2.
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General</td>
<td>All environmental safeguards must be incorporated within the following documents:</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Project environmental management plan.</td>
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<td></td>
<td></td>
<td>- Detailed design stage.</td>
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<td></td>
<td></td>
<td>- Contract specifications for the proposal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Construction environmental management plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>General</td>
<td>A risk assessment must be carried out on the proposal in accordance with the Roads and Maritime Services Audit Pack and OSD risk assessment procedures to identify an audit and inspection program for the works. The recommendations of the risk assessment are to be implemented. A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate. Any works resulting from the proposal and as covered by the review of environmental factors may be subject to environmental audit(s) and/or inspection(s) at any time during their duration.</td>
<td>RMS project manager and regional environmental staff</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>3.</td>
<td>General</td>
<td>The environmental contract specification must be forwarded to the RMS regional environmental officer for review at least 10 working days prior to the tender stage. A contractual hold point must be maintained until the CEMP is reviewed by the RMS regional environmental officer.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>4.</td>
<td>General</td>
<td>The Roads and Maritime Services Project Manager must notify the RMS regional environmental officer, Sydney Region at least five days prior to work commencing.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
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<tr>
<td>5.</td>
<td>General</td>
<td>All businesses and residences likely to be affected by the proposal must be notified at least five working days prior to the commencement of the proposed activities.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>6.</td>
<td>General</td>
<td>Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.</td>
<td>Contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>7.</td>
<td>Traffic and access</td>
<td>Therefore the inclusion of a southbound left turn slip lane from Fairwater Drive would be considered during detailed design.</td>
<td>RMS Project Manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>8.</td>
<td>Traffic and access</td>
<td>During detailed design, RMS would undertake further consultation with the Department of Education, Bringelly Public School and the local councils during the development of U-turn facilities on Greendale Road.</td>
<td>RMS Project Manager</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>
| 9.  | Traffic and access      | A detailed construction traffic management plan (CTMP) would be prepared during the detailed design phase. The CTMP would be prepared in accordance with the RMS’ Guide to Traffic Control at Work Sites and would include guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements. The CTMP would be submitted in stages to reflect the progress of work and would:  
- Identify the traffic management requirements during construction.  
- Describe the general approach and procedures to be adopted when producing specific traffic control plans.  
- Provide for the continuous, safe and efficient movement of traffic for both the public and construction workers.  
- Maintain the capacity of local roads.  
- Identify temporary speed restrictions to ensure safe driving environmental around work zones. | Construction contractor | Pre-construction        |
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<tr>
<td>10</td>
<td>Traffic and access</td>
<td>Traffic control plans (TCPs) would be prepared and implemented for the appropriate stage of works by suitably qualified personnel. Implementation of TCPs would be inspected as required for the duration of the construction phase in accordance with the RMS Traffic Control at Worksites Manual.</td>
<td>Construction contractor</td>
<td>Pre-construction &amp; construction</td>
</tr>
<tr>
<td>11</td>
<td>Flora and fauna</td>
<td>Minimise the removal of vegetation within areas that are ‘non-certified’ would be considered in the detailed design.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
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<td>12</td>
<td>Flora and fauna</td>
<td>Safeguards as described in the Biodiversity Guidelines (RTA 2011a)</td>
<td>RMS project manager</td>
<td>Detailed design</td>
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<td></td>
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<td>would be applied, including riparian revegetation post-scour protection.</td>
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<td>13</td>
<td>Flora and fauna</td>
<td>The design of creek and waterway crossings would be in line with guidelines to maintain adequate fish passage according to fish habitat (Fairfull and Witheridge 2003).</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>14</td>
<td>Flora and fauna</td>
<td>A rehabilitation plan including the selection of suitable native plant species would be developed during detailed design.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
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<tr>
<td>15</td>
<td>Flora and fauna</td>
<td>Should blockage of culverts be required, a permit to temporarily block fish passage would be obtained.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
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</tbody>
</table>
| 16  | Flora and fauna         | A flora and fauna management plan would be prepared as part of the CEMP. The plan would include but not be limited to the following:  
  - Clearly defined vegetation clearing boundaries including a map representing areas that would need to be protected (including exclusion zone fencing requirements).  
  - Pre-clearance surveys and management measures.  
  - Provision for the education of all construction personnel with regards to the importance of clearing limits and remnants/individual trees of significant value.  
  - A procedure for clearing hollow bearing trees in line with the then RMS Biodiversity Guidelines.  
  - A weed management plan.  
