

Submissions and Preferred Infrastructure Report

Albion Park Rail bypass

September 2017

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ROADS AND MARITIME SERVICES

ALBION PARK RAIL BYPASS

SUBMISSIONS AND PREFERRED INFRASTRUCTURE REPORT

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Appendix B Addendum Aviation Assessment

Appendix C Addendum Hydrology and Flooding Assessment report

Appendix D Biodiversity Assessment Report

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Appendix F Addendum Aboriginal Cultural Heritage Assessment Report

Appendix G Addendum Statement of Heritage Impact

Appendix H Noise and Vibration Addendum Report

Appendix I Urban Design and Landscape Comparative Assessment Addendum

GLOSSARY

AHD	Australian Height Datum: is a geodetic datum for altitude measurement in Australia.
ARI	Average Recurrence Interval: The long term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 years ARI flood event would occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
AS	Temporary ancillary site.
BR	Bridge.
Conveyance	The transport of floodwaters downstream with minimal, if any, damage.
dB(A)	Decibels
Flood depth	The depth of floodwater above ground level, typically in metres.
Flood level	The flood level is the depth of the flood waters as referenced against a standard datum. In Australia, the preferred datum is AHD (see above), which corresponds approximately to mean sea level. Hence, a flood level of 3.0 m AHD corresponds to a water depth 3.0 m above mean sea level.
Flood prone land	Land susceptible to flooding by the Probable Maximum Flood (PMF) event. Flood prone land is synonymous with flood liable land. The PMF event is also used to define the floodplain.
Framework for Biodiversity Assessment	The Framework for Biodiversity Assessment prepared by the NSW Office of Heritage and Environment underpins the Biodiversity Offsets Policy for Major Projects. It contains the assessment methodology that is adopted by the policy to quantify and describe the impact assessment requirements and offset guidance that apply to Major Projects
ha	Hectares.
Hydrology	Term given to the study of rainfall and runoff processes; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods. A hydrologic model is typically used to simulate flood flows in the creek/river, and these are then fed into the hydraulic model.

Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Landscape value	A term used under the Framework for Biodiversity Assessment, which describes the native vegetation cover, vegetation connectivity and other biodiversity factors. The landscape value for the project is calculated based on an equation within the Framework for Biodiversity Assessment.
LEP	Local Environmental Plan.
LEP Corridor	The road corridor gazetted by for the bypass of Albion Park Rail in the Wollongong and Shellharbour City Council Local Environmental Plans in the mid-1990s.
Local road	A road or street used primarily for access to abutting properties under the care of Council or similar.
Lot	A parcel of land defined by measurement as a lot in a deposited plan (DP) or as a Crown portion or allotment.
m	Metres.
m ³	Cubic metres.
mm	Millimetres.
NSW	New South Wales.
OLS	Obstacle limitation surface: Buildings, trees or other structures or objects that intrude into the obstacle limitation surface associated with an aerodrome have potential to act as obstacles to aircraft taking off or landing at an airport. The OLS are a set of imaginary surfaces associated with an aerodrome. They define the volume of airspace that should ideally be kept free from obstacles in order to minimise the danger to aircraft during an entirely visual approach. These surfaces are of a permanent nature and comprise the reference datum which defines an obstacle. Anything above the vertical limits of the OLS is regarded as an obstacle.

PANS-OPS	Procedures for Air Navigational Services — Aircraft Operations Surface: rules for designing instrument approach and departure procedures. Similar to an obstacle limitation surface, PAN-OPS is a surface that describes the volume and dimensions of operational airspace that must be kept clear of obstacles. No permanent penetration of the PAN-OPS protection surfaces is permitted.
PMF	Probable maximum flood: The largest flood that could conceivably occur at a particular location, usually estimated from the probable maximum precipitation. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain.
Project boundary	This boundary delineates the area of assessment considered in the environmental impact statement as described in Section 5.5 of the environmental impact statement.
Project footprint	This footprint delineated the area of assessment as considered in this report and refers to the operational area plus the construction area of the project.
Receptor/ receiver	An environmental modelling term used to describe a map reference point where the impact is predicted. A sensitive receptor is a home, workplace, school or other place where people spend some time. An elevated receptor is a point above ground level.
SEPP	State Environmental Planning Policy.
Submissions and Preferred Infrastructure Report	This report, developed in response to submissions raised during the exhibition and to describe and assess design refinements made since the exhibition of the environmental impact statement.
Threatened	As defined under the NSW <i>Threatened Species Conservation Act 1995</i> and the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> , a species, population or ecological community is threatened when it is likely to become extinct or is in immediate danger of extinction.
Urban design	The process and product of designing human settlements, and their supporting infrastructure, in urban and rural environments.
Wetland	Wetlands are areas of land where water covers the soil throughout the year or at certain times of the year.

EXECUTIVE SUMMARY

Background

The NSW Government is planning to build a 9.8 kilometre extension of the Princes Motorway between Yallah and Oak Flats that would bypass the suburb of Albion Park Rail. The Albion Park Rail bypass would provide customers with an improved travel experience and increase the capacity and efficiency of the road network for through and local traffic.

The project is subject to Part 5.1 of the *Environmental Planning and Assessment Act 1979*. Accordingly, an environmental impact statement was prepared, which described and assessed the Albion Park Rail bypass. The environmental impact statement was placed on public exhibition by the Department of Planning and Environment from 28 October to 27 November 2015. A total of 108 submissions were received for the project.

Purpose of this report

In accordance with section 115Z(6) of the *Environmental Planning and Assessment Act 1979*, the Secretary requires Roads and Maritime Services (Roads and Maritime) to provide a response to the issues raised in the submissions received for the project.

Following the exhibition of the environmental impact statement, Roads and Maritime refined the concept design of the project to address the issues raised during the exhibition and to minimise its environmental impact. The Secretary has advised that a preferred infrastructure report is required to address the proposed changes to the project.

Roads and Maritime, as the proponent of the project, has prepared this submissions and preferred infrastructure report to respond to issues raised in submissions and describe and assess design refinements made since the exhibition of the environmental impact statement.

Key issues raised by submissions to the environmental impact statement

Of the 108 submissions received for the project, 101 were submissions from the community, interest groups or businesses. Four were from government agencies, and submissions were also received from Wollongong City Council, Shellharbour City Council and Shoalhaven City Council.

The key issues raised included:

- Project development and alternatives; including route selection and alternatives, avoidance of biodiversity impacts and avoidance of impacts on agricultural land
- Project description; including pedestrian and cyclist facilities, reconfiguration of the Croom Regional Sporting Complex, local road changes and vertical alignment
- Consultation; including consultation activities carried out to date and key issues for ongoing consultation
- Traffic and transport; including road network performance, access, impacts on road safety, the new service road, and aviation impacts
- Hydrology and flooding; including flood planning, bridges and drainage, and impacts on agricultural land
- Biodiversity; including managing impacts to threatened species and ecological communities, and biodiversity management and protection
- Noise and vibration; including the assessment methodology, construction noise, operational noise and noise mitigation options

- Socio-economic; including construction impacts, business impacts, economic impacts, and impact on agricultural commercial activities
- Landscape character and visual amenity; including visual impacts and urban design and landscaping
- Land use; primarily relating to agricultural land use impacts
- Air quality; primarily relating to dust and construction impacts.

Proposed design refinements

Roads and Maritime has refined aspects of the project as presented in the environmental impact statement in order to minimise impacts, where possible. The design refinements are a direct response to:

- Consultation with the community during the environmental impact statement exhibition period
- Submissions received during the environmental impact statement exhibition period
- Landowner discussions during property acquisition and adjustment
- Further review of the environmental impact statement concept design.

The key design refinements proposed include:

- Reconfiguration of the interchange at Albion Park to minimise the impact on agricultural land and allow northbound traffic to exit the motorway onto Tongarra Road
- Reduction of the project footprint within agricultural land and refinements to intersection arrangements in response to further detailed traffic modelling
- Further design refinement of the Croom Regional Sporting Complex
- Extension of the standard construction hours to include extended work hours across the project area. The project standard construction hours would be:
 - Monday to Friday, between 6am and 7pm
 - Saturdays, between 8am and 5pm
 - No work on Sundays and public holidays.

Proposed design refinements are detailed and assessed in Section 5 of this report.

Assessment updates

The proposed design refinements were assessed against each of the key issues and other issues, as set out in the Secretary's Environmental Assessment Requirements issued for the project on 18 March 2015 by the Department of Planning and Environment. The assessment of each of the proposed design refinements is presented in Section 5.5. The assessment process involved desktop and field investigations (where required). Supporting technical reports were prepared and are included in Appendices A to I of this report.

Potential impacts identified that are additional or different to those in the environmental impact statement include:

- Traffic and Transport - some intersections would operate at a predicted lower level of service under the final project arrangement than those predicted in the environmental impact statement. This is primarily due to the difference in modelled traffic assessment methodology adopted in the revised assessment following consultation with Wollongong City Council which has resulted in different projected traffic numbers in a number of locations. The project would achieve travel time savings of 11 minutes (64 per cent).

- Land use - the proposed refinements, particularly the revised layout of the interchange at Albion Park, would result in a reduction of 10.3 hectares (based on operational boundaries) of impact to agricultural (dairy) land from the environmental impact statement, with a further reduction of 3.8 hectares on the construction footprint as a result of the removal of an ancillary site on agricultural (dairy) land.
- Hydrology and flooding - impacts in the Macquarie Rivulet catchment, near the interchange at Albion Park are expected to be generally less than those presented in the environmental impact statement as a result of the proposed design refinements. Impacts to dwellings within the Macquarie Creek catchment as identified in the environmental impact statement have decreased. Impacts to the Duck Creek and Horsley Creek catchments remain unchanged from the environmental impact statement.
- Biodiversity - about 7.22 hectares of Illawarra Lowlands Grassy Woodland endangered ecological community, listed under the NSW *Threatened Species Conservation Act 1995*, would be removed for the project. This is an increase of 0.22 hectares from the area estimated in the environmental impact statement as a result of the project footprint adjustments. Additional biodiversity offsets have been included in the Biodiversity Offset Strategy for this small increase in impact. This community corresponds to Illawarra and South Coast Lowland Forest and Woodland critically endangered ecological community, which was listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* after exhibition of the environmental impact statement. A referral under this Act has been made.
- Noise and vibration - the project would result in an increase to the number of properties requiring treatment following mitigation in a number of noise catchment areas to 256 properties from 215 in the environmental impact statement. These impacts would be reassessed during detailed design and treatments confirmed in consultation with landowners. The extension of standard construction hours would result in additional impacts to sensitive receivers, however, consultation carried out has indicated support from the majority of respondents in efforts to complete the construction activities in a shorter timeframe.

Revised environmental management measures

The environmental impact statement identified a range of environmental outcomes and management measures proposed to avoid or reduce the environmental impacts. After consideration of the issues raised in the public submissions, Roads and Maritime has carried out minor amendments to the environmental management measures for the project where appropriate.

The main amendments to these management measures include the requirement for consideration of low noise activities in the weekday morning (6am to 7am) period and the requirement for consideration of obstacle limitation surfaces, engineering feasibility and community consultation outcomes in the detailed design of noise barriers. These environmental management measures, detailed in Section 6 of this report, will guide subsequent development and delivery phases of the project.

Next steps

This submissions and preferred infrastructure report will be made available to the public in accordance with section 115Z of the *Environmental Planning and Assessment Act 1979*. Following the display period, the Department of Planning and Environment will consider this submissions and preferred infrastructure report during its assessment of the Albion Park Rail bypass. The Secretary will prepare an environmental assessment report in accordance with section 115ZA of the *Environmental Planning and Assessment Act 1979*. The Minister for Planning will then decide whether or not to approve the project and identify any conditions of

approval that would apply. If approved, Roads and Maritime will continue to consult with community members, government agencies and other stakeholders during the detailed design and construction phases of the Albion Park Rail bypass.

1 INTRODUCTION AND BACKGROUND

1.1 THE PROJECT

1.1.1 PROJECT OVERVIEW

Roads and Maritime Services (Roads and Maritime) propose to build a 9.8 kilometre extension of the Princes Motorway between Yallah and Oak Flats that would bypass the suburb of Albion Park Rail (Figure 1-1).

The project would form part of the Princes Highway upgrade program that seeks to improve road safety and efficiency. The project forms one of the last remaining sections of the Princes Highway to be upgraded and will complete the missing link of a high standard road between Sydney and Bomaderry.

1.1.2 PROJECT FEATURES

The project would have two lanes in each direction with a central median. It would be signposted at a minimum of 100 kilometres per hour. To accommodate future population growth in the region, the project has capacity for an extra lane in each direction as they become required. To accommodate the development of the motorway, the project would involve the reconfiguration of the Croom Regional Sporting Complex, and a number of other associated works.

The key features of the project are presented in Table 1-1.

Table 1-1 Key features of the project

Feature	Description
Lanes	There would be two lanes in each direction divided by a median (with capacity to upgrade to three lanes in each direction in the future).
Route	The route is shown in Figure 1-1.
Interchanges	Three interchanges provided at Yallah, Albion Park and Oak Flats would connect the local road network with the motorway. The delivery and timing of the Yallah interchange would be subject to funding availability and traffic need.
Bridges	The following bridges would be provided: ▪ Bridges to carry the motorway over Duck Creek, Macquarie Rivulet and Frazers Creek ▪ Bridges to carry the motorway over the Princes Highway and Tongarra Road ▪ A bridge to carry the motorway over the South Coast Rail Line ▪ Bridges to carry local roads, and ramps over the motorway ▪ Bridges to provide improved floodwater conveyance and flood immunity.
Local road changes or upgrades	An upgrade to Yallah Road between Larkins Lane and the Princes Highway at Yallah would be undertaken as part of this project. The motorway would replace the existing East West Link. A new local service road would be constructed which runs parallel to the motorway on the southern side, connecting the Oaks Flats interchange with Croome

Feature	Description
	Road and replacing the East West Link. Other changes and upgrades to the local road network would include minor realignments and creation of cul-de-sacs.
Pedestrian and bicycle connections	Improved pedestrian and cycle connections are proposed as part of the project. Shared path crossings are proposed in all locations where motorway and local road bridge crossings are proposed. Cyclists would have access along the motorway in both directions via motorway shoulders or separated cycle lanes, accessible via motorway ramps. The motorway would have controlled access fencing to prevent pedestrians from accessing the road corridor.
Drainage	The following drainage elements would be provided: ▪ A network of gutters, channels, pipes and pits to collect and convey stormwater by gravity to the point of discharge into receiving waters ▪ Scuppers and carrier pipes to convey stormwater from bridged sections to the bridge supports ▪ Detention basins, vegetated swales, sediment traps, water quality basins and spill containment devices, where required.
Emergency access and management facilities	Emergency stopping bays would be provided along the road alignment at a spacing of one to two kilometres. Maintenance access would be provided to bridge abutments, basins, utilities and cut benches. Access tracks would generally originate from emergency stopping bays.
Detention basins	Adjustments to the Green Meadows detention basin would ensure an appropriate flood storage volume would be maintained. An additional detention basin is proposed adjacent to Croome Road to mitigate flooding impacts in smaller flood events.
Lighting	Lighting would be provided as required for safety reasons. This would be limited to busy entry and exit ramps and the local road network.
Landscape and urban design	Landscape and urban design treatments would integrate the project with the surrounding environment.
Croom Regional Sporting Complex	Directly impacted sporting facilities at the Croom Regional Sporting Complex would be replaced, including sporting fields and associated amenities. Changes would be made to the southern access of the sporting complex. There would be new and reconfigured internal roads, pedestrian / cycle paths and parking provided.
Construction activities and temporary ancillary sites	The key construction activities would include: ▪ Mobilisation and site establishment ▪ Clearing, grubbing and topsoil stripping, including clearing all areas within the site boundary (except within the nominated environmental protection areas), temporary work areas and local work areas ▪ Demolition of existing roads and buildings ▪ Bulk earthwork and haulage of materials ▪ Construction of the road pavement

Feature	Description
	▪ Construction of drainage structures ▪ Construction of bridges (this would likely include heavy vehicle deliveries of oversize loads) ▪ Relocation and construction of sporting facilities ▪ Changes to property access ▪ Signposting ▪ Installation of lighting and roadside furniture ▪ Landscaping, waste disposal and rehabilitation of disturbed areas with no future use. Temporary ancillary sites would be provided to enable the above construction activities to be carried out.



Figure 1-1 Proposed Albion Park Rail bypass

1.1.3 STATUTORY CONTEXT

Roads and Maritime is seeking approval for the Albion Park Rail bypass under Part 5.1 (State significant infrastructure) of the *Environmental Planning and Assessment Act 1979*.

Section 115U(4) of the *Environmental Planning and Assessment Act 1979* provides that:

“Specified development on specified land is State significant infrastructure... if it is specifically declared to be State significant infrastructure. Any such declaration may be made by a State environmental planning policy or by an order of the Minister (published on the NSW legislation website) that amends a State environmental planning policy for that purpose.”

Clause 15 of *State Environmental Planning Policy (State and Regional Development) 2011* provides that development specified in Schedule 4 of that State Environmental Planning Policy is declared to be State significant infrastructure pursuant to section 115U (4) of the *Environmental Planning and Assessment Act 1979*. Roads and Maritime has requested declaration of the project, which when gazetted, would be included in Schedule 4 of *State Environmental Planning Policy (State and Regional Development) 2011*.

An environmental impact statement was placed on public exhibition between 28 October and 27 November 2015, which described and assessed the Albion Park Rail bypass. In accordance with section 115Z(6) of the *Environmental Planning and Assessment Act 1979*, the Secretary required Roads and Maritime Services to provide a response to the issues raised in submissions to the environmental impact statement.

Following the exhibition of the environmental impact statement, Roads and Maritime refined the concept design of the project to address the issues raised during the exhibition and to minimise its environmental impact. The Secretary has advised that a preferred infrastructure report is required to address the proposed changes to the project.

Roads and Maritime, as the proponent of the project, has prepared this submissions and preferred infrastructure report to respond to issues raised in submissions received during the exhibition of the environmental impact statement, as well as describe and assess design refinements made since the exhibition of the environmental impact statement.

The NSW Department of Planning and Environment will consider this submissions and preferred infrastructure report during its assessment of the Albion Park Rail bypass. The Secretary will prepare an environmental assessment report in accordance with section 115ZA of the *Environmental Planning and Assessment Act 1979*. The Minister for Planning will then decide whether or not to approve the project and identify any conditions of approval that would apply. If approved, Roads and Maritime will continue to consult with community members, government agencies and other stakeholders during the detailed design and construction phases of the Albion Park Rail bypass.

The approval process under Part 5.1 of the *Environmental Planning and Assessment Act 1979* is illustrated in Figure 1-2. Further information on the assessment process is available on the Department of Planning and Environment webpage (www.planning.nsw.gov.au).