  - Safeguards to minimise unavoidable impacts to biodiversity according to the Biodiversity Guidelines (RMS 2011a). | Construction contractor | Pre-construction |
<p>| 17  | Flora and fauna         | Pre-clearance surveys would be undertaken by a suitably qualified ecologist prior to any clearing works to clearly demarcate and map.                                                                                                                                                                                                                      | Construction contractor | Pre-construction |</p>
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<td>vegetation protection areas. These surveys would include a survey of the existing bridge structures to confirm that the bridges do not continue provide habitat for microchiropteran bats. The management measures identified as a result of the pre-clearing survey would be incorporated into the Flora and Fauna Management Plan of the CEMP.</td>
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<tr>
<td>18.</td>
<td>Flora and fauna</td>
<td><em>Where possible areas within the assessed areas that do not need to be cleared to provide for construction activities would be included as part of the exclusion areas and fenced accordingly.</em></td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>19.</td>
<td>Flora and fauna</td>
<td>A Biodiversity Offset Strategy would be developed for the 0.1 hectares of ENV to be removed from non-certified areas. This plan would be developed in consultation with OEH. Offsets would be in accordance with relevant biodiversity measure 11 of the Biodiversity Certification. Offsets would be developed in consultation with both DP&amp;I and OEH. <em>This plan to be provided to Council.</em></td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>20.</td>
<td>Flora and fauna</td>
<td><em>During detailed design a nest box plan would be prepared by a suitably qualified ecologist in consultation with OEH and council. The plan would determine the most appropriate locations for the installation of roost/nest boxes to mitigate potential impacts on microbats and arboreal fauna due to the removal of hollow bearing trees for that stage of construction. In accordance to RMS Biodiversity Guidelines – Guide 8 Nest Boxes, the roost/nest boxes would be installed at least three to six months prior to removal of vegetation, where feasible.</em></td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>21.</td>
<td>Flora and fauna</td>
<td>Temporary infrastructure would be sited and the sites managed to avoid potential impacts to areas of significant biodiversity, such as areas of native vegetation and the locations of records of the Cumberland Plain Land Snail.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>22.</td>
<td>Flora and fauna</td>
<td>Regular inspections would be undertaken to ensure all retained vegetation and fauna habitat are clearly marked and exclusion zones and fencing are maintained.</td>
<td>Construction contractor</td>
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<tr>
<td>23.</td>
<td>Flora and fauna</td>
<td>An ecologist would be present during the clearing of habitat trees to handle and relocate any injured fauna. WIERES would be consulted if any injured fauna are encountered.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>24.</td>
<td>Flora and fauna</td>
<td>RMS would develop a translocation strategy for the relocation of the Cumberland Plain Snail and Marsdenia viridiflora subsp. Viridiflora (Native Pear) within the proposal area where individuals of the species have been identified and suitable replacement habitat can be sourced.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>25.</td>
<td>Flora and fauna</td>
<td>Vegetation representative of River-flat Eucalypt Forest would be replanted in cleared areas adjacent to Thompsons Creek.</td>
<td>Construction contractor</td>
<td>Post Construction</td>
</tr>
<tr>
<td>26.</td>
<td>Aboriginal cultural heritage</td>
<td>An Aboriginal cultural heritage management plan would be prepared and incorporated into the CEMP. The plan would include, but not be limited to the following:</td>
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<td>Pre-construction</td>
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<td>• Identification of Aboriginal cultural heritage areas using diagrams.</td>
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<td>• Identification of Aboriginal items that are not impacted by the proposal.</td>
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<td>• Measures to protect Aboriginal item such as fencing.</td>
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<td>• Induction requirements.</td>
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<td>• Mitigation measures to avoid risk of harm.</td>
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<td>• Process to communicate risk and responsibilities through environmental awareness training.</td>
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<td>• Include any requirements for AHIPs or approvals.</td>
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<td>27.</td>
<td>Aboriginal cultural heritage</td>
<td>An area based Section 90 Aboriginal heritage impact permit (AHIP) would be sought for impacts on all Aboriginal sites within the proposal that cannot be conserved, and for any required salvage excavations or surface collections. This includes the following items IFI (Harrington Park), O-IF-2/TNRU2, NR4, NR5, BRP-IF-16/TNRU14, TNRU1, TNR2, TNRU3, TNRU4, TNRU5, TNRU6, TNRU7, TNRU9 and TNRU10.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
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<td>28.</td>
<td>Aboriginal cultural heritage</td>
<td>A number of Aboriginal sites are currently listed on existing AHIPs (O-IF-3, BRP-S-01, BRP-S-04 and BRP-S-08). Before an AHIP application is submitted by RMS, the permit holder and OEH would be consulted as to the current status of the Aboriginal sites.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>29.</td>
<td>Aboriginal cultural heritage</td>
<td>Salvage excavation of a representative area of the sites with moderate archaeological significance would be undertaken to identify appropriate mitigation measures for these sites. This would include the following sites O-IF-2/TNRU2, BRP-IF-16/TNRU14, TNRU4 and TNRU6, TNRU10. A section 90 AHIP would be obtained to conduct this testing.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>30.</td>
<td>Aboriginal cultural heritage</td>
<td>Hand collection of site TNRU7 would be undertaken by the Aboriginal stakeholder group.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>31.</td>
<td>Aboriginal cultural heritage</td>
<td>The scarred tree NRST1 would continue to be conserved by the design. Prior to and during construction an exclusion zone would be in place around the tree so that impacts would be avoided during construction.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>32.</td>
<td>Aboriginal cultural heritage</td>
<td>Site cards for the newly recorded sites would be submitted to AHIMS and site update cards for those sites found to have errors in their co-ordinates would also be submitted.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
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<tr>
<td>33.</td>
<td>Aboriginal cultural heritage</td>
<td>An exclusion zone would be created for O-IF-3, Northern Road PAD2, NR6, BRP-S-01, BRP-S-02, BRP-S-08, TRNU8 and TRNU13 during construction.</td>
<td>RMS project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>34.</td>
<td>Aboriginal cultural heritage</td>
<td>Should Aboriginal cultural heritage items be uncovered during construction, RMS' unexpected finds procedure would be followed. All work in the vicinity of the find would cease and the RMS Aboriginal Cultural Heritage Advisor and the regional environmental officer would be contacted immediately. Works in the vicinity of the find would not re-commence until clearance is been received from those RMS officers and the OEH.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>35.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Where possible, heritage items and archaeological deposits would be avoided by the proposal.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>36.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Consultation with the Heritage Council regarding the State heritage register listed item and items of archaeological potential would be undertaken. Consultation would also be undertaken with Camden and Liverpool City Councils regarding potential impacts to locally listed heritage items.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>37.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Consideration would be given to veering the Derwent link road near Farmstead complex (Lots 141 &amp; 142, DP 625519) to the west to avoid impacts to the farm buildings. If the route of the road is not altered then archival recording would be conducted prior to any works being carried out.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>38.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Consideration would be given to moving the proposed link road at Mersey Road to avoid demolition of the house (Lot 1, DP 234403) and any associated archaeological deposits.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>39.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>A non-Aboriginal cultural heritage management plan would be</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
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<tr>
<td>40.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>An exemption would be sought from the NSW Heritage Branch for Orielton before any impacts occur to the site, including impacts on archaeological deposits associated with the millers cottage. A research design would be completed as part of this application and a suitably qualified excavation director would be nominated to ensure consistency of archaeological monitoring during the construction of the Hillside Drive link road.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
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<tr>
<td>41.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Archival and photographic recording of the Orielton homestead, driveway and its surroundings would be undertaken in order to document the character of the estate before construction.</td>
<td>RMS project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Non-Aboriginal cultural heritage</td>
<td>Archival recording would be undertaken for Lots 141 &amp; 142, DP 625519 prior to any works being carried out.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>42.</td>
<td>Non-Aboriginal cultural</td>
<td>If the route remains unchanged for House at Lot 1, DP 234403 archival and photographic recording, the creation of site plans and</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>

The environmental safeguards prepared and incorporated into the CEMP. The plan would include, but not be limited to the following:

- Identification of non-Aboriginal cultural heritage items using diagrams.
- Identification of non-Aboriginal items that are not impacted by the proposal.
- Measures to protect non-Aboriginal item such as fencing.
- Induction requirements.
- Mitigation measures to avoid risk of harm.
- Process to communicate risk and responsibilities through environmental awareness training.
- Requirements for applications and approvals.
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<td></td>
<td>heritage</td>
<td>archaeological monitoring would be required. A section 140 permit would be required to undertake monitoring and archaeological excavations if required at the site. As part of the application for the permit a research design would be developed and a suitably qualified excavation director nominated.</td>
<td>Construction contractor</td>
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<td>43.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>An exception would be obtained under section 139 of the Heritage Act before works begin within the Narellan Army Camp area.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
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<tr>
<td>44.</td>
<td>Non-Aboriginal cultural heritage general</td>
<td>A heritage induction would be provided before construction begins to inform workers of the location of known heritage items. This induction would include the process to follow if unanticipated heritage items or deposits are located during works, in accordance with the RMS Unexpected Archaeological Finds Procedure (November 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>45.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>The Orielton fence that would be removed as part of the road widening would be replaced with a suitable rural-style fence.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>46.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>A suitable entrance gate to Orielton would be constructed on the new link road stub. The link road stub would be constructed with suitable road treatments in order to reduce noise impacts at to Orielton.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>47.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Archaeological monitoring would be conducted during the construction of the Hillside Drive link road where deposits associated with the miller’s cottage may be located. A section 60 Permit would be required for archaeological monitoring.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>48.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>An exclusion zone would be created for the northern and southern gateposts, gatehouse at the entrance to Maryland, Prince of Wales Inn, Bringelly Church, Structures at Lot 3 DP 590913.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>49.</td>
<td>Non-Aboriginal cultural heritage</td>
<td>Screening vegetation would be planted along the road boundary of The Northern Road in order to alleviate any impacts on views from Maryland homestead and Cottage at 1186 The Northern Road.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>50.</td>
<td>Noise and vibration</td>
<td>Further investigation of all feasible and reasonable noise control options would be considered for the affected receivers (as identified in tables 6-44 and 6-45, and listed in Appendix K as part of the proposal to reduce traffic noise levels to within the applicable noise limits. As a part of this investigation affected landowners would be consulted regarding their individual needs.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
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</table>
| 51. | Noise and vibration                                   | A Construction Noise and Vibration Management Plan (CNVMP) would be developed during finalisation of the construction methodology and the detailed design phase. This plan would include but not be limited to: 
- A noise assessment in accordance with the Interim Construction Noise guideline (DECC2009). 