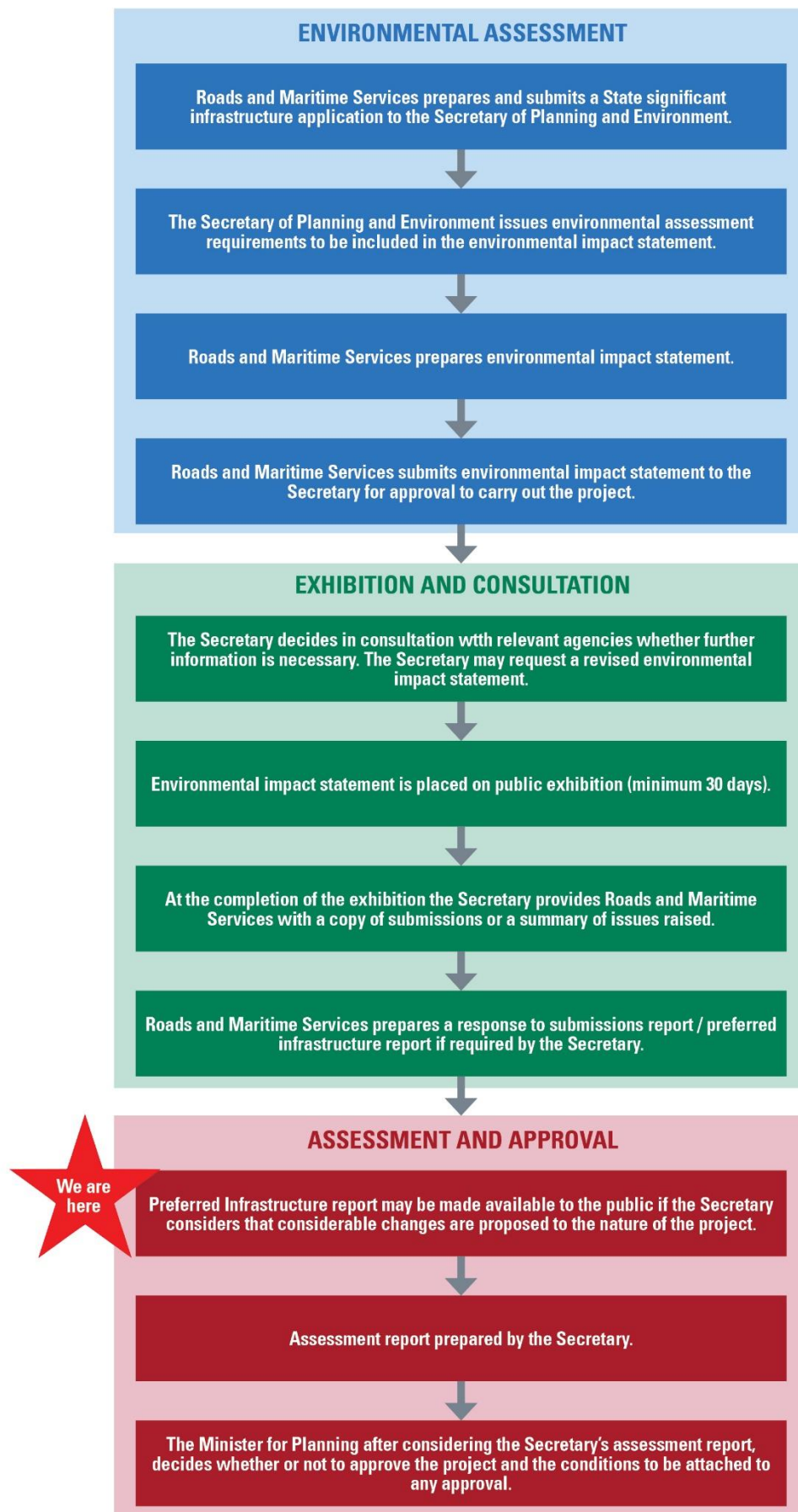


Figure 1-2 State significant infrastructure process

1.2 ENVIRONMENTAL IMPACT STATEMENT EXHIBITION

The environmental impact statement was publicly exhibited by the Department of Planning and Environment between 28 October and 27 November 2015, being 31 days in total.

The environmental impact statement was made available for information and comment at the following locations:

- Department of Planning and Environment's website
- Via the Roads and Maritime project website (link to Department of Planning and Environment's website provided)
- Department of Planning and Environment, 22-23 Bridge Street, Sydney
- Wollongong City Council, 41 Burelli Street, Wollongong
- Shellharbour City Council, Lamberton Crescent, Shellharbour City Centre
- Roads and Maritime Services, Level 4, 90 Crown Street, Wollongong
- Roads and Maritime Services (Head Office), Level 9, 101 Miller Street, North Sydney
- Wollongong Central Library, 41 Burelli Street, Wollongong
- Dapto Library, Dapto Ribbonwood Centre, 93-109 Princes Highway, Dapto
- Albion Park Library, Russell Street, Albion Park
- Oak Flats Library, Corner Central Avenue and Fisher Street
- Nature Conservation Council, Level 2, 5 Wilson Street, Newtown.

Throughout the exhibition, the project team spoke directly to over 1,000 people from the community and key stakeholder groups and organisations.

1.2.1 EXHIBITION ACTIVITIES

As part of the exhibition a number of activities were undertaken by Roads and Maritime to engage the community. An A5 postcard was distributed to around 23,000 households in Albion Park, Albion Park Rail Calderwood, Oak Flats, Shellharbour City Centre, Blackbutt, Flinders and Dapto. This included information on how to make a submission, details on information sessions and where to go for further information.

Variable messaging signs were placed along the Princes Highway and Tongarra Road encouraging motorists to have their say on the project.

A free call project information line (1800 708 727) and project email address AlbionParkRailbypass@rms.nsw.gov.au were available during the exhibition.

During the exhibition a series of short videos were placed on the M1/Princes Highway upgrade Facebook page and the Roads and Maritime project webpage. The short videos were developed to help explain some of the project impacts. These included videos about construction, flooding, traffic, Croom Regional Sporting Complex, the interchange at Yallah, the interchange at Albion Park and the Oak Flats interchange. A 3-dimensional fly over of the project was also developed.

During the exhibition period, the Facebook page reached around 70,000 people with each of the videos viewed up to 19,000 times.

Information sessions, where community members had access to a substantial amount of supporting information, were held during the exhibition period to allow community members to ask the project team questions and get further information (refer Table 1-2). Information sessions were advertised in local media, on the A5 postcard, Facebook and the project webpage.

A series of more casual 'pop-up' staffed display sessions (Table 1-3) were also held at local shopping centres so community members could talk with members of the project team while going about their daily business. These pop-up sessions were not advertised prior but allowed the project team to engage with a broader cross section of the community.

Table 1-2 Information sessions

Venue	Address	Date and time
Albion Park Public School	Tongarra Road, Albion Park	Saturday 7 November, 9am to 1pm
Camp Quality Convoy	Croom Regional Sporting Complex	Sunday 15 November 2015, 9am to 3pm
The Rail Community Centre	Corner of Ash Avenue and Tongarra Road, Albion Park Rail	Thursday 19 November, 6pm to 9pm

Table 1-3 Staffed displays

Venue	Address	Date and time
Dapto Mall	Princes Highway and Moombara Street, Dapto	Thursday 5 November, 4pm to 7pm Tuesday 10 November, 10am to 1pm.
Stocklands Shellharbour	211 Lake Entrance Road, Shellharbour	Friday 6 November, 10am to 1pm Thursday 12 November, 4pm to 7pm

The following materials were made available during the information sessions:

- The environmental impact statement and technical papers
- The environmental impact statement overview
- A series of 11 information posters, displaying the concept design, interchanges, changes to the Croom Regional Sporting Complex, how to make a submission and key environmental issues (flooding, traffic and transport, noise, construction, socio-economic)
- A 3-dimensional animated model of the concept design which was also used during one-on-one discussions with community members. The model allowed stakeholders to move freely around the project to get a better idea of visual impacts and the look and feel of the proposed bypass
- An interactive flood mapping tool, showing the effects of flooding before and after construction of the proposed bypass.

1.2.2 STAKEHOLDER ENGAGEMENT

Stakeholder engagement during the exhibition period included:

- An overview document of the environmental impact statement, which was published on the Roads and Maritime project webpage, distributed to key stakeholders and made available at community information sessions
- Face-to-face or telephone meetings with individual businesses, property owners, residents and special interest groups
- Briefings with organisations such as Wollongong City Council, Shellharbour City Council, the local Emergency Management Committee, the Airport Operation Working Party and both the Albion Park and Dapto Chamber of Commerce
- Briefings with local members of parliament
- Briefings with government agencies including the NSW Office of Environment and Heritage, Department of Planning and Environment, Department of Primary Industries (Agriculture) and Environment Protection Authority
- Meetings with utilities providers including Energy Australia, Sydney Water, Sydney Trains etc.

1.2.3 EXTENDED WORK HOURS' CONSULTATION

The environmental impact statement identified extended works hours for certain construction activities in some areas of the project to reduce disruption to motorists and shorten construction time.

During exhibition of the environmental impact statement, additional assessment and consultation was carried out to identify the potential impact of implementing extended work hours across all project construction activities and locations to maximise the project and community benefits of reduced construction time.

An additional assessment was carried out to identify residences that were likely to be noise affected during the extended work hours. Modelling indicated that noise levels during extended work hours would comply with noise management levels in most areas.

In areas where noise impacts are more likely to occur, receivers located relatively close to the alignment were targeted for consultation. Properties that would be potentially impacted by more than 10dB above the rating background level were targeted with letter box drops, and properties where impacts would potentially be 30dB or more above the rating background level received individual briefings such as door knocks.

Table 1-4 identifies the noise catchment areas and associated suburbs in which consultation was carried out, as well as the number of properties consulted in each noise catchment area.

Table 1-4 Extended work hours consultation

Noise catchment area	Suburbs	Number of properties consulted
NCA1	Blackbutt	46
NCA2	Croom	1
NCA3	Albion Park Rail	465

NCA4	Croom	3
NCA5	Albion Park	400
NCA6	Albion Park, Croom	0
NCA7	Albion Park Rail	0
NCA8	Albion Park	0
NCA9	Albion Park	4
NCA10	Albion Park, Calderwood	40
NCA11	Albion Park Rail	4
NCA12	Haywards Bay	1
NCA13	Yallah	19
NCA14	Yallah	1
NCA15	Dapto	93
NCA16	Dapto	54
Total		1131

Roads and Maritime surveyed the occupants of about 1,100 local residences that would be affected by project construction through dropping off a survey at each residence in the identified area and collecting them at a later date. The survey included a brief description of the extended work hours on the front and one question (would you support extended work hours) on the back. There was also room for written comments.

About 44 per cent of these surveys were returned. Eighty-four percent were in support of the extended work hours, 15 per cent were opposed and one per cent did not indicate their preference. A number of comments were made on the surveys indicating support for the extended work hours and a need to “hurry up and build the project.” Of those opposed to the extended work hours, some of the comments received were related to increased noise and impact on local traffic as their reasons for opposing the extension.

Seven residences were targeted for individual briefings due to potential exceedances of 30dB or more above rating background level. Four of these were successfully briefed and supported the extended work hours. The remaining three were not available for individual briefing.

Based on the outcomes of the consultation, extended work hours are proposed to be implemented as standard construction hours for the project.

The project standard construction hours would be:

- Monday to Friday, between 6am and 7pm
- Saturdays, between 8am and 5pm
- No work on public holidays.

Any work required outside of the project standard construction hours (out of hours work) would be carried out in accordance with relevant conditions of the project approval and any Environment Protection Licence for construction of the project.

1.2.4 FURTHER CONSULTATION

Consultation following the environmental impact statement exhibition period is summarised in the Section 5.4 of this report. This submissions and preferred infrastructure report will be made available by the Department of Planning and Environment on its major project assessment website (<http://majorprojects.planning.nsw.gov.au>).

Roads and Maritime would continue to consult with stakeholders during the planning and delivery of the project should project approval be granted.

A description of consultation activities and other consultation processes that would be carried out during construction of the project is provided in the Draft Community Consultation Framework (Appendix C to the environmental impact statement).

1.3 PURPOSE AND STRUCTURE OF THIS REPORT

1.3.1 PURPOSE OF THIS REPORT

The Secretary of the Department of Planning and Environment received 108 submissions during the exhibition of the environmental impact statement, and provided copies of the submissions to Roads and Maritime.

In accordance with section 115Z(6) of the *Environmental Planning and Assessment Act 1979*, the Secretary required Roads and Maritime to provide a response to the issues raised in these submissions.

Subsequently, Roads and Maritime reviewed the concept design presented in the environmental impact statement in response to:

- Feedback from stakeholders
- Consultation with the community during the environmental impact statement exhibition period
- Submissions received during and following the environmental impact statement exhibition period
- Landowner discussions during the process of property acquisition and adjustment

As a result of the design review, Roads and Maritime refined a number of aspects of the project as exhibited in the environmental impact statement to minimise impacts. The key design refinements proposed comprise:

- Reconfiguration of the interchange at Albion Park to minimise the impact on agricultural land and allow northbound traffic to exit the motorway onto Tongarra Road
- Reduction of the project footprint within agricultural land, and provision of additional connectivity across the highway for agricultural use
- Refinements to intersection arrangements in response to further detailed traffic modelling.

The Secretary has advised that a preferred infrastructure report is required to address the proposed changes to the project. Roads and Maritime, as the proponent of the project, has prepared this submissions and preferred infrastructure report which responds to issues raised in submissions received during the exhibition of the environmental impact statement. This report also describes and assesses the design refinements made since the exhibition of the environmental impact statement.

1.3.2 STRUCTURE OF THIS REPORT

This submissions and preferred infrastructure report has the following structure:

- Section 1 provides a background to the project, and outlines the consultation activities carried out during the public exhibition of the environmental impact statement and the purpose of this submissions and preferred infrastructure report
- Section 2 sets out the issues raised in community submissions to the environmental impact statement and presents responses to those issues
- Section 3 sets out the issues raised in agency submissions to the environmental impact statement and presents responses to those issues
- Section 4 provides corrections and clarifications to the environmental impacts statement
- Section 5 sets out the preferred infrastructure report including a description of project design refinements and an environmental assessment of the changes
- Section 6 presents the revised environmental management measures for the project.

2 RESPONSE TO COMMUNITY SUBMISSIONS

2.1 RESPONDENTS AND SUBMISSIONS HANDLING PROCESS

A total of 108 submissions were received for the project. Of these, 101 were submissions from the community, while seven were from government agencies.

Each submission was examined individually to identify and understand the issues raised. Community submissions are addressed in this section, and submissions from government agencies are addressed in Section 3.

The content of each community submission was reviewed and categorised according to the key issues (such as traffic and transport) and sub-issues (such as traffic congestion).

The issues in each submission were extracted and collated, enabling the grouping and summarising of similar submissions to help prepare this submissions and preferred infrastructure report. This means that while the exact wording of a particular submission may not be presented in the issue summary in this section, the intent of each individual issue raised is captured and responded to. Where similar issues were raised in different submissions, only one response is provided. The community issues raised, and Roads and Maritime's responses to these issues, forms the basis of this section.

Each community submission was assigned an individual number by Department of Planning and Environment. These numbers are used throughout this section.

2.2 OVERVIEW OF COMMUNITY ISSUES

The majority of the issues raised by the community are addressed, at least in part, in the environmental impact statement. As such, the structure of this section generally mirrors that of the environmental impact statement, and reference is made to the environmental impact statement where relevant; additional information to respond to issues is provided where needed.

Figure 2-1 shows the issues most commonly raised. In many cases individual submissions raised more than one issue. The most common issues raised by the community related to:

- Project development and alternative options - Route selection and alternatives, avoidance of biodiversity impacts and avoidance of agricultural impacts
- Project description - Pedestrian and cyclist facilities, reconfiguration of the Croom Regional Sporting Complex, local road changes and vertical alignment
- Consultation - Consultation activities carried out to date and key issues for ongoing consultation
- Traffic and transport - Road network performance, access, impacts on road safety, the new service road, and aviation impacts
- Hydrology and flooding - Flood impacts of the project, and flood mitigation structures such as bridges and culverts
- Biodiversity - Managing impacts to species and endangered ecological communities, rehabilitation and biodiversity conservation
- Noise and vibration - The assessment methodology, construction noise, operational noise and noise mitigation options

- Socio-economic - Construction, business and economic impacts, and impacts on agricultural activities
- Landscape character and visual amenity - Visual impacts, urban design and landscaping
- Land use impacts - Agricultural land use impacts
- Air quality - Dust generation during construction.

No issues relating to Aboriginal heritage, non-Aboriginal heritage, groundwater, greenhouse gases, waste or cumulative impacts were raised in the community submissions.

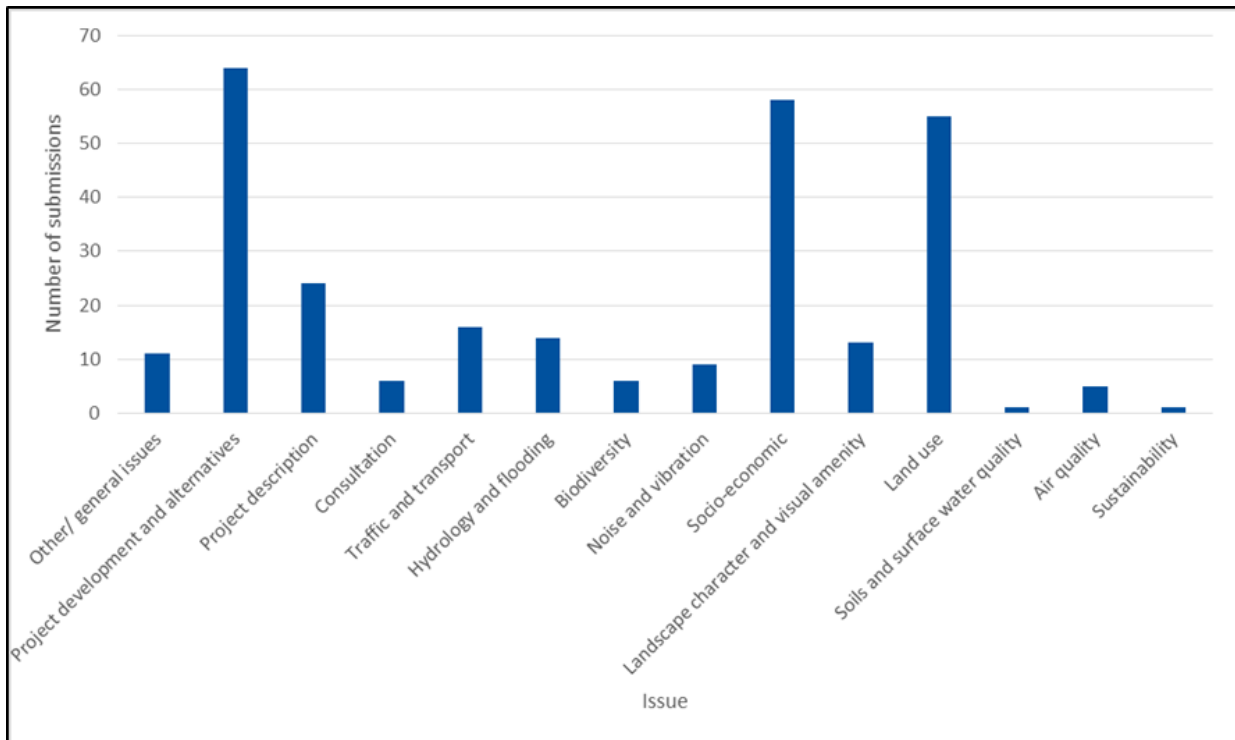


Figure 2-1 Number of submissions that raised issues

The following sections summarise and respond to the issues raised in the community submissions.

2.3 PROJECT DEVELOPMENT AND ALTERNATIVES

2.3.1 ROUTE SELECTION AND ALTERNATIVES

Submission number

1.

Issues

1. Instead of the Albion Park Rail bypass, could traffic be managed by:
 - Duplicating the existing bridge over the Macquarie Rivulet to the west of the Princes Highway
 - Connecting Yallah Road to the Illawarra Highway
 - Demolishing the roundabout at the intersection of the Princes and Illawarra Highways and prohibiting right-hand turns for both southbound and northbound traffic travelling through that intersection.

Response

Chapter 4 of the environmental impact statement describes the process that has been carried out to select a preferred route for the Albion Park Rail bypass. This has included an intensive process of reviews, investigations, planning, community and stakeholder consultation, and design work.

The existing traffic capacity on the Princes Highway between Yallah and Oak Flats is heavily constrained, with traffic congestion and delays during peak traffic periods (refer Section 4.5 of Technical Paper 1 – Traffic and Transport). There are also delays at key intersections. Historical growth rates in traffic volumes are between 1.2 per cent and 1.5 per cent per year. However significantly higher growth rates are predicted due to increases in traffic associated with future development areas such as Calderwood and West Dapto (refer Section 5.4 of Technical Paper 1 – Traffic and Transport). There is therefore a need to provide improved capacity in the road network to service both local traffic travelling from east to west, and also through traffic travelling between Sydney and the South Coast. The options proposed in Issue 1, in isolation, would not achieve the required improvements in capacity and traffic flow needed to meet the future requirements of the road network as a whole.