- Identification of potentially affected properties and residences. 
- A risk assessment to identify potential risk for discrete work elements/activities likely to affect residents. This would guide the development of the construction timetable and the identification of feasible and reasonable mitigation measures. 
- A map indicating the locations of likely potential impacts potentially impacted receivers. 
- Mitigation measures to control and minimise the impacts of construction noise and vibration with consideration of the requirements of section 5 of ENMM. 
- Noise monitoring program during construction. 
- A process for assessing the performance of the implemented | Construction contractor | Pre-construction    |
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<td>52.</td>
<td>Noise and vibration</td>
<td>Construction timetabling would be organised to minimise noise impacts. Timetabling considerations may include time and duration restrictions and respite periods. The nearest noise receptors would be notified of the construction work schedule and expected noise levels prior to construction. Where rock breaking/hammering is required within 10 metres of any occupied dwelling, occupants would be notified of the works and the duration of activity. Activity would be restricted to no more than two hours in any working day.</td>
<td>Communications manager</td>
<td>Pre-construction</td>
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<tr>
<td>53.</td>
<td>Noise and vibration</td>
<td>Where feasible and reasonable, measures identified to manage and mitigation operational noise and vibration impacts would be implemented as early and possible during construction to provide additional construction phase mitigation as well.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>54.</td>
<td>Noise and vibration</td>
<td>Where residents are highly noise affected (above 75 dB(A)) additional safeguards including respite periods would be considered in consultation with the affected community.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>55.</td>
<td>Noise and vibration</td>
<td>Works would be carried out during standard working hours (that is 7am-6pm Monday to Friday, 8am-1pm Saturdays). Any work that is performed outside normal work hours or on a Sunday or public holiday is to minimise noise impacts in accordance with the Environmental Noise Management Manual, “Practice Note vii – Roadworks Outside of Normal Working Hours and the Interim Construction Noise Guidelines (OEH 2010). This would include notifying the local community of any works planned to be undertaken outside standard construction hours.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>56.</td>
<td>Noise and vibration</td>
<td>A community liaison phone number and site contact would be provided so that noise and vibration-related complaints can be received and addressed in a timely manner.</td>
<td>Construction contractor</td>
<td>Construction</td>
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</table>
| 57. | Soils, landscape and water quality      | Detailed design would consider the following:  
  • Separation of off site and on site water.  
  • Sedimentation basin locations and sizes.  
  • Management of runoff during construction, including the application of appropriate erosion and sediment control measures.                                                             | Design contractor    | Detailed design |
| 58. | Soils, landscape and water quality      | During detailed design the design of the grass swales would include review of their location, length, size and design for operational water quality treatment.                                                                                               | Design contractor    | Detailed design |
| 59. | Soils, landscape and water quality      | A soil and water management plan (SWMP) would be prepared as part of the construction environmental management plan (CEMP) for the proposal before construction. The SWMP would address the RMS Code of Practice for Water Management, the RMS Erosion and Sediment Procedure and incorporate specifications outlined in the NSW Soils and Construction – Managing Urban Stormwater Volume 1 “the Blue Book” (Landcom, 2004) and Volume 2 (DECC, 2008).  
  The SWMP would include but not be limited to:  
  • Minimisation of the area of disturbance, including designated exclusion zones for construction plant and equipment storage and use.  
  • Delineation of traffic areas and restriction of entry and exit points to construction sites.  
  • Appropriate storage of chemicals and fuels.                                                                 | Construction contractor | Pre-construction |
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|     |        | - Description of works and activities and a list of equipment and machinery.  
|     |        | - Identify areas of risk (e.g. steep areas or high erosivity soils) and areas requiring management controls.  
|     |        | - A maintenance schedule for the ongoing maintenance of temporary erosion and sediment controls.  
|     |        | - Emergency procedures for chemical spills and other potential emergency incidents.  
<p>|     |        | This plan would be reviewed by the RMS regional environmental officer, Sydney Region before construction. | | |
| 60. | Soils, landscape and water quality | An Environmental Work Method Statement (EWMS) would be prepared for the proposal. With regards to soils, landscape and water quality, it would include the identification of areas requiring management controls (such as high risk areas including Narellan Creek, Thompsons Creek and Lowes Creek). | Construction contractor | Pre-construction |
| 61. | Soils, landscape and water quality | Progressive erosion and sediment control plans would be implemented. | Construction contractor | Construction |
| 62. | Soils, landscape and water quality | Water quality monitoring and construction works would be undertaken in line with the RMS Guideline for Construction Water Quality Monitoring (RTA undated) and EPL conditions. | Construction contractor | Construction |
| 63. | Soils, landscape and water quality | An incident emergency spill plan would be developed and incorporated into the CEMP. The plan would include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways and emergency response plan. | Construction contractor | Construction |
| 64. | Soils, landscape and water quality | An emergency spill kit would be kept on site at all times. All staff would be inducted into the incident emergency procedures and | Construction contractor | Construction |</p>
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<tr>
<th>No.</th>
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<tbody>
<tr>
<td>65.</td>
<td>Soils, landscape and water quality</td>
<td>Should a spill occur during construction, the incident emergency spill plan would be implemented, and the RMS regional environmental officer, Sydney Region would be contacted.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>66.</td>
<td>Soils, landscape and water quality</td>
<td>Stockpiles would be managed in accordance with the Stockpile Site Management Guideline (RTA 2011).</td>
<td>RMS project manager</td>
<td>Construction</td>
</tr>
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<td>67.</td>
<td>Soils, landscape and water quality</td>
<td>A site stabilisation plan would be prepared as part of the CEMP. The plan would include but not be limited to the following:</td>
<td>RMS project manager</td>
<td>Construction</td>
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<tr>
<td></td>
<td></td>
<td>• Identification and mapping of areas along the length of the proposal requiring stabilisation.</td>
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<td>• A risk assessment for disturbed areas and stockpiles.</td>
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<td>• Detailed methods for stabilisation.</td>
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<td></td>
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<td>• A monitoring program for the stabilised areas.</td>
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<td></td>
<td>• A process for determining the success of stabilised areas or methods.</td>
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<td></td>
<td>• A process for identifying additional stabilisation methods in:</td>
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<td></td>
<td></td>
<td>• All high risk areas would be stabilised within two weeks.</td>
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<tr>
<td></td>
<td></td>
<td>• All medium risk areas would be stabilised within one month.</td>
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<td></td>
<td></td>
<td>• In anticipation of rain events.</td>
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<tr>
<td>68.</td>
<td>Soils, landscape and water quality</td>
<td>Topsoil would be stockpiled separately for possible reuse in landscaping and rehabilitation works.</td>
<td>RMS project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>69.</td>
<td>Soils, landscape and water quality</td>
<td>Controls would be implemented at entry and exit points to minimise the tracking of soils and particulates onto pavement surfaces.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>No.</td>
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<tr>
<td>70.</td>
<td>Soils, landscape and water quality</td>
<td>Any material transported onto pavement surfaces would be swept and removed at the end of each working day.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>71.</td>
<td>Soils, landscape and water quality</td>
<td>Soil sampling would be undertaken prior to works commencing where high risk of salinity occurs, to identify the level of salinity in the soils.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>72.</td>
<td>Soils, landscape and water quality</td>
<td>Where high saline soils are identified, salinity management options would be considered and incorporated into the detailed design for structure protection (e.g., concrete cover requirements).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>73.</td>
<td>Soils, landscape and water quality</td>
<td>In the event that indication of contamination is encountered (such as odorous or visually contaminated materials), work in the area would cease until an environmental consultant can advise on the need for remediation or other action, as deemed appropriate.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 74. | Soils, landscape and water quality          | A fuel truck would be used during construction to refuel vehicles. This truck would be appropriately bunded and carry spill kit material. Should fuels, chemicals and liquids be stored within the proposal they would be:  
  - Stored at least 50 metres away from any waterways or drainage lines.  
  - Stored in an impervious surface or undertaken off-site. | Construction contractor | Construction |
<p>| 75. | Soils, landscape and water quality          | Vehicle wash downs and/or concrete truck washouts would be undertaken within a designated bunded area of an impervious surface or undertaken off-site.                                                                       | Construction contractor | Construction |
| 76. | Soils, landscape and water quality          | The proposal would be undertaken in line with the Code of Practice for Water Management (RTA 1999) and RMS' Water Policy.                                                                                                  | Construction contractor | Construction |</p>
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<tr>
<td>77.</td>
<td>Soils, landscape and water quality</td>
<td>Machinery would be checked daily to ensure that no oil, fuel or other liquids are leaking from the machinery.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>78.</td>
<td>Soils, landscape and water quality</td>
<td>Should the groundwater table be encountered a management plan would be prepared.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>79.</td>
<td>Hydrology</td>
<td>The proposal would be undertaken in line with the Code of Practice for Water Management (RTA 1999) and RMS' Water Policy. RMS would review Camden Council's Upper South Creek Floodplain Management Plan (2011) during detailed design.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>80.</td>
<td>Hydrology</td>
<td>Works to maintain bridge waterway area at Thompsons Creek bridge so that the potential increase in the 100 year ARI upstream flood levels and increase in flood risk to existing properties is alleviated.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>81.</td>