As discussed in Section 4.2 of the environmental impact statement, in the mid-1990s the then Roads and Traffic Authority carried out a study, and subsequent extensive consultation, that identified a preferred route for the project. The route selection study investigated a number of options for possible locations where the road corridor could be placed. These included options similar to those proposed in Issue 1, including the upgrade of the existing Princes Highway, and the provision of a grade separated interchange at the intersection of the Princes Highway and Illawarra Highway. Six options (shown in Figure 4-1 of the environmental impact statement) were shortlisted for detailed evaluation against a number of engineering, environmental, social and economic constraints. The options to utilise the existing Princes Highway were considered against a range of environmental and planning factors and determined not to be the most suitable solution. The preferred route option passed to the west of the Illawarra Regional Airport along the existing Illawarra Highway, through the Croom Regional Sporting Complex and along the East West Link. Based on the preferred route, in the 1990s a road corridor was included in both the Wollongong and Shellharbour City Council Local Environmental Plans to reserve the road corridor for the project (this is known as the 'LEP corridor').

In 2013, Roads and Maritime reviewed the reserved road corridor to assess if it was still a suitable location for the project. This road corridor review report is available on the Roads and Maritime project webpage (<http://www.rms.nsw.gov.au/projects/illawarra/albion-park-rail-bypass/project-documents.html>). The review confirmed the reserved corridor was still largely suitable. Following the road corridor review, Roads and Maritime carried out an extensive shortlisting and options development, assessment and selection process to identify a preferred route and interchange arrangements for the project.

The outcomes of the options development, assessment and selection process are described in more detail in the preferred option report (Roads and Maritime, 2014) on the Roads and Maritime project web page: (<http://www.rms.nsw.gov.au/documents/projects/illawarra/albion-park-rail-bypass/albion-park-bypass-preferred-option-report.pdf>). This report was placed on public exhibition in October 2014, with the majority of responses received in support of the proposed bypass.

The proposed alignment of the project, heading south from the interchange at Yallah, largely follows the gazetted road corridor between Yallah Road, across the Macquarie Rivulet and up to the Illawarra Regional Airport. The selection of a preferred route for the project in this area considered a range of environmental constraints, including the airport's operational limitation surface, flooding and hydrology, and land use impacts. Based on more detailed consideration of the traffic flow, safety and functionality of the available options, as well as site constraints (including the Eastern Gas Pipeline), a preferred option was selected that deviates from the LEP corridor, impacting on adjacent land.

Submission number

66.

Issues

2. South of the Macquarie Rivulet and down to the Illawarra Highway, the project would directly impact businesses at the roundabout, a residence and the wetlands. This also creates a curve in the alignment that can adversely affect traffic flow and safety. It is recommended the alignment be straightened and bridged in this section to minimise these impacts.

Response

The businesses located to the west of the intersection of the Princes Highway and the Illawarra Highway lie within the LEP corridor that has been reserved since the 1990s, and it is expected that the resultant socio-economic impacts of the project on these businesses would likely have been known to the business owners for some time. The socio-economic impacts on these businesses are discussed in Section 13 of the environmental impact statement and Technical Paper 9 – Socio-economic.

Section 5.2 of the preferred option report provides details of all options considered for the Albion Park interchange. The preferred interchange configuration was adopted following consideration of a range of factors, including:

- Engineering feasibility
- Functionality (connectivity, layout and safety)
- Traffic performance (network performance, flexibility, interchange performance, amenity)
- Socio-economic impacts (noise, property, heritage, visual amenity, connectivity, community facilities, business, and flooding)
- Environmental impacts (terrestrial and aquatic ecology)

- Relative cost estimates.

Several options were removed during the options assessment for the interchange based on their performance against the abovementioned criteria. Options 8, 9 and 10 were eliminated based on a desire to minimise impacts on the freshwater wetland endangered ecological communities in this location. The interchange at Albion Park option 13c was adopted as the preferred configuration in the environmental impact statement based on careful consideration of all these factors. When compared to other shortlisted options for the Albion Park interchange, it scored highest with respect to:

- Functionality, as it would provide connectivity across the alignment and minimise safety risks
- Best traffic performance in terms of the road network performance and efficiency of the interchange and intersections
- Flexibility, as it could connect to a future bypass of Albion Park (Tripoli Way)
- Socio-economic impacts, including connectivity for pedestrians and cyclists, and minimisation of impacts on Albion Park and Albion Park Rail.

Following the exhibition of the environmental impact statement, in response to the submissions received, the Albion Park interchange design was reviewed to determine if an alternative alignment could be developed that might further improve traffic outcomes and address considerations raised during the exhibition process. As a result of this refinement process, the northbound off-ramp into Albion Park and the southbound entry ramp at Albion Park are now located off Tongarra Road. This would further reduce the impacts on the neighbouring properties identified in the submission. This change is described and discussed in Section 5.2.1.

One submission also suggested that this section could be bridged and straightened to minimise impacts. It is considered that changes to the alignment in the vicinity of the bend at Macquarie Rivulet would have much larger impacts on residences along Larkins Lane and possibly other businesses at Yallah. This change would also have additional impacts on heritage and ecology in the Macquarie Rivulet area.

Of the four options considered for the main carriageway alignment in the preferred option report, Option B was preferred, which is generally somewhat straighter west of the Illawarra Airport and down to Croom Regional Sporting Complex. Bridging the section between the Macquarie Rivulet and Tongarra Road was not considered feasible, mainly due to the substantially higher cost associated with the bridging structure, but also due to the proximity to the airport and the need to consider the airport's operational airspace requirements. If this section was bridged, some of the access impacts on the dairy enterprise's operations and other properties in the region would be minimised or avoided, although the impact associated with the loss of existing built infrastructure would be unlikely to change.

Submission number

7, 16 and 93.

Issues

3. A southbound exit ramp at the Croom Regional Sporting Complex should be included to improve travel times and efficiencies for residents in the south of Albion Park.

Response

As noted in the response to Issue 1, Chapter 4 of the environmental impact statement describes the process that has been carried out to select a preferred route for the Albion Park Rail bypass. This has included an intensive process of reviews, investigations, planning, community and stakeholder consultation, and design work.

A range of options were considered in the preferred option report for the Oak Flats interchange, including several with southbound exit ramps located at the Croom Regional Sporting Complex. Each option was assessed against a range of environmental, social, traffic performance and functionality criteria to identify a preferred option for the project. It was found that each of the options with southbound exit ramps at Croome Road were not feasible, due to either poor traffic performance or the likely social impacts arising from an associated increase in traffic on Woollybutt Drive. The preferred option for the Oak Flats interchange (southern interchange option 1c; refer Roads and Maritime, 2014) would provide full access between the motorway, Princes Highway, New Lake Entrance Road and the new local road without requiring an overpass at Colden Drive.

As discussed in the response to Issue 1 and Issue 2 above, the preferred route was closely modelled on the existing LEP road corridor and considered various parameters to refine the design. The existing road corridor as defined in the Wollongong and Shellharbour City Council Local Environment Plans was developed as part of strategic planning process, which was undertaken prior to the commencement of this project (in the mid-1990's).

Submission numbers

48 and 91.

Issues

4. Impacts associated with over 26 per cent of the route would affect only two families, suggesting Roads and Maritime has selected a route to minimise public outcry.

Response

The process utilised to select the route is described in response to Issue 2 above, and was not based directly on limiting the number of families affected. Roads and Maritime developed and delivered the proposed project route through the use of an objective and balanced approach, including processes such as extensive community consultation. This included an assessment of the preferred routes against a range of environmental, social, traffic performance and functionality criteria to identify a preferred option for the project. The processes undertaken are detailed in the Road Corridor Review Report and Preferred Option Report which are available on the Roads and Maritime project website available at:

<http://www.rms.nsw.gov.au/projects/illawarra/albion-park-rail-bypass/index.html>

Submission number

101.

Issue

5. The project would impact the proposed 'Tallawarra lands' development as follows:
- The location of the eastern roundabout at the interchange at Yallah and the connection with Yallah Bay Road differs from proposal shown in the concept plan
 - The redirection of Cormack Avenue has not been included
 - Access to Yallah Bay Road now requires additional acquisition of Tallawarra land
 - Lease for construction purposes of a portion of the central precinct would potentially cause an unnecessary interruption to the land development.
 - It is requested that the design be reviewed with a view to minimising these impacts on the Tallawarra development.

Response

Chapter 4 of the environmental impact statement describes the project alternatives considered and the project development process. The route options selection processes aimed to minimise impact on the Tallawarra Lands development area. The project would support and facilitate future changes in land use across the region, including Tallawarra Lands, by creating consistent travel conditions for through traffic travelling between Sydney and Nowra. It would improve travel times and efficiency for local traffic and improve east–west connectivity locally.

The Tallawarra Lands development would be located immediately east of the motorway. Chapter 15 of the environmental impact statement provides a detailed assessment of the land use impacts of the project. Section 15.3.2 of the environmental impact statement notes that the project would directly impact on about 5.4 hectares of the proposed Tallawarra Lands release area (land parcel 13) which has now been reduced to 4.2 hectares as a result of the proposed design refinements. Following the exhibition of the environmental impact statement, the construction footprint has been revised to exclude the use of ancillary site AS02, which was located within the Tallawarra Lands development area. The project footprint adjacent to this area has also been revised and, where possible, has been reduced as part of the proposed design refinements. This has included the removal of ancillary site AS02 which was approximately 5.2ha in area. These refinements have been undertaken in consultation with the landholder.

The existing Cormack Avenue approach to the Princes Highway would form part of the southbound exit ramp at the interchange at Yallah. Cormack Avenue would connect to the southbound exit ramp, providing left in and left out movements only to and from the residential area on the eastern side of Dapto.

Following construction of the project, northbound motorists accessing eastern Dapto (for example Colvin Place) from Albion Park Rail would be required to travel via the Princes Highway and Emerson Road bridge, an additional 3.3 kilometres. This would be a temporary impact as the Tallawarra Lands development will be redirecting Cormack Avenue (and closing the existing access). Roads and Maritime will further consult with the Tallawarra Lands developer in regards to the alternative connection and look for opportunities to utilise this connection as part of the construction of the northern interchange. Residents would still be able to travel south along Cormack Avenue and have access to Albion Park Rail.

Section 7.3.3 and Figure 7-11 of the environmental impact statement describe the proposed local road changes required as part of the project. The Yallah Bay Road connection to the Princes Highway would change from a T-intersection with the Princes Highway to a roundabout connection with the Princes Highway. This is required to provide access to the Tallawarra Power Station and the proposed Tallawarra Lands development area, and has been designed within the complex constraints at this site including electricity and high pressure gas utilities. The eastern roundabout of the interchange at Yallah would provide a connection for traffic on Yallah Bay Road and the southbound exit ramp, with traffic volumes expected to increase once Tallawarra Lands is developed.

Submission number

35, 48, 54, 58, 61, 62, 66, 75, 91, 93 and 94.

Issues

6. Irrespective of the cost implications, the project should be bridged through the floodplain in order to minimise impacts on the environment, wetlands, flooding in Albion Park and Albion Park Rail, and agriculture. It is requested that the option of bridging the floodplain be investigated by flood modelling to assess the relative flood impact
7. It is considered that the project has prioritised cost over impacts on Albion Park, flooding, agriculture and wetlands, and has not been sufficiently innovative
8. There are insufficient funds to ensure this project is best practice and something to be proud of that meets the needs of the community, both current and into the future. The project is being built to a cost and not to best practice. Roads and Maritime admit that money is preventing best practice outcomes:
 - It is cheaper to divert the creek than bridge the section where it naturally flows
 - It is cheaper to leave the entry / exit ramps where they have designed them rather than deal with the soft soils in one of the alternative areas
 - It is cheaper to put hard fill on irreplaceable farm land than to bridge the floodplain
 - It is cheaper to swing the entry / exit ramps further out into the dairy enterprise paddocks than build a longer bridge over the main carriageway.

Response

Chapter 4 of the environmental impact statement outlines the process carried out to select a preferred project for the Albion Park Rail bypass. The process included an intensive process of reviews, investigations, planning, community and stakeholder consultation, and design work dating back to the 1990's.

Following a review in 2013 of the road corridor gazetted within both Wollongong and Shellharbour City Councils' local environmental plans, a range of road alignment and interchange arrangements were identified for the project through an extensive short listing and option elimination process. A shortlisting workshop was held in July 2014, which generated a short list of options to be taken to a value management workshop for further assessment.

The value management workshop brought together technical experts and key project stakeholders to make recommendations and develop a way forward for the project. At the workshop the shortlisted options were each ranked against key criteria (function, traffic, socio-economic and environment), after which participants were given the relative cost estimates for each of the interchange options.

Following the value management workshop, additional modelling and design refinements were completed, and a technical workshop was held to select the preferred interchange arrangements for the interchanges at Albion Park and Oak Flats (for which a preferred option had not been selected at the value management workshop). Again, the remaining options were assessed against a range of criteria including land use, flooding, biodiversity and traffic, prior to being assigned relative cost estimates.

The preferred options for each of the interchange arrangements (whether selected at the value management workshop or the technical workshop) were selected as they would provide the best option from a function, traffic performance, socio-economic and environmental perspective. This process aimed to provide a balanced and transparent means of assessing the relative merits of the options under consideration.

The options development, assessment and selection process is described in more detail in the preferred option report on the Roads and Maritime project web page:

<http://www.rms.nsw.gov.au/documents/projects/illawarra/albion-park-rail-bypass/albion-park-bypass-preferred-option-report.pdf>.

It is understood that the community submissions are concerned primarily with impacts in Albion Park and Albion Park Rail, and the discussion below focusses on these areas.

As articulated in the preferred option report (Roads and Maritime, 2014), the preferred interchange option for Albion Park (option 13c) which was included in the environmental impact statement was not the lowest cost option, but was in the mid-range of the spectrum of options assessed. It would provide the best value for money when assessed against not only cost, but also the range of engineering feasibility, environmental and social criteria used in the options assessment.

As discussed above in relation to community Issues 1 to 4, the preferred option does deviate from the gazetted LEP corridor, resulting in greater land take to the west of the corridor. The preferred option (which incorporates interchange at Albion Park option 13c) would result in negative impacts on the dairy enterprise's operation and associated infrastructure, as well as a residence. These socio-economic and land use impacts are discussed in greater detail in Chapters 13 and 15 of the environmental impact statement. These impacts would be reduced as a result of the proposed design refinements identified in Section 5 of this report. These reductions are described in Section 5.2 and assessed in terms of land use impacts in Section 5.5.9.

The flooding impacts of each option were assessed via preliminary flood modelling, as described in Chapters 7 and 8 of the preferred option report (Roads and Maritime, 2014). Of the three shortlisted options considered for the Albion Park (central) interchange following the value management workshop, the selected option (option 13c) would have the lowest flood impact. One positive outcome of the project is a reduction in flood levels in Albion Park Rail, resulting in a total of 23 properties becoming flood-free in the 100 year Annual Recurrence Interval (ARI) flood event. This will be a substantial socio-economic benefit for those properties.

Further discussion on flood impacts can be found in Section 2.7 of this report. Section 2.7.2 discusses submissions relating to bridging of the floodplain, and Section 2.7.3 responds to submissions on flood impacts on the dairy enterprise and agricultural land. Changes to the flood impacts as a result of the proposed design refinements can be found in Section 5.5.2 of this report.

The adoption of option 13c for the configuration of the interchange at Albion Park would result in reduced impacts on the freshwater wetlands community in comparison to other options considered.

Issue 8 (second dot point) also discusses the potential impacts on Frazers Creek. Section 5.14 of the environmental impact statement describes the proposed creek adjustment for Frazers

Creek. The adjustment of the creek alignment to remove a meander and relocate it to the east of the alignment was selected because it was considered to have the lowest net environmental impact in the long term. This was because it would reduce the number of creek crossings, minimise shading of the creek, provide suitable flood conveyance, and reduce the number of times the creek would be disturbed during construction.

The creek corridor would be vegetated with locally native riparian vegetation in accordance with the requirements of the Policy and Guidelines for Fish Habitat Conservation and Management (Department of Primary Industries, 2013) and Guidelines for Instream Works on Waterfront Land (Office of Water, 2012). The creek channel would be rehabilitated to preconstruction conditions or better.

The second bullet point under Issue 8 suggests that the entry and exit ramps for the interchange at Albion Park are not located in soft soils. In fact, there are soft soils associated with the Macquarie Rivulet floodplain in this area, and the design and construction of the interchange will consider how to manage these materials.

Following consultation during preparation of the environmental impact statement, and in response to issues raised during exhibition of the environmental impact statement, Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise. In accordance with the submission, broad changes to the interchange at the Albion Park interchange are proposed to reduce the impact on agricultural land, and to eliminate a potential traffic weaving issue that could occur under the environmental impact statement design arrangement. The alignment of the interchange has been designed in consultation with the landowner, and the proposed design refinement would substantially reduce the amount of agricultural land (dairy) impacted by the project (by about 10.3 hectares for the operational boundary and a further reduction of 3.8 hectares for the construction footprint). Details of the proposed change are discussed in Section 5 of this report.

2.3.2 AVOIDANCE OF BIODIVERSITY IMPACTS

Submission number

43.

Issue

9. It is noted that the environmental impact statement commits to offsetting and mitigating impacts on biodiversity. However, impacts should be avoided and minimised in the first place, rather than offset. The project should be redesigned to minimise impacts on ecological communities particularly any endangered ecological communities.

Response

Chapter 4 of the environmental impact statement outlines the route selection and interchange configuration process, including a description of the methodology used to avoid and minimise biodiversity impacts. Section 9.3.1 of the environmental impact statement and Technical Paper 4 – Biodiversity Assessment Report summarise how the project has been designed to avoid biodiversity impacts to the greatest extent possible within the project constraints, as required by the Framework for Biodiversity Assessment (Office of Environment and Heritage, 2014a). The following are examples of where the project has sought to avoid or minimise impacts on biodiversity values:

- The project footprint through the Macquarie Rivulet floodplain was adjusted during preparation of the 50 per cent concept design to minimise direct impacts on high value vegetation, while still allowing for the construction of the project
- The road corridor route through the Croom Regional Sporting Complex was selected in order to limit clearing of the Illawarra Lowlands Grassy Woodland endangered ecological community to the greatest extent possible within the project constraints, to minimise impacts on the Croom Voluntary Conservation Agreement lands, to allow sufficient space for the recreational facilities within the sporting complex (including those to be relocated), to provide space for the internal road to fit around existing constraints, and to optimise safety
- Design refinements were made to the Yallah Road intersection to minimise impacts on the Eastern Flame Pea, which is listed as an endangered species under the *Threatened Species Conservation Act 1995*
- The project boundary was adjusted to avoid two areas where the Eastern Flame Pea occurs (identified as environmental protection areas)
- Ancillary sites were selected to minimise vegetation clearing and disturbance. The construction footprint largely encompasses previously cleared and sparsely vegetated areas
- Route and interchange options were assessed during the selection of the preferred option against key environmental, social and economic criteria, with several options eliminated due to their impact on endangered ecological communities, threatened species habitat and wetlands.

The residual impacts of the project are considered unavoidable given the array of additional constraints that were required to be considered for the project, such as flooding and traffic.

Responses to submissions regarding biodiversity are also discussed in Sections 2.8, 3.4 and 3.5 of this report.

2.3.3 ROUTE SELECTION IMPACT ON AGRICULTURAL LAND

Submission number

26, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 56, 57, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 91, 92, 94 and 102.

Issues

10. The design needs to be carefully reviewed to find an alternative solution that will reduce impacts on agricultural land. Adequate provision has not been made to minimise the adverse impacts on the dairy enterprise, particularly with respect to:

- Proposed landscaping works
- Loss of infrastructure (dairy)
- Loss of flood free land
- Loss of the associated homestead.

To minimise the impact on the dairy enterprise, the design should follow the existing Illawarra Highway, providing extra lanes with a central divide. The Albion Park interchange entry and exit ramps should be relocated further to the south

11. The motorway should be moved to the eastern side of the Illawarra Highway (perhaps under the east-west Airport runway) to minimise impact to the dairy enterprise
12. A number of alternatives for the design of the interchange at Albion Park have been provided to Roads and Maritime that would minimise the impact to the dairy enterprise. These have not been adopted.