<td>Hydrology</td>
<td>Detailed flood modelling would be undertaken during detailed design. RMS would consult with any affected landowners identified regarding the potential drainage and flooding impacts on private properties, in order to formulate appropriate mitigation measures.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>82.</td>
<td>Hydrology</td>
<td>RMS would consult with Council during detailed design to confirm that future development upstream of proposal would not increase peak flows arriving at the proposed road corridor boundary.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>83.</td>
<td>Hydrology</td>
<td><em>Existing farm dams to be maintained where possible. Consultation with NSW Government Dam Safety Committee would only be undertaken if required. If any consultation with the NSW Government Dam Safety Committee is required, any approvals would be forwarded to local councils for their information.</em></td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>84.</td>
<td>Hydrology</td>
<td><em>RMS would continue to minimise the size and number of drainage channels required, and would consult with Council regarding ongoing</em></td>
<td>RMS project manager</td>
<td>Detailed design</td>
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<tr>
<td>85</td>
<td>Hydrology</td>
<td>Drainage systems would be checked at regular intervals and maintained to ensure they are operating at full capacity (e.g. clearance of debris from drainage lines).</td>
<td>RMS</td>
<td>Operation</td>
</tr>
<tr>
<td>86</td>
<td>Land use</td>
<td>Consultation would be undertaken with property owners partially or wholly impacted by the proposal.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>87</td>
<td>Land use</td>
<td>Property acquisition would be managed in accordance with the provisions of the Road and Maritime Services’ Land Acquisition Policy and the Land Acquisition (Just Terms Compensation) Act 1991.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>88</td>
<td>Socio-economic</td>
<td>Property acquisition would be managed in accordance with the provisions of the Road and Maritime Services’ Land Acquisition Policy and the Land Acquisition (Just Terms Compensation) Act 1991.</td>
<td>RMS Property Officer</td>
<td>Detailed design</td>
</tr>
<tr>
<td>89</td>
<td>Socio-economic</td>
<td>Detailed design of each construction stage would provide U-turn facilities, including for B-double trucks, to provide a detour length no great than five kilometres to access property.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>90</td>
<td>Socio-economic</td>
<td><em>RMS notes Camden Council's proposed sporting facilities and a water body near Narellan Creek and would include these for future design development reference.</em></td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>91</td>
<td>Socio-economic</td>
<td>Local residents would be notified prior to works commencing and would be kept regularly informed of construction activities during the construction process.</td>
<td>RMS project manager and construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>92</td>
<td>Socio-economic</td>
<td>A complaints-handling procedure and register would be included in the CEMP.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
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<tr>
<td>93.</td>
<td>Socio-economic</td>
<td>Ongoing consultation with Bringelly Public School to maintain access and safety for students. This may include education and awareness programs for school students about road safety in the vicinity of construction works.</td>
<td>RMS project manager and construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>94.</td>
<td>Socio-economic</td>
<td>Road users, pedestrians and cyclists would be informed of changed conditions including likely disruptions to access.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>95.</td>
<td>Socio-economic</td>
<td>Property access would be maintained wherever possible. Prior to any unavoidable disruption to access, consultation would be undertaken with the affected property owner.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>96.</td>
<td>Socio-economic</td>
<td>Early and ongoing consultation and communication with local businesses would be required to identify potential impacts on local businesses and appropriate management strategies to avoid or minimise these impacts. This may include measures such as additional signage, provision of alternative access including for delivery vehicles, and communication with local communities about changes to business access.</td>
<td>RMS project manager and construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>97.</td>
<td>Socio-economic</td>
<td>Access would be maintained for emergency vehicles in the vicinity of construction works. Ongoing consultation would be undertaken with emergency services during construction to ensure that potential impacts are identified and appropriately managed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>98.</td>
<td>Socio-economic</td>
<td>Prior to construction, residents in the vicinity of the construction compound sites and work areas would be notified.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>99.</td>
<td>Socio-economic</td>
<td>Prior to construction, RMS would also notify residents that may be in the vicinity of the construction compound sites and work areas.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>100.</td>
<td>Socio-economic</td>
<td>If night time works are required consideration would be given to the location and direction of lighting to minimise impacts on residents.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td>Lighting would be oriented to provide least light spill outside of the proposal during construction. The location and direction of lighting for construction compound and stockpile sites would take into consideration light spillage into adjacent residents, where applicable.</td>
<td></td>
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</tr>
<tr>
<td>101</td>
<td>Landscape character and visual impact</td>
<td>Detailed design would be undertaken according to the urban design vision, objectives and principles which underpin the concept design and incorporate the urban and landscape design master plan requirements from section 8 of the landscape character and visual impact assessment.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>102</td>
<td>Landscape character and visual impact</td>
<td><em>All landscape plans would take into consideration any ongoing and future maintenance requirements.</em> Landscape plans and requirements would be prepared in consultation with the relevant Council and/or land manager for that area.</td>
<td>RMS</td>
<td>Detailed design</td>
</tr>
<tr>
<td>103</td>
<td>Landscape character and visual impact</td>
<td>Existing trees would be retained in the road corridor where feasible. This would be undertaken by identifying 'no go areas' to restrict access around trees not affected by the proposal and making minor adjustments to the horizontal and vertical carriageways to move them clear of root zones.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 104 | Landscape character and visual impact                                   | Landscaping would be undertaken in accordance with the master plan and include:  
  - Screening trees and shrubs.  