It is noted in the environmental impact statement that the design of the entry and exit ramps at the interchange at Albion Park was refined (increasing impact to the dairy enterprise) to allow the Illawarra Highway to remain open during construction. The impact of closing the Illawarra Highway would be short-term, in comparison to the permanent loss of prime quality agricultural land

13. Roads and Maritime have advised that the project cannot be redesigned to minimise agricultural impacts due to the impact this would have on freshwater wetland endangered ecological communities on either side of the alignment within the dairy enterprise. However, they propose to adjust the alignment of Frazers Creek; this is considered inconsistent
14. It is understood that the two main constraints that have led to the adoption of the current alignment are the Eastern Gas Pipeline and the Airport obstacle limitation surface, resulting in direct impacts on the dairy enterprise. Could the Eastern Gas Pipeline be relocated instead?
15. The change in the design from that originally proposed will have a greater impact on some properties, and particularly the dairy enterprise. 27 hectares of agricultural land will be taken to build the road. This is more than double the amount of land identified in the original corridor.

Response

Chapter 4 of the environmental impact statement outlines the process carried out to select a preferred project for the Albion Park Rail bypass. The process included an intensive process of reviews, investigations, planning, community and stakeholder consultation, and design work, dating back to the 1990's.

Following a review in 2013 of the road corridor gazetted within the Wollongong and Shellharbour local environmental plans, a range of road alignment and interchange arrangements were identified for the project through an extensive shortlisting and option elimination process. A total of 17 interchange configurations for the interchange at Albion Park were considered during the selection of a preferred option. These options were assessed against a range of environmental, social, traffic performance and functionality criteria to select a preferred arrangement.

In response to feedback received during consultation and issues raised during the exhibition of the environmental impact statement, Roads and Maritime has reviewed the project to minimise impact on the dairy enterprise. This process is detailed in Section 5. In summary:

- The northbound entry ramp to Terry Road connecting the Illawarra Highway (Terry Street) to the motorway has been realigned, reducing the project footprint at this location
- The southbound exit ramp to the Illawarra Highway (Terry Street) has been realigned. The ramp would pass over the motorway via a bridge about 200 metres further to the south
- The northbound exit ramp for traffic leaving the motorway to the Illawarra Highway (Terry Street) has been removed. A northbound exit ramp has been added at Tongarra Road.

The proposed design refinement would reduce the area of agricultural land (dairy) impacted by the project by about 10.3 hectares for the operational boundary and an additional 3.8 hectares removed from the construction footprint as a result of the removal of an ancillary site.

Roads and Maritime acknowledges the quality of pasture land on the western side of the Illawarra Highway, and that the acquisition of agricultural land for the project would be a permanent change in land use. Socio-economic and land use impacts are discussed in greater detail in Chapters 13 and 15 of the environmental impact statement. Changes to these impacts resulting from the proposed changes to the interchange layout are discussed in Section 5.5 of this report. A range of mitigation measures are proposed in relation to the identified impacts.

A description of the proposed adjustment of Frazers Creek is provided in Section 5.14 of the environmental impact statement. The justification of the proposed creek adjustment provided in the environmental impact statement is discussed in Section 3.3.1. Further information about potential impacts of the creek adjustment can be found in Technical Paper 4 – Biodiversity Assessment Report, and the hydrological function of the adjusted creek channel is provided in Technical Paper 3 – Hydrology and Flooding.

The Eastern Gas Pipeline runs adjacent to the existing Illawarra Highway south of the Macquarie Rivulet, up until the southern extent of the project before the motorway curves to the east around the Croom Regional Sporting Complex. The pipeline is a licensed pipeline under the *Pipelines Act 1967*. The Eastern Gas Pipeline was installed after the LEP corridor was gazetted for the bypass, and it was originally intended that the pipeline might be crossed by the road. The pipeline is unsuitable for relocation due to the size of the main and as such the proposed alignment was chosen to minimise impacts. The close proximity of the airport has also been a major constraint to the design of the project. Adverse impacts on the airports obstacle limitation surface would result in limitations to the operations of the airport such as the use of various types of aircraft (as identified in Appendix B of this report).

2.4 PROJECT DESCRIPTION

2.4.1 PEDESTRIAN AND CYCLIST FACILITIES

Submission number

2, 3, 5, 6, 10, 17, 18, 19, 20, 21, 29, 48, 57, 88, 89, 91 and 97.

Issues

16. The lack of cycle lanes on the project is highly objectionable. Cyclists should be considered within the project design, particularly given the relatively small contribution of cycleways to the overall cost of the project. While the lake cycleway is an alternative to having cycle lanes on the motorway, it is incomplete and doesn't provide an effective cycle route for regular riders
17. The lack of cycle lanes will lead to fragmentation of an integrated bicycling network that will be a key part of a sustainable future
18. Both local and visiting cyclists need access to a safe north-south route through the Illawarra. A marked designated cycleway should be provided to link to the existing north and southbound designated cycleways
19. If no specific cycleway will be provided on the motorway, white safety lines should be included on the motorway to identify a safety zone for riders
20. Cycling is of strategic importance to the NSW Government and cycling safety should be considered in every infrastructure project

A cycle link should be provided on the northern side of the motorway (and northern side of the proposed noise barrier) between Croome Road and Durgadin Drive. This would provide a safe route between the exiting cycling infrastructure in Croom Reserve and Oak Flats when linked with back streets, the signalised intersection on the Princes Highway and the pedestrian rail crossing

This proposal is supported by Shellharbour City Council, who has indicated they would be amenable to allow the shared path to be built on Council property
21. Previous concerns about cycling access have been addressed by the inclusion of shoulders marked as bicycle lanes, including a separation line to provide a buffer zone between cyclists and motorists
22. The proposed cycle path connecting Terry Street and the Illawarra Highway should be removed and the area returned to the adjoining dairy enterprise for grazing, as this proposal is inconsistent with previous commitments by Roads and Maritime. The area is prime grazing land

23. The use of the underpass under Bridge BR07 by both the dairy enterprise and pedestrians and cyclists will lead to safety issues as cyclists are likely to frighten and spook cattle traversing the underpass with potential for a stampede. This puts both the public, dairy staff and cattle in danger. Heavy machinery (such as tractors) associated with the dairy enterprise frequently using the underpass may pose a safety risk to public users of the underpass.
- Cattle using the underpass will leave behind urine and manure, and will carry dirt, grass and stones in their hooves. This may create an uneven surface unsuitable for public use, and could have health impacts
24. No pedestrian or cycle paths should be located along the same side of the road network as the quarry sites.

Response

Section 5.9 of the environmental impact statement describes the proposed pedestrian and cyclist facilities that would be provided as part of the project.

Facilities for cyclists would include:

- Access to and from the motorway via the shoulders at entry and exit ramps
- Marked (painted and sign posted) cycle lanes within motorway shoulders (similar to the Motorway to the north)
- Access along local road shoulders (Princes Highway and East West Link).

Facilities for cyclists and pedestrians would include:

- A crossing beneath the motorway via a shared path alongside the Princes Highway at the interchange at Yallah
- A crossing over the motorway via a shared path at Yallah Road
- A crossing beneath the motorway via a shared path alongside Tongarra Road
- A crossing beneath the motorway via a shared path alongside the Croom Regional Sporting Complex access road
- A crossing over the motorway via a shared path alongside Croome Road.

The proposed pedestrian and cyclist facilities would connect into the existing and proposed facilities in the surrounding suburbs (refer Figures 3-6 and 3-7 in Appendix A of this report). All road crossings over and under the motorway would include safe pedestrian and cycle access, which would be a substantial improvement on existing conditions.

The motorway would utilise 2.5 metre wide shoulders as detailed in Table 5-1 of the environmental impact statement. This shoulder width would be adequate for use by cyclists and so the construction of a separate cycle lane is not considered necessary to ensure suitability for cyclists. Line markings will be utilised to delineate allocated shoulders.

No shared path is proposed between Croome Road and Durgadin Drive. Cyclists and pedestrians would be able to connect from Croome Road to the Princes Highway via the new East West Link, or the local road network, as shown in Figures 3-6 and 3-7 of Appendix A. The East West Link would have lower traffic volumes following the opening of the project and safety would be improved.

In response to feedback during the environmental impact statement exhibition period, Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise. The proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to

reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities.

Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings.

Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project).

The shared path to be constructed as part of the project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement.

No shared path is proposed along the southern side of the new East West Link, ensuring no conflict between quarry vehicles and pedestrians / cyclists. It is noted that cyclists may use the new East West Link. It is understood that cyclists utilise the current East West Link, and the project would not result in an adverse change from the existing condition. The new East West Link would to some degree improve conditions for cyclists through removing the roundabouts and replacing them with signalised intersections. The East West Link would have lower traffic volumes following the opening of the project and with a consistent 2 metres wide shoulder provided along the road alignment for local cyclists.

2.4.2 PROJECT DESCRIPTION

Submission number

8 and 13.

Issues

25. The motorway should have at least three lanes in both directions at opening. It would be a lot cheaper to plan to have the infrastructure in place for future road widening rather than doing it in 10 to 20 years, particularly for bridges and overpasses
26. Will the motorway be widened on the northern or southern side of the East West Link after it passes under Croome Road?

Response

Chapter 5 of the environmental impact statement provides a detailed description of the project. The motorway would have a typical median width of about 13 metres between edge lines. This means the two carriageways are divided to allow for future widening of the motorway within the median. The Croome Road bridge is designed to cater for the possible future widening. The potential future widening is not included in the current proposed activities.

Section 5.2 of the environmental impact statement lists the road design criteria adopted for the project, noting that the project has been designed for two lanes in each direction at the year of opening with potential for three lanes in the future as required. Chapter 7 of the environmental impact statement describes the traffic modelling carried out to guide the road design. This modelling has been updated in the Addendum Traffic and Transport Assessment Report included in Appendix A of this report. This modelling utilised a scenario for the year 2041 to determine the motorway level of service (level of service is described in Table 3-1 of the environmental impact statement). For the 2041 a level of service D or better was predicted. As such Roads and Maritime will be reviewing the need for the additional lanes in 2041. Based on

these results, it was determined that providing two lanes along the main alignment from the year of opening would be suitable for 20 years of operation.

Submission number

57.

Issues

27. The Illawarra Highway could cease at the Croome Lane entrance giving a back access to the house opposite Meadow View and a back entrance to the Eastern Gas Pipeline substation via Croome Lane and save further land.

Response

Section 5.13 of the environment impact statement outlines the local road changes and upgrades proposed as part of the project. The project would replace the function of, and physically sever, the Illawarra Highway. The connection between Albion Park and Albion Park Rail via the Illawarra Highway would be closed permanently. The northern section of the highway would be retained, but terminated in a cul-de-sac at Croome Lane (as requested in submission 57). Remnants of the existing Illawarra Highway would be retained for maintenance and private property access, including to the dairy farm.

Submission number

55.

Issues

28. The proposed roundabout on Croome Road should be located on the existing road alignment in order to minimise impacts on properties.

Response

As noted in Section 5.13 of the environmental impact statement, Croome Road would cross the motorway via a new bridge to maintain connectivity between Albion Park (south) and Albion Park Rail. The road would be upgraded to provide a single lane in each direction and a shared path which would connect to the Croom Regional Sporting Complex. The upgrade and change of Croome Road was designed to balance a range of constraints within the area. The Illawarra Regional Airport's aspirational obstacle limitation surface is currently impacted by the local road network and topography in this area. The design of Croome Road aims to ensure no further impact than what is currently experienced. Movement of the new bridge further toward the west, on the current alignment, would result in a greater impact into the Airport's aspirational obstacle limitation surface.

The Shellharbour City Stadium is located immediately west of Croome Road. Maintaining the alignment for the new Croome Road bridge would have potential direct impacts on the stadium. The alignment also aims to minimise impact on Croom Reserve. Other reasons for the selected alignment are:

- To maintain access to the Croom Regional Sporting Complex
- To maintain connectivity between Albion Park (south) and Albion Park Rail

- To enable the offline construction of Croome Road overbridge and maintain the existing Croome Road during construction of the bridge.

Submission number

48 and 91.

Issues

29. The environmental impact statement document notes that on the Macquarie Rivulet floodplain “bedrock was reported at depths of between nine and 20 meters below ground level” (page 490). The soft soils in this location make it a poor place to build a road.

Response

Section 5.20.5 of the environmental impact statement describes earthworks activities required for the construction of the project, including soft soil treatments. It is noted that the project area traverses the Lake Illawarra floodplain. The construction of the project would include a series of embankments in the floodplain to provide flood immunity and, where soft soils occur, the project would include soft soil treatments. The depth of soft soils in the central part of the project ranges from a few metres to up to 10 metres. Settlement of soft soils following the construction phase can present long-term risks to the integrity of the motorway. Embankments are the primary means of facilitating construction in areas of soft soils. There are a range of different construction methods that may be used in soft soil areas such as:

- Loosening and compacting soil materials
- Excavating and replacing soft soils with more suitable materials
- Preloading to compress materials and make them firm
- Installing wick drains
- Piling down to higher strength materials.

It is expected that the proposed soil treatments could reduce settlement periods to less than six months. These soft soil treatments have been used on numerous projects and are well established construction techniques. For example, a range of these methods were used on the recently completed Gerringong upgrade of the Princes Highway.

The specific type of soft soil treatment to be adopted for the project would be determined during detailed design. A description and assessment of soft soil treatments is provided in Technical Paper 11 – Groundwater Assessment of the environmental impact statement.

2.4.3 FENCING

Submission number

59.

Issues

30. Fencing must be provided to ensure the safety of people, animals and motorists. This has not been adequately addressed.

The proposed post and wire fencing is clearly inadequate to stop any potential resident or visitor, including children or animals, from entering the motorway and the 100 kilometres per hour traffic flow. Any interaction could have fatal consequences. This type of fencing may also invite motorists to stop on the motorway and visit the residences, or businesses on adjoining properties.

Noise barriers or two metre chain mesh fencing should be used instead of post and wire fencing to improve safety

31. The cut required at Yallah poses a safety risk for adjoining property owners. Inadequate fencing could allow a person or animal to fall down the cutting, which would be fatal or cause serious injuries.

Response

Section 5.17 of the environmental impact statement notes that fencing would be used to control pedestrian access onto the motorway for security purposes and to ensure public and motorist safety. Boundary fencing would be provided to separate private properties from the motorway and local roads, to prevent unauthorised access to the motorway, and to prevent stock (farm animals) accessing the motorway. This fencing would generally comprise 'post and wire' fencing with steel posts and barbed or plain wire where necessary. The use of barbed or plain wire would be defined during detailed design and would be based on the potential for security issues on the freeway such as pedestrian access. To minimise visual impacts of the development noise barriers would only be used where required to limit traffic noise impacts.

The proposed cut at Yallah is shown in Figure 5-2 of the environmental impact statement. The location of this cut is along the back of properties where pedestrian traffic is unlikely. In accordance with the relevant standards, person proof fencing would be installed where the slope is sufficient to result in the potential for someone to sustain serious injury.

2.4.4 VERTICAL ALIGNMENT

Submission number

55.

Issues

32. The environmental impact statement lacks detail on the motorway's vertical alignment, particularly in relation to the existing road and land levels
33. Is the motorway behind Gumnut Street cut lower than the existing East West Link Road? It looks like there is an embankment with the noise barrier on top.

Response

Section 5.4 of the environmental impact statement describes the proposed motorway and widths, including the vertical alignment constraints and considerations. There would be a number of cuts and fill areas, which are shown in Figures 5-1 to 5-7 of the environmental impact statement. Further detail on the vertical alignment of the project can be viewed in the series of cross sections and longitudinal sections provided in Section 4.8 of Technical Paper 10 – Landscape Character and Visual Amenity. Section 6.4 of Technical Paper 10 – Landscape Character and Visual includes a series of photomontages that provide an indication of the vertical alignment from different locations.

Chapter 14 of the environmental impact statement includes a number of artistic impressions modelled in three dimensions to provide an indication of the vertical alignment and how the alignment interacts with existing landscape features.

Typical Section 5 and Typical Section 6 presented in Technical Paper 10 – Landscape Character and Visual Amenity, show the indicative vertical profile of the motorway and new East West Link in the southern portion of the project and close to Gumnut Street. The motorway would be located at a similar level to the existing East West Link in this location. A noise barrier is proposed as a potential mitigation measure to be investigated during detailed design, on the northern side of the motorway between residences on Gumnut Street and the motorway. If identified during detailed design as being required, a wall would be installed on the top of the proposed noise mounds and would largely shield views of the motorway from these residences, and minimise potential noise impacts from the project (refer Chapter 12 of the environmental impact statement).

2.4.5 RECONFIGURATION OF THE CROOM REGIONAL SPORTING COMPLEX

Submission number

14, 87 and 96.

Issues

34. The new equestrian area needs to have ample parking for cars and horse floats or horse trucks
35. The new equestrian area needs to have wash bay facilities with roughened concrete base and strong tie-up area, as well as easy access to toilets
36. Equestrian parking area needs to have a fenced area for horses to be safely tied to the floats, separated from the general public parking areas
37. Mention is made about keeping horses separate from pedestrians and cyclists on the access pathways within Croom Regional Sporting Complex. This does not necessarily need to be a barrier - perhaps signage to direct horse riders to the adjacent grass or a give way policy for all users of the shared pathway
38. The project will reduce the flat area available to the Pony Club. The Pony Club needs flat ground for riding tuition, practice and parking
39. The underpass at the Frazer's Creek adjustment (BR11) needs to be high enough to avoid the need to dismount. Re-mounting can sometimes be difficult with a tall horse unless a suitable high point can be found to assist
40. More work needs to be done to define the low level crossing from Hughes Drive to cater for the additional traffic and larger horse trucks
41. Sharing of the equestrian parking facilities with the soccer club (for overflow parking) may lead to safety impacts if a person or vehicle is impacted by a horse
42. Several references are made to equestrian access from Croome Road along Frazers Creek to the Pony Club. This is not an easily or safely accessible route and is not defined. There are locked gates, hazardous remnant fencing, cattle, and boggy sections. The underpass of Ashburton Drive is often strewn with flood debris, litter, weeds and branches. Use of this path cannot be relied upon by horse riders, and would need work to be made safe. Currently access from the south-east can be gained across Croom Road from the East West Link, as well as from the north. Rebuilding the East West link should take this into account
43. The concept plan shows the relocated enclosed equestrian arena is not rectangular and has an acute angle at the southern end. This is inappropriate for riding and is also inconsistent with the intent of replacing "like with like". There are two open equestrian arenas planned. This could be reduced to one area to free up enough space to move the new enclosed arena south and square up its boundary.

Response

Section 5.18 of the environmental impact statement, and the Croom Regional Sporting Complex Masterplan (Figure 5-9 of this report) provide descriptions of the proposed Croom Regional Sporting Complex reconfiguration. Table 5-10 of the environmental impact statement summaries the proposed changes to the Croom Regional Sporting Complex. Further design refinements are described in Section 5.2.2 of this report. Table 5-10 of the environmental impact statement details that the existing parking area for recreational horse use would be reinstated and would include the accommodation of trailers and floats. Based on concerns raised by recreational equestrian users, the site has been designed to ensure that any facilities removed due to the project are replaced like-for-like and integrated into the Croom Regional Sporting Complex layout, including parking facilities. Management of these facilities following completion would be the responsibility of Shellharbour City Council.

The project has provided the opportunity to co-locate all equine activity within the horse recreation area. The Croom Regional Sporting Complex Masterplan (Figure 5-9 of this report) outlines the infrastructure proposed within this area:

- New arenas to be reinstated to replace existing public ones on Croome Road—dimensions and log edging to match existing
- Proposed timber post and rail to be installed to match existing public arena and separate public area from existing area
- Existing entry to be maintained, new public entry to be provided
- Four existing western arenas to be retained
- Fenced off area at Croome Road to be re-instated to same dimensions
- Installation of Croom Regional Sporting Complex directional signage
- Existing grass to be retained where possible
- Car float parking area with horse wash bay
- Existing shrubs, small trees and fence to be retained additional trees to be planted on fence line up to new public entrance point.

Technical Paper 10 – Landscape Character and Visual Amenity provides an indicative cross section of the underpass at Frazers Creek (BR11). As illustrated in this drawing, the access road would be designed to allow access for pedestrians, cyclists and cars. To allow for this the clearance of the underpass would be 3.5 metres. This would provide sufficient clearance for horses with riders to use the underpass, without riders being required to dismount.

The existing pathway network through the Croom Regional Sporting Complex is relatively informal, with only one major concrete pathway running from Hughes Drive over Frazers Creek to the northern side of the grounds. From here it heads north, running in between the Senior and Junior Rugby League Clubs, onwards past the existing cricket and athletics field passing underneath the motorway. The path then meanders through the Croom Reserve past the BMX and Model Car Club ending at Croome Road.

The other main track through the complex is the equine route where rider and horse cross at Frazers Creek culvert under Croome Road, riding on further through to the Croom Regional Sporting Complex. It is acknowledged that this route is not ideal and it is likely that recreational users may choose to take an alternative route by crossing Croome Road and using East West Link, and would still be able to after the Croom Regional Sporting Complex construction. The existing equine access from the Horse Recreational Area along Frazers Creek to Croome Road is currently managed by Shellharbour City Council and wouldn't be impacted by the project. Further details of the refinement in the design of the sporting complex since the exhibition of the environmental impact statement are provided in Section 5.2.2 of this report.

2.5 CONSULTATION

2.5.1 CONSULTATION TO DATE

Submission number

48, 59, 91, 93 and 94.

Issues

44. Despite Roads and Maritime receiving submissions from organisations, Ravensthorpe, the dairy enterprise and members of the community nothing appears to have changed with regard to the proposal. Issues identified during consultation should be addressed via this assessment phase of the project
45. The environmental impact statement identifies areas where sleep disturbance may be experienced. Residents within these areas have not been informed by Roads and Maritime that / where this would occur.

Response

Section 4.5.2 of the environmental impact statement lists a range of design refinements made to the project following the exhibition and consultation period for the preferred option and in response to the identification of new environmental constraints.

Chapter 6 of the environmental impact statement summarises the consultation activities carried out for the project. Community and stakeholder feedback has formed an integral part of selecting a road corridor, identifying a preferred road design and preparing the environmental impact statement. Sections 6.3 and 6.4 discuss how and where comments received from organisations, community members and government agencies were considered in the environmental impact statement. For example, feedback from users of the Croom Regional Sporting Complex was instrumental in informing the design for this aspect of the project, and consultation with Aboriginal stakeholders was used to inform the assessment of Aboriginal cultural heritage and development of mitigation measures.

Section 6.6 of the environmental impact statement, and Section 1.2 of this report, detail Roads and Maritime's commitment to ongoing consultation with the community and stakeholders. A draft Community Involvement Framework is provided as Appendix C of the environmental impact statement.

Following consultation carried out during preparation of the environmental impact statement and in response to issues raised during the exhibition of the environmental impact statement, Roads and Maritime has carried out a review of the design and a number of design refinements are now proposed. Details are provided in Section 5. These refinements have generated a substantial reduction in the impact on agricultural land.

A detailed noise assessment has been carried out for the project and is provided in Technical Paper 8 – Noise and Vibration, and summarised in Chapter 12 of the environmental impact statement. An addendum to this assessment has been prepared to consider the proposed design refinements and is included in Appendix H of this report. The assessments found that there would be sleep disturbance in noise catchment areas 3, 4, 10, 11, 15 and 16 for out of hours work which remains unchanged from the environmental impact statement. The remaining noise catchment areas are below the adopted criteria. The maximum levels of noise generated by construction activities would be unlikely to cause sleep disturbance. The exception to this would be only for out of hours works for noise catchment areas 3, 4, 10, 11, 15 and 16

(described in Section 3 of Technical Paper 8 – Noise and Vibration and Section 10.3.4 and 10.4.4 of Appendix I) including truck air brakes or high noise generating tools. The addendum report has provided similar findings.

Table 6-1 of this report identifies environmental management measures to assist in reducing noise impacts. Prior to out of hours work being carried out, all affected receivers would be notified of relevant details of the proposed activities. Notifications would include information on the proposed noise management measures, how to provide feedback on the proposed out of hours work, how to lodge complaints, and the relevant contact details to provide any such feedback or complaints. This process would be documented in the project construction noise and vibration management plan.

Out of hours work would be carried out in accordance with relevant conditions of the project approval and any Environment Protection Licence for construction of the project.

2.5.2 ONGOING CONSULTATION

Submission number

59 and 86.

Issues

46. Noise attenuation and visual amenity should form an integral part of project consultation
47. Consultation should be conducted with affected landholders regarding planting by Roads and Maritime of screening trees within the road corridor to reduce the visual impact of the roadway
48. If it is the case that the flight paths are moved either temporarily or permanently as a result of the project, consultation should be conducted with potentially affected residents
49. Consultation with impacted residents should continue during the construction, commissioning and operational phases of the project
50. Ongoing dialogue should be maintained with Landcare Illawarra representatives regarding the design and implementation of landscaping / revegetation works.

Response

The exhibition of the environmental impact assessment included a substantial community consultation component with opportunity for the community to comment on the design and any associated issues (refer Section 1.2). Roads and Maritime acknowledge the importance of ongoing consultation throughout future stages of the project. Section 1 of this report summarises the proposed ongoing consultation that would be carried out for the project. Roads and Maritime's commitment to ongoing consultation is reflected in environmental management measure SE01 to prepare a Community Involvement Framework for the project (refer Section 13.5 of the environmental impact statement and Section 1.2 of this report).

The Community Involvement Framework would address, but not be limited to:

- Consultation purpose and objectives
- Communications tools
- Monitoring and evaluation

- Stakeholder analysis, to provide details on all stakeholders and indicative tools for engaging with these stakeholders
- Procedures for gathering, managing and using feedback provided by stakeholders
- Identification of specific issues, communications and management strategies for traffic management (including property access, pedestrian access)
- Social and business impacts
- Landscaping / urban design matters
- Construction programming and activities, including project construction hours and out of hours work
- Noise and vibration
- Enquiries and complaints handling framework.

A draft Community Involvement Framework is included as Appendix C to the environmental impact statement.

As noted in Section 15.3.2 of the environmental impact statement, Roads and Maritime would undertake ongoing consultation with directly affected landowners. All construction activities would be carried out in consultation with relevant landowners and service providers to minimise impact where possible.

An urban design concept plan has been prepared for the project and is presented in Chapter 4 of Technical Paper 10 – Landscape Character and Visual Amenity. This technical paper includes management measures that describe opportunities to better integrate the project into the Albion Park area including vegetation that would provide screening of the project. Opportunity was provided to make comment on the screening vegetation when the environmental impact statement was placed on display for public feedback in 2015. The detailed design and documentation of these works, both inside and outside the project area, would be the subject of comprehensive consultation with a range of stakeholders including government agencies.

A detailed aviation assessment has been carried out for the project and is provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement. An addendum has been undertaken of this assessment based on the proposed design refinements and is included in Appendix B of this report. On Yallah Road, at the intersection with the local access to the TransGrid substation, two light poles would penetrate the aspirational obstacle limitation surface runway 34 take-off climb surface. These reduced clearances would have no impact on the current operation of the airport and would not affect the safety of future aspirational operations. There may be some restrictions on take-off to the north by larger aircraft. Compared to the existing situation (without the motorway), the overall impact on future aircraft operations is minimal and flight paths would be unlikely to be altered. During construction short term changes to airport operations may occur, if this is the case, consultation with affected residences would be undertaken as part of ongoing construction consultation.

As noted in Section 7.5 of the environmental impact statement (mitigation measure TT4) the detailed design of the project would comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport.

Roads and Maritime commit to continuing consultation with Landcare during the detailed design phase.

2.5.3 OTHER

Submission number

48, 59 and 91.

Issues

51. Residents in Larkins Lane were not provided a copy of the environmental impact statement overview
52. Some of the language within the environmental impact statement overview is inconsistent and of a different strength than language used in the actual environmental impact statement. This inconsistent language could unfairly alter the view of the reader, reduce the reader's potential concerns and reduce the number of representations which would be submitted. Those same people would be shocked once construction has commenced and the result is different from that outlined in the overview but consistent with the environmental impact statement
53. The environmental impact statement overview document states "The proposed new motorway is forecast to cut morning northbound travel times by almost 65 percent, from nine minutes down to five and a half minutes." Later in the document it states that "When the Albion Park Rail bypass is open to traffic it is forecast to cut morning northbound travel times by almost 33 per cent, from nine minutes down to six minutes"
54. The environmental impact statement overview document does not identify Haywards Bay or Yallah as potentially impacted areas. Residents may therefore assume there will be no impacts and therefore not read the environmental impact statement
55. The environmental impact statement overview states that noisy works would be avoided in close proximity to residential areas, whereas the environmental impact statement only states that they are not proposed in close proximity.

Response

As discussed in Section 1.2 of this submissions and preferred infrastructure report, the environmental impact statement was placed on public exhibition by the Department of Planning and Environment between the 28 October and the 27 November 2015. A copy of the environmental impact statement was made available on the Department of Planning and Environment webpage at:

majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6878

Section 1.2 of this submissions and preferred infrastructure report also identifies locations where copies of the environmental impact statement were made publicly available during the public exhibition period. It is noted that submissions could only be made in relation to the environmental impact statement document, and were to be directed to the Department of Planning and the Environment.

The environmental impact statement overview document was prepared as a brief summary of the environmental impact statement to outline some of the key issues identified. A copy of the overview is available on the Roads and Maritime webpage at:

www.rms.nsw.gov.au/projects/illawarra/albion-park-rail-bypass/index.html

The environmental impact statement overview document outlines some of the key issues relevant to the project and directs the reader to refer to the environmental impact statement in full for detailed information. The overview document does not form part of the environmental impact statement, and was not submitted to the Department of Planning and Environment. Its

purpose was to provide an overview of the environmental impact statement and an indication of key issues detailed in the environmental impact statement. It also explains where the environmental impact statement could be viewed and how respondents could make a submission on the environmental impact statement.

The difference in traffic time statistics identified in Issue 53 above is due to the values being derived from different design years, as one design year was at opening and the other in the design year 2041. Due to the design refinements proposed in Section 5 of this report, these values have been superseded based on updated traffic modelling. The results are summarised in Section 5.5.1 of this report.

By 2041, with Albion Park Rail bypass in place, northbound travel time between Oak Flats and Yallah via the motorway is expected to be 6 minutes 42 seconds in the AM peak hour and the southbound travel time is expected to be 6 minutes and 42 seconds in the PM peak hour. In comparison to the 2041 travel time via existing Princes Highway route, this equates to a travel time saving of 64 per cent and 61 per cent in the AM and PM peak hour respectively. The travel time savings have been calculated using the TRACKS strategic model, which may underestimate the level of delay caused by heavy congestion in the future year 'Do Nothing' scenarios. As such, the values reported here represent the minimum travel time savings that can be anticipated as a result of the project.

The project proposes to extend the motorway between Yallah and Oak Flats to bypass Albion Park Rail. The works proposed to be undertaken in Yallah are documented throughout the environmental impact statement and technical papers, including the executive summary, and multiple sections thereafter. Section 5.6.1 of the environmental impact statement describes the proposed interchange at Yallah.

Section 5.20.12 of the environmental impact statement proposes extended work hours for construction of the project, stating that it is not proposed to carry out work during extended working hours close to sensitive receivers. During exhibition of the environmental impact statement, additional assessment and consultation was carried out to identify the potential impact of implementing extended work hours across all project locations to maximise the project and community benefits of reduced construction time. Based on the outcomes of the consultation, extended work hours are proposed to be implemented as standard construction hours for the project. The consultation process and findings are presented in Section 1.2.3 of this report and detail that eighty-four per cent of the consultation received supported the extended work hours.

2.6 TRAFFIC AND TRANSPORT

2.6.1 ROAD NETWORK PERFORMANCE

Submission number

4, 22, 23, 25, 27, 48, 53, 59, 62, 66, 85, 90, 91 and 93.

Issues

56. I am a daily commuter through Albion Park Rail to my place of employment in Western Sydney and at present I encounter delays on my journey due to traffic congestion, flood events, and the occasional accident or breakdown. The project will improve transport and economic efficiencies
57. The combination of an increasing population, additional traffic, more commercial development, and the use of the Princes Highway as a "convenient" access road, has caused significant traffic congestion issues along the Princes Highway. The project is desperately required to alleviate the traffic congestion
58. The project would increase congestion in Albion Park
59. The most significant bottleneck is the junction of the Princes Highway and the Illawarra Highway. The installation of the "traffic light" system causes the build-up of congestion, which brings traffic to a "go-slow"
60. The Illawarra Highway is a major access road for residents in the Albion Park area. As an interim measure to manage traffic until the bypass is constructed, it is recommended that the southbound right hand turn from the Princes Highway onto the Illawarra Highway be banned, with the new alternate route being through either:
 - Marshall Mount, or
 - Via the Hayward Bay exit, turning right onto the overpass, then left at Harrigan Ford, incorporating a connection between Yallah Road and the Illawarra Highway.

Response

A comprehensive assessment of the traffic impacts of the project was carried out to assess the operational phase impacts of the project. The findings are reported in Chapter 7 of the environmental impact statement and Technical Paper 1 – Traffic and Transport. As part of the proposed design refinements identified in Section 5.2 an addendum to Technical Paper 1 was undertaken to reflect the design changes as well as amendments to the traffic model. The addendum report is provided in Appendix A. The following benefits of the completed bypass were identified:

- A reduction in the total vehicle hours travelled of 24 per cent by 2041 with the project in place
- Average network travel speeds improved by 47 per cent in 2041 with the project in place
- Travel time savings as a result of using the bypass instead of the existing Princes Highway alignment is 11 minutes 42 seconds on a northbound journey from Oak Flats to Yallah in the morning peak (a 64 per cent reduction) and 10 minutes 36 seconds on a southbound journey from Yallah to Oak Flats in the afternoon peak by 2041 (a 61 per cent reduction).

The traffic modelling results show that the project would result in a slight increase in peak hour traffic volumes on Tongarra Road (west of Terry Street). This increase is estimated to be up to 2 per cent by 2041 in the morning peak and a reduction of 8 to 9 percent in the evening peak when compared to equivalent scenario without the project. Peak hour traffic volumes on Tongarra Road (east of Terry Street) is estimated to increase by 2 per cent by 2041 in the morning peak and a minimal change (reduction of 1 per cent) in the evening peak by 2041 when compared to equivalent scenario without the project.

The proposed motorway will result in the diversion of traffic from the intersection of the Illawarra Highway and Princes Highway onto the bypass. The project will also result in the removal of through traffic travelling via the Illawarra Highway to Albion Park as the Illawarra Highway in the north will be closed just south of Croome Lane. This will result in a reduction of future traffic flows which would otherwise use the intersection of the Illawarra Highway and Princes Highway. The proposed project alignment has been designed to allow for improved traffic flows into and out of the Albion Park area. Alternative arrangements will not be required as the proposed project design will result in improved access outcomes for Albion Park. Short term treatments to temporarily alleviate traffic issues such as those identified in Issue 60 would introduce additional infrastructure that would be made redundant when the project is constructed and given the size of works would require considerable processes such as environmental assessment and road design development prior to being ready to construct. Due to the proposed construction start date of 2019, there would be little benefit given for short term treatments. An alternative route through Marshall Mount was also not considered feasible due to the current alignment being determined not suitable for large volumes of traffic without substantial upgrades.

Submission number

4, 22, 23, 25, 27, 48, 53, 59, 62, 66, 85, 90, 91 and 93.

Issues

61. The northbound exit ramp at the Oaks Flat Interchange needs to have two lanes on approach to the roundabout so that the left lane can proceed to the new local road without having to queue behind traffic that is waiting to go right into Oak Flats
62. The new East West Link would be heavily congested, particularly during holiday times, with all of the traffic from the industrial park, Shellharbour Square and northbound traffic
63. Traffic would be funnelled along the new East West Link as there are no entry and exit points on the bypass. This would directly compete with Jamberoo traffic, Mt Terry traffic and traffic from the two quarries, negatively impacting local traffic movements
64. To ease congestion in the short term while awaiting the construction of the bypass:
 - Ban right-hand turns from Station Road onto the Princes Highway
 - Remove at least one set of traffic lights (e.g. at the junction of the Princes Highway and Creamery Road).

Response

The community's concerns about the potential for traffic to queue at the Oak Flats interchange northbound exit ramp are noted. The detailed traffic modelling undertaken as part of the design refinement process identifies that the northbound exit ramp from the Princes Motorway onto the Oak Flats interchange would need two lanes. The design has now been changed to adopt the two lane exit northbound and this ramp would maintain a level of service of B or better by 2041 (refer Figure 5-13 of this report). It is not anticipated that any substantial queuing would occur with the adoption of two lanes at the northbound exit ramp by 2041.

The results of detailed traffic modelling presented in Appendix A and summarised in Section 5.5.1 identified the forecast average daily traffic volumes for 2041 for the new service road (i.e. the new East West Link). As shown in Appendix A, by 2041 average daily traffic volumes on the East West Link are expected to be 10,500 with the bypass (compared to the 2014 surveyed average daily traffic volumes of 15,100 on the existing East West Link). The southbound entry ramp to the Oak Flats interchange and the Princes Highway are level of service A by 2041 (refer Table 5-9 and Table 5-10 of Appendix A). These results suggest that congestion on the new East West Link is not expected to occur as a result of the project, the traffic volumes are predicted to reduce. Any additional entry and exit ramps between the East West Link and the bypass would compromise traffic flows on the bypass resulting in declines in the levels of service achieved in the current design.

Due to the limited construction period for the project temporary treatments to the Princes Highway such as those described in issue 64 are not deemed necessary as this traffic congestion would be addressed by the project.

2.6.2 ACCESS

Submission number

4, 22, 25, 48, 66, 90 91 and 93.

Issues

65. The justification that the ramps for the interchange at Albion Park are tied to Tripoli Way bypass is incorrect. This is an excuse by Roads and Maritime who lack the funds to complete them now. If they are not built now, they will never be built. Tripoli Way would become the Western Gateway between the Illawarra and the Highlands, it is a road of state importance and should be state funded. It should be Roads and Maritime's, not Council's, obligation to fund the project
66. It is a must that the northbound exit ramp and southbound entry ramp at the interchange at Albion Park be built from year one, as northbound motorists would not be able to enter Albion Park and surrounds at this location. It would result in traffic being pushed through four kilometres of built-up areas, when it could be diverted easily onto the bypass
67. Had the motorway been built as per the original corridor the entry / exit ramps would have been located on Tongarra Road. This design would have improved efficiency for the business park. The current design would force commercial traffic through the already overburdened intersection at Terry Street and Tongarra Road
68. The loss of direct access from the Industrial Park to the East West Link is not desirable and adds additional travel time for trips to Albion Park. It is requested that a direct connection from the Industrial Park onto the new service road (the East West Link) be provided
69. The northbound exit ramp at the interchange at Yallah should merge with the existing Princes Highway before the western roundabout, reducing the number of roads entering the roundabout
70. The project does not allow northbound traffic coming from Nowra / Shellharbour directions to access Albion Park.

Response

Shellharbour City Council will be developing and delivering the Albion Park bypass (Tripoli Way). This is a local government project which is already under development. Roads and Maritime has been working with the Shellharbour City Council and has designed the Albion Park Rail bypass to cater for the Albion Park bypass (Tripoli Way). The proposed design refinements at the interchange at Albion Park, as described in Section 5.2.1 of this report, were developed in consultation with Shellharbour City Council to ensure cohesion between the two projects. As described in Section 5.2.1, the northbound entry ramp and southbound exit ramp at the interchange at Albion Park will now be located at Tongarra Road.