  - Visually valuable exotic trees in existing residential and commercial areas.  
  - Scattered trees to maintain open views across rural areas.  
  - Planting in verges, medians and traffic islands to soften and break up large areas of pavement. | Construction contractor | Construction |

The Northern Road upgrade, Narellan to Bringelly
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<tr>
<td></td>
<td></td>
<td>• Maintenance, restoration and enhancement of riparian areas.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<td></td>
<td></td>
<td>• Maintenance of landmark regional views to the Blue Mountains and Razorback Mountains.</td>
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<td>105</td>
<td>Air quality</td>
<td>Stockpiles and general areas with the capacity to cause dust would have site-specific safeguards implemented such as water spraying, wheel washes, compaction or progressive revegetation or stabilisation with cover crops to suppress dust emissions.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>106</td>
<td>Air quality</td>
<td>Stockpiles would be managed in accordance with the Stockpile Site Management Guidelines (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>107</td>
<td>Air quality</td>
<td>Should wind reach a level where dust cannot be controlled, then the dust generating activity would be stopped.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>108</td>
<td>Air quality</td>
<td>Stabilisation and rehabilitation of disturbed surfaces would be undertaken progressively.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>109</td>
<td>Air quality</td>
<td>Construction equipment and vehicles would be properly maintained to ensure exhaust emissions comply with the POEO Act.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>110</td>
<td>Waste management and resource and water use</td>
<td>Water captured in construction sediment basins would be reused for dust suppression, watering of landscaped areas and any other suitable construction activity where feasible.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>111</td>
<td>Waste management and resource and water use</td>
<td>Procurement would endeavour to use materials and products with a recycled content and low carbon footprint where that material or product is cost and performance effective.</td>
<td>RMS project manager</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>112</td>
<td>Waste management and resource and water use</td>
<td>Excavated material would be reused on-site for fill or other RMS projects where feasible.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>113.</td>
<td>Waste management and resource and water use</td>
<td>Roadside materials (guideposts and signs) would be reused or recycled where feasible.</td>
<td>RMS project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>114.</td>
<td>Waste management and resource and water use</td>
<td>The contractor would classify any excavated spoil in accordance with the Protection of the Environment Operations Act 1997.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>115.</td>
<td>Waste management and resource and water use</td>
<td>Resource management hierarchy principles are to be followed:</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td></td>
<td></td>
<td>• Avoid unnecessary resource consumption as a priority</td>
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<td></td>
<td>• Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery).</td>
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<td></td>
<td>• Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).</td>
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<tr>
<td>116.</td>
<td>Waste management and resource and water use</td>
<td>Recyclable wastes would be separated and transported to a suitable recycler.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>117.</td>
<td>Waste management and resource and water use</td>
<td>All construction waste material would be removed from site once the works have been completed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>118.</td>
<td>Waste management and resource and water use</td>
<td>Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>119.</td>
<td>Waste management and resource</td>
<td>Any offsite disposal of spoil would be accompanied by a Section 143 permit under the POEO Act.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>120.</td>
<td>Waste and litter impacts during operation</td>
<td>Standard road maintenance works would be undertaken during operation. This would include litter removal and response to accidental spills and collisions. The maintenance requirements would be managed by RMS and/or Council, as per their standard operating procedures.</td>
<td>RMS</td>
<td>Operation</td>
</tr>
<tr>
<td>121.</td>
<td>Greenhouse gas and energy use</td>
<td>Further investigations into opportunities for reducing greenhouse emissions during construction and operation of the proposal would be undertaken during the detailed design phase.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>122.</td>
<td>Greenhouse gas and energy use</td>
<td>Equipment would be selected with the consideration of fuel efficiency.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>123.</td>
<td>Greenhouse gas and energy use</td>
<td>Material would be sourced from the local region, where possible, to reduce transport-related energy consumption.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>124.</td>
<td>Greenhouse gas and energy use</td>
<td>Surplus fill and waste material would be re-used on site, where possible</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>125.</td>
<td>Greenhouse gas and energy use</td>
<td>Machinery would be turned off, when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>126.</td>
<td>Greenhouse gas and energy use</td>
<td>The use of recycled steel in pavement/concrete reinforcement would be investigated and used, where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>127.</td>
<td>Greenhouse gas and energy use</td>
<td>Energy-efficient lighting would be used, where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>128.</td>
<td>Greenhouse gas and energy use</td>
<td>Delivery of materials with full loads would be collected from local</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
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<tr>
<td>129</td>
<td>Greenhouse gas and energy use</td>
<td>Energy use suppliers where possible to minimise the number of trips required and maximise fuel consumption.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>130</td>