The Albion Park bypass (Tripoli Way) does not form part of this project. Shellharbour City Council would be developing and delivering Tripoli Way, and at their meeting of 27 October 2015, Council resolved to adopt an accelerated development program to enable commencement of construction of Tripoli Way coincident with the ramps for the Albion Park interchange of the Albion Park Rail bypass. The potential impacts of Tripoli Way on the Terry Street / Tongarra Road intersection would need to be assessed as part of the environmental impact assessment undertaken for the Albion Park bypass (Tripoli Way).

Given that the location of the northbound exit ramp has been relocated to Tongarra Road travel patterns in the Albion Park area will now not change significantly due to the project. As such these ramps are now not tied to the construction of the Albion Park (Tripoli Way) bypass and are proposed to be constructed with the project regardless of the status of the Albion Park (Tripoli Way) bypass.

As stated in Sections 5.3 of Technical Paper 1 – Traffic and Transport, the Albion Park (Tripoli Way) bypass and the connection to Terry Street is driven by the proposed development in the Calderwood future development area. Traffic capacity at the Terry Street / Tongarra Road signalised intersection would be driven by both background traffic growth and additional traffic from the future growth areas (refer Section 6.5.2.4 of Technical Paper 1 - Traffic and Transport).

Currently direct access to the existing East West Link from the industrial park west of the Oak Flats interchange is achieved via Durgadin Drive. With the project, traffic travelling from the industrial area to Albion Park would travel via the existing signalised intersection of the Princes Highway and Colden Drive. From this point traffic could travel north via the Princes Highway and Tongarra Road to Albion Park, or alternatively turn right on the Princes Highway and access the new East West Link (and then Croome Road) via the Oak Flats Interchange. This results in an increase in the distance travelled of around 1.1 kilometres. However, it is anticipated that there would be minimal (or no) increase in travel times between the industrial park and Albion Park with the project. A comparison of 2014 traffic surveys with forecast average traffic volumes with project shows a reduction in traffic volumes on Princes Highway of up to 30 per cent. Similarly, the new East West Link will see a reduction in average traffic volumes of 25 per cent by 2041 (refer Figure 6-2 of Appendix A).

The configuration of the proposed interchange at Yallah provides for the northbound exit ramp for traffic exiting the bypass, which then travels through the western roundabout, from which traffic can then exit to travel north on the Princes Highway (refer Figure 5-8 of this report). This configuration provides for safe traffic movements between the bypass and the Princes Motorway, and is necessary to provide access and traffic capacity for motorists exiting the bypass to travel in an easterly direction towards the eastern roundabout.

As described in Section 5.5.1 of this report, northbound traffic from Nowra or Shellharbour will be able to exit the motorway at Tongarra Road and then proceed west to Albion Park. This is illustrated in Figure 5-13 of this report.

2.6.3 IMPACTS ON ROAD SAFETY

Submission number

25 and 27.

Issues

71. The project would result in improvements in road safety by separating local and pedestrian traffic from through traffic. The benefits for both safety and public amenity should be significant for both Albion Park and Albion Park Rail
72. The speed limit on the Oak Flats Interchange and sections of approach roads should be reduced to 60 km/hr to prevent crashes, with Speed Safety Cameras being placed in strategic positions.

Response

A comprehensive traffic assessment was undertaken for the Albion Park Rail bypass, as presented in Chapter 7 of the environmental impact statement and Technical Paper 1 – Traffic and Transport. This was further updated in the addendum traffic and transport assessments which is included in Appendix A of this report. Section 5.5.1 of the addendum reports that, between 1 July 2011 and 30 June 2016, a total of 333 crashes (resulting in one fatality) were reported on the Princes Highway, Illawarra Highway and Tongarra Road between Yallah and Oak Flats. Of these, 85 per cent occurred on the Princes Highway. The project would provide improved safety via separation of through and local traffic, and provision of a safer, motorway standard bypass. The project is expected to achieve a target reduction 31 casualty crashes per year, which would be equivalent to annual crash savings of \$4.5 million per year (refer Section 5.5 of Appendix A).

The speed limit on the approach to the Oak Flats interchange is currently 80 kilometres per hour on the Princes Highway and 80 kilometres per hour on the current East West Link. These current approach speeds have been used in the model presented in Section 5.5.1. Roads and Maritime is currently undertaking a speed zone review of the existing roundabout and will consider whether the speed zones are appropriate in this location.

2.6.4 NEW SERVICE ROAD – QUARRY ACCESS INTERSECTIONS

Submission number

97.

Issues

73. The existing roundabout access to the Holcim quarry site is proposed to be replaced with a T-intersection. The proposed T-intersection access to the Holcim quarry site does not give adequate consideration to the integration of the Holcim quarry site traffic (quarry and concrete) with future road use. The justification for the proposed intersection is based on Cleary Brothers trip figures from 2012. No source is detailed for movements associated to the Holcim site. No detail was supplied as to whether the movements were associated to heavy or light vehicles, nor whether or not movements associated with the concrete batching plant have been considered. Movements to and from the site have been underestimated (114 versus 780), thus bringing in to question the ability of the proposed intersection to cater for site traffic and the ability to transport products from the site at required peak volumes (i.e. sales requirements)
74. No data is provided on required lead times for fully laden heavy vehicles leaving the quarry site to merge with other vehicles. An acceleration lane has not been mentioned. Heavy vehicles leaving the quarry site may encounter substantial waiting times
75. The T-intersection configuration for the quarry access may impact site operations causing 'banking' up of vehicles before they exit the site. Given the proposed East West Link would consume 25 metres of existing buffer between the site weighbridge and the existing roundabout, the ability for trucks to queue prior to departure would be removed
76. The location of the new East West Link would jeopardise the functionality of the Holcim quarry site weighbridge. By removing ability for trucks to queue (following ticketing) prior to departure, the use of the weighbridge would effectively be controlled by the ability for heavy vehicles to depart the site in a timely manner. Impacts would need to be mitigated.

Response

Traffic modelling was reassessed in consultation with Holcim and Cleary Brothers. The addendum traffic and transport assessment report (Appendix A of this report) contains updated traffic data provided by Holcim based on traffic counts during the AM peak between 14 November 2016 and 18 November 2016. Traffic generation data remained the same for the Cleary Brothers access point.

As a result of the revised traffic model, while the footprint of the intersection remains the same as the environmental impact statement, the implementation of traffic lights at opening year is proposed at the quarry access intersections on East-West Link. With the implementation of traffic lights, both quarry access intersections are anticipated to operate at level of service A (refer Section 5.4 of Appendix A of this report) which is considered a satisfactory level of service.

2.6.5 AVIATION

Submission number

55 and 59.

Issues

77. Will the project affect the flight path of aircraft taking off and landing at the Illawarra Regional Airport?
78. Aircraft flying overhead at low altitude are a distraction for drivers and cause other safety issues. Future flight paths should be altered, moving aircraft away from the east-west corridor and residential properties? If there is any alteration to the flight paths they should be altered to the east and over the factories to avoid impacts to residents.

Response

A detailed aviation assessment has been carried out for the project; provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement. An addendum to the aviation assessment has since been produced to assess the potential impacts associated with the proposed design refinements described in Section 5 and is included at Appendix B of this report.

The flight paths for aircraft taking off and landing at the Illawarra Regional Airport are determined primarily by the location and orientation of the runways, as discussed in Technical Paper 2 - Aviation. These would not be changed by the project. It is not expected that aircraft movements would present a substantial distraction for road users, particularly given the low volumes of aircraft movements at the airport.

The original assessment and addendum identified that vehicles and street light poles would not infringe the existing Procedures for Air Navigation Services (PANS-OPS) surfaces or the obstacle limitation surface for the precision approach path indicator system, and as such would not affect the flight path of aircraft taking off and landing at the airport. As noted in Section 4.1.1 of Technical Paper 2 – Aviation, where structures or lighting have limited clearance to the existing obstacle limitation surface would be monitored and controlled during detailed design to ensure no penetration occurs.

The assessment and addendum also considered the aspirational (Code 3) obstacle limitation surface, being the airspace requirements for the airport in the event it is upgraded in future to accommodate bigger aircraft. Shellharbour City Council has since confirmed that scheduled passenger services will commence in October 2017, and the aspirational (Code 3) obstacle limitation surface will become the operational obstacle limitation surface for the Illawarra Regional Airport. The environmental impact statement and submissions and preferred infrastructure report assess the project against the aspirational (Code 3) obstacle limitation surface.

The project would extend into the aspirational obstacle limitation surface in three areas as described in the environmental impact statement. Two of the intrusions relate to areas where the motorway is proposed to connect with existing local roads that already intrude into the aspirational obstacle limitation surface. In these locations, the project would not result in a greater penetration than currently occurs. The third intrusion would only occur when a 4.6 metre high vehicle parks in an 80 metre section on the southbound shoulder of the motorway. This area will be marked as no stopping to ensure that it remains free on any intrusions on the aspirational obstacle limitation surface (management measure TT06).

A number of existing and proposed facilities in the Croom Regional Sporting Complex would also intrude on the aspirational obstacle limitation surface, however this would not produce a greater intrusion than already occurs.

In two other locations proposed street poles may come close to, but are unlikely to penetrate the aspirational obstacle limitation surface (refer Technical Paper 2 - Aviation). Given the nature of existing constraints, the project would not be expected to influence future flight paths associated with an upgraded airport.

Section 7.5 of the environmental impact statement (management measure TT04) requires that the detailed design of the project would comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport.

Roads and Maritime will continue to consult with Shellharbour City Council during detailed design and construction to ensure impact to the airport's operations are minimised.

2.7 HYDROLOGY AND FLOODING

2.7.1 FLOOD PLANNING

Submission number

62 and 59

Issues

79. Wollongong and Shellharbour Councils are not in agreement with the flood studies carried out for the project and appear to have reservations about the data presented
80. Planning must be in accordance with the present flood planning models for Wollongong, not just Shellharbour, as affected properties and embankments are within Wollongong City Council area
81. Flooding is a major issue and has not been adequately addressed in the environmental impact statement.

Response

Wollongong and Shellharbour City Councils each provided a submission during the public exhibition period that includes comments on Technical Paper 3 – Hydrology and Flooding and Chapter 8 of the environmental impact statement. Their submissions have been reproduced in Section 3.6 and 3.7 of this report, along with Roads and Maritime's responses to the issues raised in relation to flooding.

Section 8.1.3 of the environmental impact statement and Chapter 3 of Technical Paper 3 – Hydrology and Flooding detail the methodology adopted for the flooding investigations. Section 3.3 of Technical Paper 3 explains that the models used for the project were based on the catchment-wide flood models being used by Shellharbour City Council and Wollongong City Council for their floodplain risk management processes under the NSW floodplain management program, including:

- Duck Creek Flood Study (BMT WBM, 2012) prepared for Wollongong City Council
- Macquarie Rivulet Flood Study (WMAwater, unpublished) for Shellharbour City Council and Wollongong City Council
- Horsley Creek Flood Study (Rienco, 2011) prepared for Shellharbour City Council.

An additional assessment was carried out to assess any changes in impacts to hydrology and flooding due to the proposed design refinements. The additional flooding and hydrology assessment is attached as Appendix C of this report. The Macquarie Rivulet Flood Study is currently in progress, and a draft report was made available for public exhibition in July 2016 by Shellharbour City Council after the environmental impact statement was issued for public exhibition. In 2014, an advance copy of the Macquarie Rivulet flood model was made available to Roads and Maritime for the environmental impact statement. The model represented the most comprehensive flood model available at the time for this catchment.

After the flood model was provided to Roads and Maritime for the environmental impact statement, some changes were made to the Shellharbour City Council flood model for the issue of the draft Macquarie Rivulet Flood Study.

All of these changes to the model mean that the results of the 2016 draft Macquarie Rivulet Flood Study are different to the results from the preliminary Macquarie Rivulet flood model

provided to Roads and Maritime for the environmental impact statement in 2014. A comparison of the two models found that flow rates and flood levels are lower in the July 2016 draft flood model compared to the model used in the environmental impact statement for a range of design storm events between the 5 year ARI and 100 year ARI. In events greater than the 100 year ARI, the 2016 draft flood model predicts higher flow rates and flood levels.

The flood impacts and immunity of the project have been developed based on the Macquarie Rivulet flood model used in the environmental impact statement. As a sensitivity test, the revised design has been analysed in the 2016 draft Macquarie Rivulet flood model to determine what level of immunity and impacts would be achieved if the draft model was used. The results of this analysis are provided at Section 3.4.4 and Section 3.5.4 of Appendix C of this report and identified that impacts predicted would be lower than that presented in the environmental impact statement making the model used in the environmental impact statement the conservative model.

The assessment presented in Technical Paper 3 – Hydrology and Flooding Assessment and the additional hydrology and flooding assessment (Appendix C of this report) is consistent with the flood modelling undertaken by both Wollongong City Council and Shellharbour City Council.

Technical Paper 3 – Hydrology and Flooding Assessment, Chapter 8 of the environmental impact statement and the additional hydrology and flooding assessment (Appendix C of this report) were prepared to meet the requirements of the Secretary's Environmental Assessment Requirements and the NSW Government Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005).

Submission number

66, 55 and 75

Issues

- 82. The project should attempt to improve flooding, not just attempt not to make it worse
- 83. The environmental impact statement states that the Green Meadows Basin current status would be preserved. The opportunity should be used to improve the current situation, as 100 year ARI events are becoming increasingly regular
- 84. The project would cause an increase in flood levels in the Macquarie Rivulet floodplain, such that water would be a metre deep (in a 100 year ARI flood event) at flood affected property number 2. Roads and Maritime do not plan to mitigate or compensate the landowner, leaving it to them and Council to resolve. This would impact insurance premiums for the property.

Response

The objectives of the flooding assessment are stated in Chapter 3 of Technical Paper 3 – Hydrology and Flooding Assessment and Section 8.1.3 of the environmental impact statement. The objectives and criteria seek to define reasonable and justifiable limits on the impact of the project on flood behaviour, and consequently socio-economic impacts on the community. This is in accordance with the Secretary's Environmental Assessment Requirements and the NSW Government Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005). The flood impact criteria are consistent with those applied on other Roads and Maritime projects across New South Wales and have been applied in the additional hydrology assessment report (Appendix C of this report).

As discussed in Section 8.2 and 8.3 of the environmental impact statement, there are a range of flood benefits that would be realised as a result of the project:

- Existing flood risk would be mitigated by constructing a new detention basin upstream of the bypass near Croome Road, resulting in 23 properties in the Horsley Creek catchment becoming no longer flood impacted. This would bring significant social and economic benefit to the community
- There would be a significant improvement in access during a flood event over the existing condition, with the majority of the new motorway being flood free in the 100 year ARI event, except for a small section at Duck Creek, which would be flood free in the 50 year ARI event. In the 100 year ARI one of the three north bound lanes and all south bound lanes are flood immune
- Access for local and through traffic would be improved during a flood event
- There would be improved access for emergency services and evacuation for both regular and rare flood events because the new motorway would be higher than the existing road network, which is regularly inundated by flood waters. Currently the project area does not have designated flood evacuation routes (State Emergency Service, 2008 and 2010)
- There would be an improved level of flood immunity at Tongarra Road, increasing flood immunity from the 2 year ARI in the existing condition to the 5 year ARI.

Technical Paper 3 – Hydrology and Flooding identifies that the Green Meadows Basin currently stores water temporarily during a storm event, and releases the water slowly in order to reduce flooding downstream. Due to the interaction of the motorway with this basin, modification of the basin would be carried out to ensure the current flood storage and the structural safety of the basin are maintained. Increasing the storage capacity of the basin and, therefore, the flood immunity for the East West Link would result in an increased risk to downstream residents in the event the basin wall were to break. This risk was identified during consultation with Shellharbour City Council and the Dam Safety Committee. The capacity of the Green Meadows Basin will be further investigated during the detailed design to investigate possible benefits that could be achieved whilst still maintaining the same dam break consequence category.

Chapter 8 of the environmental impact statement identifies that impacts on property 2 would be monitored and assessed through the detailed design stage and re-assessed when the Macquarie Rivulet flood model has been finalised by Shellharbour City Council. It also states that in the event that the new flood assessment with the updated flood model does not occur improving the flooding results at property 2 during detailed design, appropriate flood mitigation would be identified in consultation with the property owner (environmental management measure HF06). Roads and Maritime is in consultation with the property owner in regards to these impacts.

Submission number

48 and 91

Issues

85. Assessments relating to scouring have not yet been complete. This assessment should have been part of this stage of the project rather than detailed design. Scour assessment, to be carried out during detailed design is limited to investigating issues with the projects' structures. Scour of agricultural land parcels (particularly through culverts M2b and M2c) may result in ground being gouged out, removal of top soil and / or loss of grazing land. This will result in reduced productivity. What do Roads and Maritime propose to do if assessment during detailed design of scour impacts identifies serious impact to the dairy enterprise?

Response

Chapter 8 of the environmental impact statement states that an assessment of the bed and bank stability and potential for scour would be undertaken as part of detailed design (environmental management measure HF08). This assessment occurs during detailed design as the findings are fed directly into the design process, ensuring that measures are incorporated in the design to adequately protect bank stability. This process would be done in consultation with the Department of Primary Industries (Water) and Department of Primary Industries (Fisheries) to ensure the selected measures are suitable and adequate and the residual impacts acceptable. Technical Paper 3 – Hydrology and Flooding Assessment and the additional hydrology and flooding assessment (Appendix C) assessed the potential flow velocity and duration impacts of the project against the flood impact objectives. Objectives for flood velocity in agricultural areas were achieved for the project and as such no substantive scour impacts are anticipated for agricultural land.

Submission number

48 and 91

Issues

86. Section 3.2.2 (page 26) states "The Princes Highway floods three times a year south of Station Road. It is closed on average for half a day a year." Then at the bottom of the page it contradicts itself and states "Floodwaters close the Princes Highway three times each year on average, typically for 1.5 days on each occasion. This sums to a total of around 4.5 days each year during which the highway is closed to traffic".

Response

Roads and Maritime acknowledges there is an unintended error in the environmental impact statement. The sentence stating "Floodwaters close the Princes Highway three times each year on average" should read "Floodwaters close the Princes Highway three times each year on average, for a total of 1.5 days a year. Floodwaters close the Illawarra Highway seven times each year on average, typically for a total of 4.5 days a year". The conclusions regarding the nature of impacts on flooding are still valid.

2.7.2 BRIDGES AND CULVERTS

Submission number

48, 57, 58, 59, 61, 62, 66, 91, 96 and 101.

Issues

87. The proposed Albion Park Rail bypass is a giant levee bank across a floodplain. It would cause significant flooding and hardship to the residents of Albion Park, Albion Park Rail and the yet to be developed Calderwood Valley, despite the best efforts of the designers of the project to provide drainage
88. The ramps and embankments forming the interchange at Albion Park would form a dam wall, preventing rapid dispersal of rain / storm / flood waters
89. Any works in proximity to watercourses should, where possible, lessen future flood damage. Construction of BR09 and BR07 will force water through Frazers Creek and may erode the creek banks downstream. Frazers Creek has considerable scouring and often has slumping of banks which expands into usable land and also causes diversion

of flows. Rehabilitation should be considered as an offset in numerous areas

90. It is unclear what impact, if any, the bridgeworks and additional culverts on Duck Creek and other tributaries will have on the Tallawarra Lands. Further discussion and investigation of this work should be considered during design to avoid exacerbation of flooding impacts on Tallawarra Lands
91. The roadway construction must ensure that it does not impact on the water flow from the upper houses in Larkins Lane to the present lowlands and into Macquarie Rivulet. The large embankment required for the bridge spanning Macquarie Rivulet will stop the natural flow of stormwater to the Macquarie Rivulet and back-up the water, potentially causing flooding, and leading to soil erosion and other issues. There will only be one opening in this embankment to allow the flow of stormwater. Wollongong City Council presently has a requirement for their flood studies that any opening less than six metres is classified as being blocked during a flood event. The embankment leading up to the Macquarie Rivulet Bridge on the northern side is only 1.8 metres. Roads and Maritime could address the flood issue and access issue by providing a six metre opening in the embankment. It needs to be clearly articulated to residents that the embankments are smaller than required by Wollongong City Council, and justify that they will not affect flooding.

Response

Technical Paper 3 – Hydrology and Flooding of the environmental impact statement describes the predicted impacts of the project identified through the use of predictive flood modelling. The assessment has been updated to describe the predicted impacts of the proposed design refinements (refer Section 5) in the additional hydrology and flooding assessment (Appendix C of this report). The predictive modelling and assessment criteria used for the additional assessment of the design refinements (Appendix C of this report) were unchanged and therefore the same as those used in the environmental impact statement and Technical Paper 3 – Hydrology and Flooding.

The proposed Albion Park Rail bypass is not expected to act as a levee bank across the floodplain because a number of bridge and culvert openings have been provided along the road at the watercourses and main flow paths. Within the Macquarie Rivulet floodplain, the project provides a 200 metre bridge over the Macquarie Rivulet (BR06), a 150 metre bridge over Frazers Creek (BR06), and a 90 metre bridge over Frazers Creek further to the south (BR06). The bridge openings have been sized such that the predicted impacts in the Macquarie Rivulet are minimised. No significant impacts on flood behaviour are anticipated due to the presence of embankments.

It is noted that the north bound entry ramp and south bound exit ramp have large culverts under them which means they do not form a dam wall but allow for water to flow from the Macquarie Rivulet towards Frazers Creek.

Albion Park, Albion Park Rail and Calderwood Valley are located in the Macquarie Rivulet catchment. Flood modelling in this catchment identified that impacts during the probable maximum flood event would primarily be due to the alignment blocking flows that would have previously occurred in an easterly direction across the existing Illawarra Highway. This is predicted to result in a flood level increase of about 250 millimetres to the west of the alignment, resulting in some increase in the flow of water into developed areas between Illawarra Regional Airport and the Macquarie Rivulet. Existing flood depths in this area range from three to five metres, suggesting the predicted increase would occur in areas where properties are already significantly affected by flooding during these events. In the environmental impact statement, two dwellings within this area are identified as being impacted as a result of the proposed works beyond an acceptable level (greater than 50 millimetres increase for the 20 and 100 year ARI average recurrence interval flood events). These dwellings would be considered within detailed

design to determine suitable management measures to reduce this impact (refer management measure HF06 and Section 6.2 of the additional hydrology and flooding assessment (Appendix C of this report). In the revised design, only one dwelling is considered to be impacted by the project beyond an acceptable level.

As discussed in Chapter 8 of the environmental impact statement, the proposed bridges BR07 and BR09 would result in increases in flood levels upstream of the bridges. This would delay flows downstream, and is more likely to result in decreased rather than increased bank scour upstream of the bridges where this occurs. Therefore, bank rehabilitation works are not proposed as part of this project.

Some increases in velocity are predicted in the floodplain between the main alignment and the Illawarra Regional Airport. This is due to the alignment directing the flow in the north-south direction and reducing flow in the east-west direction. The change in flow velocity is relatively minor, with velocities remaining below one metre per second across the majority of the Macquarie Rivulet floodplain. For those lands that currently experience flow velocities greater than one metre per second during a 100 year ARI flood event, some are predicted to experience decreases in flow velocity with the project. Where increases in flow velocities do occur, they increase by less than 20 per cent over the existing condition, and hence meet the design criteria established for the project. Increases in velocity greater than 20 per cent occur at the inlet and outlet of culverts and at bridge crossings, which is typically the case for hydraulic structures. Scour protection measures will be designed as required during the detailed design phase to prevent scour.

Table 8-5 of the environmental impact statement summarises the potential impacts of the proposed culverts on Duck Creek. Figure 8-9 shows the 20 year ARI flood extents and depths for project. It is expected there would be no additional flood impact on the Tallawarra Lands as a result of the project. No detrimental impacts downstream of the culverts were identified as part of the modelling and the additional assessment (Appendix C of this report).

Chapter 8 of the environmental impact statement describes flood modelling that was carried out to guide the project design, including embankment design. As indicated in Table 8-8 of the environmental impact statement, the proposed bridge BR06 (refer to Figure 5-10) and associated embankments would increase flood levels upstream by 140 millimetres in the 20 year ARI flood event. This impact is considered minor and acceptable, and would occur largely in rural areas currently inundated by a 20 year ARI flood event.

It is noted that Wollongong City Council has recently changed their blockage policy which means that the proposed 1.8 metre diameter culvert under the motorway east of Larkins Lane would have a design blockage factor of 50 per cent, not 100 per cent.

The catchment area draining to this culvert is small when compared to the Macquarie Rivulet and flooding at this culvert is primarily due to water overflowing from Macquarie Rivulet, not from local runoff. The depth of water overflowing from Macquarie Rivulet at this location is not predicted to increase as a result of the project.

It is noted that the houses on Larkins Lane are elevated above the floodplain and are not impacted by flooding from the Macquarie Rivulet.

2.7.3 IMPACTS ON DAIRY AND AGRICULTURE

Submission number

48, 54, 57, 61 and 91.

Issues

92. It is inevitable that during construction there will be several floods and yet this document hasn't assessed that eventuality. The environmental impact statement does not assess the risk to the dairy enterprise in regard to movement of material due to flooding during construction. Material from stockpiles and construction sites may mobilise across the property during a flood. How will this be addressed?
93. The project will result in increased flood extents and duration of flood waters impacting the dairy enterprise. Increasing the length of time water lies on the pastures will cause scouring and sedimentation of pastures, as well as unhealthy stagnant water issues. Excessively wet paddocks cannot be grazed. Water that hangs around for a while kills the grass in low-lying areas and makes it necessary for replanting of those sections. It prevents the cows and machinery from accessing the paddocks. If the herd were allowed into a paddock where the ground is waterlogged their hooves would rip up the grass in the paddock turning it into a bog and making a huge repair job. It also puts our animals at risk of injury
94. There will be a cumulative flooding impact on the dairy enterprise as a result of future nearby developments (such as Calderwood)
95. The 'flood level objective' identified in the environmental impact statement for agricultural land was not identified in consultation with affected landowners and is not appropriate, given that the resulting impact would be detrimental the dairy enterprise's operations.

Response

Chapter 8 of the environmental impact statement discusses the potential for flooding impacts during construction, including the mobilisation of stockpiles. The location and sizing of stockpiles would be managed to ensure that design criteria are not exceeded (environmental management measure HF02). Flood modelling of construction features would occur during detailed design to ensure any potential impacts of the construction activities on flood behaviour are identified and mitigated or managed accordingly (environmental management measure HF01).

As identified in Figure 8-4 and 8-5 in the environmental impact statement, the grazing land surrounding Macquarie Rivulet experiences inundation in a 20 year ARI flood event under existing conditions. These areas, which are utilised for grazing, would already be required to manage situations such as waterlogged soils and the distribution of cattle during flood periods. The project would result in increases in these flood levels of up to a maximum of 0.07 metres in a 20 year ARI event as demonstrated in Figure 3-3 of the additional hydrology and flooding assessment (Appendix C of this report) and, therefore, would not result in a substantial increase in the extent of inundation.

Flood duration in the Macquarie Rivulet floodplain would not be substantially changed as a result of the project, as shown in the example provided for the confluence of Frazers Creek and Macquarie Rivulet in Figure 3-5 of the additional hydrology and flooding assessment (Appendix C of this report). For this example, in the existing case flood levels are greater than five metres AHD for six hours and five minutes during the nine hour 100 year ARI event. With the project the duration of inundation is increased by five minutes to six hours and ten minutes. The project

is considered unlikely to have a substantial impact on the duration of waterlogging of soils after a flood event.

Section 6.4.2 of Technical Paper 3 – Hydrology and Flooding discusses the cumulative impact of future land use changes (such as Calderwood) and the project on flood behaviour. An analysis was carried out that included both the future development areas and the project in the flood modelling. It indicated that the cumulative impacts of the bypass and the potential land use changes are not likely to be worse than impacts of the bypass alone.

Table 3-2 of the environmental impact statement provides justification for the objectives chosen for agricultural land: “These lands can accommodate higher flood levels for short periods of time (a few hours) without any substantial increases in land damage or decreased use of the land”. The same objectives were adopted for the additional hydrology and flooding assessment (Appendix C of this report) and were achieved for agricultural land. It should be noted the identified agricultural land is routinely inundated by flooding (see Figure 8-4 and Figure 8-5 of the environmental impact statement), and the project is only expected to marginally increase flood depths in these areas (see Figure 3-3 and Figure 3-4 of Appendix C). Roads and Maritime would continue ongoing consultation with affected landowners (including the dairy enterprise) during detailed design to ensure impacts proposed are not detrimental to the operation of the enterprise.

2.8 BIODIVERSITY

2.8.1 MANAGING IMPACTS TO SPECIES AND ENDANGERED ECOLOGICAL COMMUNITIES

Submission number

43, 48, 59, 62, 91 and 95.

Issues

96. Wiping out of any endangered ecological community is unacceptable. A re-evaluation should be carried out of how to fix traffic congestion without sacrificing any endangered ecological communities which support, feed and house our local fauna
97. The environmental impact statement proposes to fill two dams to the north-west of the Macquarie Rivulet without any replacement habitat proposed. Black swans and other bird life, frogs, turtles, echidnas and wallabies have been sighted near the two dams. These species, and the impact of removing these dams, have not been assessed within the environmental impact statement
98. Duck Creek and the Macquarie Rivulet, over which the project passes at several points, are known habitat for platypus. No assessment of impact on the platypus has been made within the environmental impact statement
99. It is vital that any offsets for the project genuinely offset the project's destruction of biodiversity, specifically of Eastern Flame Peas, and 14 hectares of endangered ecological community. Proposed offsets need to restore and protect in perpetuity lands that would have originally borne the same endangered ecological communities as those impacted by the project, and that would not otherwise have been restored and protected
100. No mention has been made within the environmental impact statement of the impact on the biodiversity of the current farming activity in this area.

Response

Technical Paper 4 – Biodiversity Assessment Report was prepared as part of the environmental impact statement to address the requirements of the NSW Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a) and to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (Chapter 9 of the environmental impact statement).

The biodiversity assessment report has since been revised to include the potential impacts associated with the proposed design refinements described in Section 5 (refer Appendix D of this report).

This framework has been developed by the NSW Government to ensure a rigorous evaluation of biodiversity issues associated with a development and to ensure the impacts are assessed for biodiversity. Under this framework, reasonable measures to avoid and minimise impacts must be carried out as a first measure in the project design. Where this is not possible, other measures are then considered (such as offsetting) as detailed in the environmental impact statement and the revised biodiversity offset strategy included at Appendix E.

The biodiversity assessment report (Appendix D of this report) outlines the measures taken to avoid and minimise the direct impacts of the project on biodiversity, and describes the rigorous options selection process undertaken for the project (Section 5.1 of Appendix D). The following are examples of where the project has sought to avoid impacts on biodiversity values:

- The project footprint through the Macquarie Rivulet floodplain was adjusted during preparation of the 50 per cent concept design to minimise the direct impacts on high value vegetation, while still allowing for the construction of the project. This footprint was later reduced during the design refinement process to minimise direct impacts on biodiversity (Section 5 of this report)
- The road corridor route through the Croom Regional Sporting Complex was selected in order to limit clearing of the Illawarra Lowlands Grassy Woodland endangered ecological community to the greatest extent possible, avoid increased impact on the Freshwater Wetlands on Coastal Floodplains endangered ecological community, to minimise impacts on the Croom Voluntary Conservation Area, to allow sufficient space for the recreational facilities within the sporting complex (including those to be relocated) and to provide space for the internal road to fit around existing constraints to optimise safety
- Design refinements were made to the Yallah Road intersection to minimise impacts on the Eastern Flame Pea, which is listed as an endangered species under the *Threatened Species Conservation Act 1995*
- The project boundary was adjusted to avoid two areas where the Eastern Flame Pea occurs (identified as environmental protection areas)
- The ancillary sites were selected to minimise vegetation clearing and disturbance. The project footprint largely encompasses previously cleared and sparsely vegetated areas.

The residual impacts are considered unavoidable given the array of additional factors the project was required to consider, such as flooding and traffic.

Table 2-3 of the biodiversity assessment report (Appendix D) identifies that the investigations, including targeted surveys, of the Council dams found that these dams are not key fish habitat, are not an endangered ecological community and consist of a mixture of exotic and native species. Based on the limited habitat associated with these ponds and the limited results of the field surveys, the native species diversity at these ponds is identified as low; therefore, no offsetting is required at these locations. It is noted that wetland areas in the dams located just north of Macquarie Rivulet are categorised as an endangered ecological community and will be offset. Typically, offsets calculated by the BioBanking Calculator, which is being used for this project, require greater than five times the area that is being impacted. Vegetation areas requiring offsetting are shown in Figure 3-6 of the biodiversity assessment report.

Predictive modelling of the habitat of the Platypus (*Ornithorhynchus anatinus*) identifies the potential for the platypus to be located in the Albion Park area (Southern Rivers Catchment Authority, 2005). The available habitat for the Platypus includes Duck Creek, the Macquarie Rivulet, Frazers Creek and the Horsley Inlet. Within the project area (and downstream) these creeks have been extensively modified and subject to ongoing impact over a long period of time due to urban, commercial / industrial and agricultural activities. Horsley Inlet is piped for much of its length downstream of the project. No evidence of Platypus use of the project area was observed during the ecological survey. It is therefore considered that there is a low level of likelihood of occurrence of this species in the project area.

If Platypus are present in the project footprint, there is potential for direct impact on habitat (from vegetation clearing, and excavation in the bed and banks) where the project crosses the main watercourses. There is also potential for indirect impacts on Platypus foraging due to short-term declines in water quality arising from erosion and sedimentation during construction. These impacts would be managed via implementation of a range of management measures, as detailed in Section 23.2 of the environmental impact statement, including:

- The requirement for flora and fauna management measures (management measure BD03), including fauna handling requirements if Platypus is found during project delivery
- Erosion and sediment controls (management measure SW01)
- A soil and water management plan (management measure SW02) would be incorporated into the construction environmental management plan.

Environmental management measures identified in Section 9.5 of the environmental impact statement note that the biodiversity offset strategy would be further developed in consultation with the Office of Environment and Heritage and Department of Primary Industries (Fisheries). This would ensure that offset locations selected are adequate and appropriate to the species or communities being offset. An updated version is included as Appendix E of this report.

Chapter 9 of the environmental impact statement considers the existing biodiversity of the project area to determine matters for consideration and potential impacts. The historical and ongoing use of the land for farming, as discussed in other sections of the environmental impact statement, has historically impacted the surrounding environment. Many areas identified as having low native species diversity have been land use activities such as farming, although this is not the focus of this environmental impact statement.

2.8.2 BIODIVERSITY MANAGEMENT AND PROTECTION

Submission number

95.

Issues

101. Opportunities should be provided for volunteers, under the supervision of Landcare Illawarra, to translocate species from the project site so that they can be used for revegetation in Landcare Illawarra's projects in the region
102. Tender and contract documentation should:
 - Specify strong minimum standards in terms of bush regeneration (conservation and land management) qualifications and experience for firms to be able to sub-contract for landscaping/revegetation works associated with the project
 - Require the successful tenderer to preference suitably qualified and capable local Illawarra bush regeneration in landscaping / revegetation sub-contracts associated with the project
 - Require bidders to work in partnership with a local bush regeneration firm or firms for landscaping / regeneration aspects of the project, or give a weighting for bids that include such a partnership
 - Require that landscaping/revegetation be carried out using plants grown from seed collected from plants within Illawarra, and that seed collection and propagation be carried out by those intimately familiar with Illawarra vegetation.

Response

Roads and Maritime are committed to undertaking ongoing consultation with Landcare to ensure opportunities to work with volunteers are utilised.

The tender and contract for the bush regeneration works required as part of this project would be part of the main contract for the delivery of the bypass. The tender documents would be based on best practice standards as well as Roads and Maritime guidelines and policies for these activities. The tender documents will provide detail favouring local indigenous plant species and seed. Landscape plans would be developed as part of the detailed design process detailing the proposed planting and rehabilitation areas.

Roads and Maritime will stipulate in the tender documentation that revegetation works is carried out by suitably qualified personnel.

Submission number

48 and 91.

Issues

103. A previous study found that the wetlands adjacent to the Illawarra Highway are degraded, however the environmental impact statement classifies them as “moderate to good”.

Response

The condition of the Frazers Creek wetland complex, as detailed in Chapter 9 of the environmental impact statement, was determined through desktop and field investigations carried out by qualified ecologists as part of this assessment. The assessment methodology was based on the Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a) and the NSW Biodiversity Offsets Policy for Major Projects (NSW Office of Environment and Heritage, 2014b). Some sections of this wetland are listed under the State Environment Planning Policy 14 – Coastal Wetlands as a protected wetland. It was found to contain moderate native species diversity and was therefore considered to be in moderate to good condition.

2.9 NOISE AND VIBRATION

2.9.1 ASSESSMENT METHODOLOGY

Submission number

55, 59 and 101.

Issues

104. Concern that the noise logging undertaken to establish background noise levels should have included additional loggers and/or logging in different locations. Specific locations mentioned included:
 - Near residential receivers adjacent to the existing East West Link
 - Larkins Lane
105. The environmental impact statement makes no reference to noise monitoring in the Tallawarra Lands area. Consideration of noise treatment to those sections of the project and associated access infrastructure potentially impacting the Tallawarra Lands is requested
106. Noise catchment area 13 is described in the environmental impact statement as currently being used for agricultural purposes. The environmental impact statement does not identify that the rural residential area of Larkins Lane is included within area noise catchment area 13.

Response

A comprehensive assessment of the construction and operational noise impacts of the Albion Park Rail bypass is provided in Chapter 12 of the environmental impact statement and Technical Paper 8 – Noise and Vibration. The assessment was conducted in accordance with the Secretary's Environmental Assessment Requirements and the relevant guidelines, including, but not limited to:

- NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011)
- Noise Criteria Guideline (Roads and Maritime, 2015a)
- Noise Mitigation Guideline (Roads and Maritime, 2015b)
- NSW Industrial Noise Policy (Environment Protection Authority, 2000).

An addendum noise and vibration assessment has been prepared to assess potential changes to noise and vibration impacts associated with the proposed design refinements. The addendum forms Appendix H of this report. A summary of the revised modelling methodology is provided in Section 5.5.6 of this report.

As described in Section 2 of Technical Paper 8 - Noise and Vibration, both unattended and attended noise monitoring was undertaken at 14 sites in the project area in order to establish the existing background noise levels. The same sites were used in the addendum noise and vibration assessment (Appendix H of this report). A noise model for the project area was established and validated against the traffic noise levels recorded for the existing condition based on the traffic counts collected during the monitoring period.

Logger 2 was located at 42 Larkins Lane (refer Table 12-2 of the environmental impact statement). Logger 11 was located to the north of Larkins Lane on Yallah Road at Yallah. Table

12-1 of the environmental impact statement identifies noise catchment area 13 as “Rural residential and commercial receivers west of the Princes Highway and south of Yallah Road.” This description describes the rural residential land uses along Larkins Lane.

Loggers located near the residential area near the East West Link include Logger 5 (located at 54 Oak Street, Albion Park Rail) and Logger 7 (located at 78 Jarrah Way, Albion Park).

Roads and Maritime Noise Criteria Guideline (Roads and Maritime, 2015a) defines ‘receivers’ as including the following types of development: “residences, schools, child care centres, places of worship, health care institutions.” As the Tallawarra Lands area does not meet this definition noise monitoring was not undertaken in this area. The Tallawarra lands site is not developed and as such does not meet the definition of a sensitive receiver and was not specifically considered in the noise assessment.

2.9.2 CONSTRUCTION NOISE

Submission number

8, 55, 59, 75 and 94.