<td>Greenhouse gas and energy use</td>
<td>Appropriately sized construction equipment, plant and vehicles would be used.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>131</td>
<td>Greenhouse gas and energy use</td>
<td>Servicing of equipment would be undertaken to ensure optimal performance and minimise down-time (which can reduce time disturbance and access areas).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>132</td>
<td>Greenhouse gas and energy use</td>
<td>Laydown of the vehicles and buildings would be undertaken in a way to minimise movement and clearing</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>133</td>
<td>Greenhouse gas and energy use</td>
<td>Intelligent vehicle use, such as not leaving the engine idling when not in use, would be undertaken</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>134</td>
<td>Greenhouse gas and energy use</td>
<td>Investigation of alternative fuels and power sources to be used would be undertaken and implemented, where appropriate.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>135</td>
<td>Greenhouse gas and energy use</td>
<td>Recycling of waste would be undertaken where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>136</td>
<td>Greenhouse gas and energy use</td>
<td>Material and waste supply and departure scheduling would be undertaken to optimise full loads and minimise required vehicle trips.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>137</td>
<td>Greenhouse gas and energy use</td>
<td>Energy-efficient lighting would be used where appropriate.</td>
<td>RMS</td>
<td>Operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Investigation of alternative power sources to be used where appropriate (e.g., solar power).</td>
<td>RMS</td>
<td>Operation</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>138</td>
<td>Climate change</td>
<td>Drainage requirements would take into consideration the effect of increased rainfall projections as a result of climate change on the proposal.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>139</td>
<td>Climate change</td>
<td>Conservation of vegetation and planting of street trees providing shade to the road surfaces would be considered during detailed design.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>140</td>
<td>Climate change</td>
<td>Hydrology assessment for detailed design to review potential climate change flood levels from both overtopping of local water course and increases sea level.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>141</td>
<td>Climate change</td>
<td>Flora selected for revegetation to take account of long-terms climate projections for the region.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>142</td>
<td>Climate change</td>
<td>Review tolerances for bridge structures to ensure suitability for projected climate extremes.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>143</td>
<td>Climate change</td>
<td>Review tolerances for asphalt taking into account projected climate change temperature ranges.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>144</td>
<td>Climate change</td>
<td>Consider projections for increased concrete structure deterioration in the specification and detailed design of concrete structures.</td>
<td>RMS project manager</td>
<td>Detailed design</td>
</tr>
<tr>
<td>145</td>
<td>Climate change</td>
<td>Regular inspections of pavement and structures along the road corridor would be undertaken and maintenance carried out as necessary.</td>
<td>RMS project manager</td>
<td>Operation</td>
</tr>
</tbody>
</table>
### 5.3 Licensing and approvals

Table 5-3: Summary of licensing and approval required.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Protection Licence (EPL) (under the POEO Act)</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>Minister for NSW Department of Trade and Investment, Regional Infrastructure and Service (Department of Primary Industries) must be notified of any dredging or reclamation works prior to the undertaking of such works (under the FM Act).</td>
<td>A minimum of 28 days prior to the commencement of the works.</td>
</tr>
<tr>
<td>The proposal may temporarily block fish passage during the construction of culverts and bridges and accordingly, a permit to block fish passage would be required under Section 220(1) of the FM Act.</td>
<td>Prior to the commencement of works within waterways.</td>
</tr>
<tr>
<td>Should the construction contractor have the need to establish bores for the purposes of investigation, extraction, dewatering, testing or monitoring, a licence would be obtained from OEH prior to the installation of the bores (under the WM Act).</td>
<td>Prior to the commencement of construction of the groundwater bores or dewatering.</td>
</tr>
<tr>
<td>A section 90 AHIP would be obtained for impacts on all Aboriginal sites within the design corridor that cannot be conserved, and for any required salvage excavations or surface collections (under the NPW Act).</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>If archaeological salvage excavations are conducted within the former location of the Narellan Army Camp or the Wesleyan Church which are areas of non-Aboriginal archaeological sensitivity, a consent permit or an excavation permit exception should be sought from the Heritage Council under section 139 of the Heritage Act 1977 (under the Heritage Act).</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>An exemption would be completed for the State listed Orielton for consideration by the NSW Heritage Council before any impacts occur to the site, including impacts on archaeological deposits or any part of the listed curtilage (under the Heritage Act).</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>If excavation is required in areas of archaeological potential for the Farmstead complex, a section 140 application would need to be made to the NSW Heritage Council in order to obtain an excavation permit (under the Heritage Act).</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>Act).</td>
<td>Prior to the commencement of construction works.</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>A section 140 permit would need to be obtained before any impacts can occur to the House at Lot 1, DP 234403 (under the Heritage Act).</td>
<td></td>
</tr>
</tbody>
</table>


6 References

SKM 2012, The Northern Road Upgrade Narellan to Bringelly, review of environmental factors, Sinclair Knight Merz, October 2012.

UBM 2010, The Northern Road Upgrade Cobbitty Road intersection, ecological assessment, UBM Ecological Consultants, July 2010.