Issues

107. Nearby sensitive receivers will be seriously affected by noise during the extended construction period
108. Extended construction working hours should not be approved, particularly for areas in close proximity to residences. The justification for extending construction hours appears to be based solely on reducing the construction time. A similar result could be achieved by commencing the project earlier or having more staff
109. It is noted the environmental impact statement states that it is not proposed to undertake work during extended hours in close proximity to residents. Clarification should be provided as to what “close proximity” means, as construction noise (such as from jackhammers and blasting) and vibration can travel long distances
110. The environmental impact statement notes that it is not proposed to undertake work during extended hours in close proximity to sensitive receivers. The use of the phrase “not proposed” is not considered a firm commitment; a proposal could easily be altered. A change in a proposal would not require any permission of any statutory approval, or change of development consent
111. The environmental impact statement states that affected receivers will be consulted with prior to works being carried out outside of standard working hours. Will feedback received alter the outcome of activities undertaken?
112. Compensation / respite should be provided for those impacted by noise and sleep disturbance during construction.

Response

An assessment of noise and vibration during construction was undertaken and the findings are presented in Chapter 12 of the environmental impact statement and Technical Paper 8 – Noise and vibration. An addendum noise and vibration assessment has been prepared to assess potential changes to noise and vibration impacts associated with the proposed design refinements. The addendum forms Appendix H of this report.

Construction activities generate noise and vibration of varying levels depending on the activities being carried out. The assessment identified locations where receivers may be negatively impacted by construction noise considering the likely construction methodology and typical plant and equipment used. The results are presented in Chapter 12 of the environmental impact statement and Appendix H of this report.

A range of noise mitigation measures are provided in Section 12.6 of the environmental impact statement, including development of a construction noise and vibration management plan, which will provide more detailed management measures, such as respite periods and limitations on the duration of noisy activities in proximity to residents.

Where possible, noise mitigation, such as property treatments, for dwellings impacted by operational noise would be installed before the commencement of construction, with a view to minimising construction impacts as well (refer environmental management measure NV04 in Section 6 of this report).

A revised noise assessment has been carried out to determine any changes in potential noise impacts due to proposed design refinements (Appendix H of this report). These are presented in Section 5.5.6. Further assessment of potential noise impacts will be undertaken during detailed design once the construction methodology and program are finalised. This will enable development of more detailed noise management and mitigation measures for the project. The works would be undertaken in accordance with the requirements of the project Environment Protection Licence issued under the *Protection of the Environment Operations Act 1997*.

Section 5.20.12 of the environmental impact statement proposes extended work hours for construction of the project, stating that it is not proposed to carry out work during extended working hours in proximity close to sensitive receivers. During exhibition of the environmental impact statement, additional assessment and consultation was carried out to identify the potential impact of implementing extended work hours across all project construction activities and locations to maximise the project and community benefits of reduced construction time. The consultation, which focused on those identified as potentially impacted by construction (as defined by a triggered level of potential impact as discussed in Section 5.5.6), indicated an overwhelming support of eighty-four per cent of responses supporting the proposed extended work hours. Proximity is no longer utilised as a limitation for the extended work hours for the project due to the responses to the consultation.

The expected benefits of extended work hours include a 10 per cent reduction in construction duration, reduction in exposure of the public to changed traffic conditions and reduction in the cost of construction. Commencing the project early would not reduce the overall construction timeframe. Construction of the project is dependent on availability of plant and equipment as well as staff. Having more staff or machinery would not necessarily reduce the construction timeframe if additional required resources such as materials or key equipment are not available. Additionally, there are limitations on the number of staff and plant which can safely and efficiently work on the project. The addition of too many activities occurring at once can result in inefficiencies to the construction which can substantially increase construction costs and also impact in the safety of workers, consistent with those presented in the environmental impact statement.

The outcomes of the additional consultation indicate that 84 per cent of survey respondents support extended work hours. Based on the outcomes of the consultation, extended work hours

are proposed to be implemented as standard construction hours for the project. The consultation process and findings are presented in Section 1.2.3 of this report.

Table 6-1 identifies environmental management measures to assist in reducing noise impacts. The construction noise and vibration management plan (measure NV01) is required to include:

- Construction timetabling to minimise noise impacts
- Procedures for notifying receivers of construction activities that may affect them
- Contingency procedures to be implemented in the event of non-compliances and / or noise complaints.

Prior to out of hours work being carried out, all affected receivers would be notified of relevant details of the proposed activities. Notifications would include information on the proposed noise management measures, how to provide feedback on the proposed out of hours work, how to lodge complaints, and the relevant contact details to provide any such feedback or complaints. This process would be documented in the construction noise and vibration management plan. Out of hours work would be carried out in accordance with relevant conditions of the project approval and any Environment Protection Licence for construction of the project.

Submission number

8, 55, 59 and 94.

Issues

113. Nearby receivers will be seriously affected by noise and dust during the extended construction hours. Due to the proximity of receivers along the existing East West Link, extended working hours should not be carried out for the following construction works:
 - Croome Road roundabout
 - Croome Road realignment
 - Croome Road bridge
 - New East West Link Road
 - Bypass in East West corridor.
114. The extended working hours will exacerbate impacts currently experienced by local residents due to the 24 hour operation of the quarry.
115. Can ancillary sites AS12 and AS13 be combined and either moved further east or into the Croom Regional Sporting Complex with a view to reducing construction phase traffic, noise and air quality impacts on nearby residents?
116. Due to the proximity of receivers along the existing East West Link ancillary sites AS12 and AS13 should not be used for works in other locations outside of standard working hours.
117. Ravensthorpe is used for a variety of activities on weekends (such as weddings and high teas). Allowing construction to take place every weekend would ensure the closure of Ravensthorpe.

Response

Roads and Maritime acknowledges the community's concerns in relation to construction noise impacts. Section 5.5.6 of this report outlines the proposed extended construction hours for the project with an addendum noise and vibration assessment prepared to assess potential changes to noise and vibration impacts associated with the proposed design refinements. The addendum forms Appendix H of this report.

Predicted noise levels indicated that the proposed extended hours activities can be carried out within ancillary facilities during extended hours with minimal impact on the nearest noise sensitive receivers. Additional consultation with affected residents identified that a significant majority prefer extended work hours to reduce the overall project construction timeframe.

Noise modelling for the environmental impact statement is based on background monitoring undertaken within the environmental impact statement project boundary. Background monitoring was carried out to obtain a baseline noise level representative of the existing acoustic environment, including the quarry operations. The predictive modelling used to determine the potential impact of the project combined the existing noise levels with the predicted noise impacts associated with the construction and operation of the project. The predicted noise levels are considered representative of the potential impacts in these areas. Potential construction vibration impacts associated with the proposed design refinements are consistent with those presented in the environmental impact statement,

The proposed locations for ancillary sites were selected considering a number of factors including traffic and access to the road network, the construction requirements (e.g. piling works for bridges), flooding, ecology, land tenure and the surrounding noise environment. It should be noted AS13 has been expanded in the proposed design refinements and the assessment for the site is included in Section 5.2.3 of this report.

Ancillary site AS12 was located near the East-West Link specifically to support bridge construction and due to its proximity to the intensive work zone between Croome Road and Oak Flats (refer Section 5.20.4 of the environmental impact statement). Ancillary site AS12 is no longer required for the project and so has been removed as part of the revised project design. Ancillary site AS13 was situated in the chosen location for use as a double-handling laydown area. The location and design of these sites will be further refined during detailed design. It is noted that the environmental impact statement and proposed design refinements were conservative in assessing the required size of the proposed ancillary sites.

The expanded ancillary site AS13 is located more than 400 metres from the nearest sensitive receiver. There would be no additional construction noise and vibration impacts associated with the use of this site compared to those assessed for site AS13 in the environmental impact statement. As stated in Section 5.5.6 of this report construction activities can be carried out in this ancillary site during extended hours with minimal impact on the nearest noise sensitive receivers. The noise and vibration management plan would include measures to reduce construction noise impacts on the nearby receivers.

The Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) defines recommended standard work hours, which includes work on Saturdays. An inability to undertake works on a Saturday would substantially impact on the duration of the proposed works increasing the duration of construction by a number of months and subsequently resulting in greater impacts to local businesses.

Noise impacts at Ravensthorpe were assessed as part of Technical Paper 8 – Noise and vibration within noise catchment area 8 (NCA8). Logger 4 was used to assess existing noise levels. The predicted construction noise levels are not expected to exceed the relevant noise criteria at this location. Roads and Maritime appreciates the operator's concerns in relation to construction noise impacts on the venue. Consultation would be undertaken with the business owner as required by the construction noise and vibration management plan.

2.9.3 OPERATIONAL NOISE

Submission number

57, 59, 75, 86 and 93.

Issues

118. The noise levels from the road will be considerably more than they are now, altering the rural nature of parts of the project area
119. Additional information on noise levels for individually affected properties should be provided
120. Within three months (not 12 as proposed) of the project opening an operational noise review must be conducted with the permission of landholders and any further mitigation action required be commenced. Those copies of operational noise reviews should be provided to residents and their comments sought and considered.

Response

While the current land use along most of the proposed alignment currently consists of rural land use, the alignment had been predefined as a road corridor as gazetted by in the Wollongong and Shellharbour City Council local environmental plans in the mid-1990s. This zoning was developed as part of a strategy for the region which recognised the future of this land as a road corridor rather than as rural land.

The predicted noise and vibration levels during operation are presented in Technical Paper 8 – Noise and Vibration and the addendum noise and vibration assessment (Appendix H of this report). Operational phase traffic noise impacts are discussed in Section 12.4.2 of the environmental impact statement and Section 5.5.6 of this report.

Noise mitigation measures were assessed in accordance with the requirements of the Noise Mitigation Guideline (Roads and Maritime, 2015b) and the NSW Road Noise Policy (Department of Environment, Climate change and Water, 2011). The recommended management measures listed in Section 12.4.2 and mapped in Figure 12-2 of the environmental impact statement include:

- The use of quieter pavement
- Installation of noise barriers
- Property treatments for remaining properties at which noise barriers and quieter pavement do not achieve the required reduction in noise levels.

Additional management measures are outlined in Section 13.5 of Appendix H and discussed in Section 5.5.6 of this report. The operational noise impacts would be reviewed during detailed design, and the need for noise management measures would be confirmed (refer NV04 in Section 6 of this report).

The individual properties identified as being impacted by operational traffic noise both with mitigation and without mitigation are listed in Appendix H of this report. Consultation would be undertaken with owners of properties proposed for property treatments to agree on the proposed architectural treatments.

Management measure NV05 provides for an operational noise review within 12 months of the project opening (refer Section 6 of this report). The review would identify any additional reasonable and feasible mitigation measures for implementation, if required. This timeframe is based on standard conditions of approval and would provide a suitable period of time to

determine the suitability of mitigation measures. The review can be made available to residents upon request.

Submission number

57, 59, 75, 86, 93 and 101.

Issues

121. The proposed alignment of the project would appear to increase the noise to the sensitive receptors in the central and southern precincts. This is potentially being exacerbated by the location of roundabouts and access roads closer to the extremities of the central precinct
122. The motorway will be built on an embankment in close proximity to residential properties near the existing Illawarra Highway. This will cater for a continuous stream of traffic emitting heavy vehicle noise pollution and braking noise
123. The recent addition of the entry and exit ramps at the interchange at Albion Park will increase the flow of traffic for nearby residential receivers, creating greater noise pollution impacts
124. Changes to flight paths resulting from the project will exacerbate noise impacts on Larkins Lane residents.

Response

The environmental impact statement identified a total of 732 sensitive receivers within the project area as being predicted to experience traffic noise levels in excess of the criteria if no mitigation is applied. Most of these are in Albion Park Rail (noise catchment area 3) and Albion Park (noise catchment area 5). This section of the bypass goes through land currently largely unaffected by traffic noise from the Princes Highway / Motorway.

The length of embankment proposed near the existing Illawarra Highway is located near noise catchment area 10 and noise catchment area 11. These noise catchment areas are also closest to the Albion Park interchange exit and entry ramps. The proposed layout of the interchange entry and exit ramps has been revised, with the northbound exit ramp now proposed to be located at Tongarra Road. This has reduced the number of properties in noise catchment area 10 predicted to be in need of at property treatments from 19 receivers in the environmental impact statement to 15 receivers in the proposed design.

Properties within these noise catchment areas are still predicted to experience operational noise levels in excess of the criteria (refer to Appendix D within Appendix H of this report) and qualify for property treatment. Property treatments would also be negotiated during detailed design in consultation with affected residents. Due to flood levels at this location the embankments are needed to raise the bypass to suitable levels to prevent flooding.

The impacts of the project on aviation are discussed in Chapter 7 of the environmental impact statement and Technical Paper 2 – Aviation. An addendum to the aviation assessment has since been produced to assess the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix B of this report.

Operational phase impacts on flight paths are not anticipated, and hence there would be no change in existing aircraft noise as a result of the project. There is potential for construction phase impacts on the operation of the Illawarra Regional Airport. This risk would be minimised and managed by developing a Method of Working Plan (management measure TT02) and via

consultation with the airport operator, Shellharbour City Council (management measure TT03). In the event that the construction works require changes to flight paths for aircraft taking off or landing at the airport, the noise impacts are not likely to be substantial, and would be limited. Should changes be required during construction consultation would occur with affected residents.

2.9.4 NOISE MITIGATION OPTIONS

Submission number

8, 55, 59, 75 and 86.

Issue

125. A noise barrier will be required on the northern side of the motorway between Croome Road and Colden Drive due to the proximity of the motorway to nearby residents. This should be a minimum requirement, given the road's close proximity to residential properties
126. Is the noise barrier proposed for the north of the motorway in the location of the existing East West Link located on top of an earthen mound? Please clarify
127. The new roundabout on Croome Road has been planned east of the current alignment of Croome Road, bringing this piece of infrastructure closer to residents and changing the current alignment of Croome Road to the north of the roundabout (which requires the removal of old, well established native trees that help to form a visual and sound barrier to the Croome Road traffic). This easterly positioning moves the elevated Croome Road Bridge (BR12), closer to residents and impacts on the current character of Croome Road, removing its gentle curves through a wooded area just north of the Croome Sporting Complex entrance

By maintaining the current alignment of Croome Road, it would keep the bridge that much further away. The road from the new roundabout to the bridge and on to the northern side of Croome Road will now be elevated to meet the required height over the new bypass, well above Croome Road's current level (refer Design and Landscape Character Strategy Page 74, Diagram 21), increasing both visual and noise pollution to local receivers. To help reduce this increased noise and visual pollution, I request consideration of the following:

- Maintaining the current alignment of Croome Road, to push the bridge infrastructure further away from local residents
 - Noise barriers installed along the eastern side of the bridge and elevated section to the north along Croome Road. Although noise barriers add to the visual pollution, I would rather the 24/7 noise pollution be reduced at the expense of the occasional visual blight
 - The Croome Road surface from the new roundabout to the northern extreme of construction, be treated with "quieter pavement".
128. From the new roundabout on Croome Road heading east, the new East West Link is elevated on fill material. Vehicles accelerating and decelerating as they approach/leave the roundabout, will cause noise pollution across to local receivers. I propose that some noise mitigation measures be taken:
 - Construction of an earth mound on the northern side of the East West Link at this point

- Quieter Pavement along the full length of the East West Link Road, given its elevated position. It seems strange that the bypass is to have quieter pavement along this section because of the close proximity of residents but the busy East West Link does not
129. Receivers located on Gumnut Street will be seriously affected by major noise and dust during the extended construction period, with continued noise pollution after completion. These properties (families) will be more affected when winds are coming from the west and around to the south-east. To this effect, house “noise treatment” solutions should be looked at much more closely than outlined in the environmental impact statement.
130. During the construction period, could earth mounds be constructed along the north side of the East West Link to protect receivers from noise, as the existing planting is ineffective?
131. Noise attenuation must be considered during detailed design in consultation with affected landowners. What is actually planned for noise mitigation? Actions to mitigate noise must be undertaken prior to the commencement of construction and during the operational phases.

Response

An assessment of noise and vibration during operation was undertaken for the environmental impact statement and is detailed in Technical Paper 8 – Noise and Vibration and discussed in Section 12.4.2 of the environmental impact statement.

The community’s concerns regarding noise impacts on properties in Albion Park and Albion Park Rail are acknowledged. The noise mitigation measures proposed in the environmental impact statement have been revised following the assessment of proposed design refinements. Noise treatments now include:

- The adoption of quieter pavement for most of the length of the project
- A 1.8 kilometre long noise barrier comprised of an earthen mound with a noise wall on top (total height five metres) to be located between Croome Road and Durgadin Drive
- A noise barrier of 0.8 metres height along the western side of the motorway over Tongarra Road, from the northern Frazers Creek crossing to the southern Frazers Creek crossing, and on Tongarra Road exit ramp.
- Quiet pavement was not considered for the new East West Link as predicted traffic noise levels are not predicted to be in excess of the relevant criteria. It is expected that a significant proportion of traffic would use the motorway once constructed. The new East West Link would be used mostly by local traffic and would be located further away from sensitive receivers.

The noise mitigation measures (including property treatments) proposed for properties near Croome Road (e.g. on Gumnut Street) would be further developed during detailed design in consultation with the affected residents.

Croome Road was realigned for the project for a number of reasons, primarily in order to avoid infringing on the operational airspace requirements for the Illawarra Regional Airport. The respondent’s request for noise barriers on the Croome Road bridge are noted. Noise barriers have not been proposed for the bridge, not only due to the potential visual impacts, but also due to issues around engineering feasibility and maintenance. Due to the lower traffic volumes on Croome Road, the use of quieter pavement is not currently proposed for this road. Noise mitigation in the form of property treatments is proposed for 12 properties near this part of the project (noise catchment areas NCA3 and NCA4, refer Section 12.4.2 of the environmental impact statement). This would reduce traffic noise impacts from Croome Road. Landscape

planting have been proposed in this area as defined in the landscape designs in Appendix I of this report.

The noise and vibration assessment will be reviewed during detailed design as there is potential for minor changes in the design that could result in changes in the noise impact. For this reason, the proposed operational noise impacts are subject to review at detailed design (management measure NV04) and once the project is operational (management measure NV05) (refer Section 6 of this report). Where possible, Roads and Maritime would implement the treatments for properties to be impacted by operational noise before the commencement of construction, with a view to minimising construction impacts as well (refer management measure NV04).

Submission number

8, 55, 59, 75 and 86.

Issues

132. A number of properties in Larkins Lane are identified as "receivers proposed for noise treatment", however no noise barrier is proposed adjacent to this area. Property treatments only reduce noise within the building, not outside the building, and hence the noise will negatively impact the amenity of the area. Property treatments will not suffice. The Larkins Lane estate includes emergency service workers and other shift workers. No consideration has been given to their lifestyle factors that may make them more susceptible to noise impacts
133. The environmental impact statement notes that noise barrier identified as Yallah NB has been excluded. The barrier appears to have been excluded based on a cost benefit basis as the residences are of a rural residential nature. The barrier should be erected as part of the mitigation strategy
134. Roads and Maritime have identified that noise reduction strategies would only be completed to homes, not garages. However, garages can connect to/be part of housing and should also be treated.

Response

A noise barrier aimed at providing noise mitigation for properties in Larkins Lane was considered in the noise and vibration assessment for the project (Yallah NB, refer Table 12-27 of the environmental impact statement). It was assessed in accordance with the requirements of the Noise Mitigation Guideline (Roads and Maritime, 2015b), and was not adopted in the suite of proposed noise mitigation measures as the barrier did not achieve the required noise insertion losses (i.e. noise reductions) and only resulted in compliance with the Noise Criteria Guideline (Roads and Maritime, 2015a) at one property. This result is consistent with the results in the addendum assessment included in Appendix H.

Property treatments are proposed for 21 properties in the Larkins Lane area (noise catchment area 13). These would be implemented in consultation with affected landowners. Any architectural treatments would focus on the main dwelling itself, rather than any ancillary structures such as detached garages. This is because the dwelling is more commonly occupied by residents, and is where the residents sleep.

2.10 SOCIO-ECONOMIC

2.10.1 CONSTRUCTION IMPACTS

Submission number

55 and 93.

Issues

- 135. The economic assessment does not adequately show the effect construction would have on the surrounding area
- 136. The amount of construction works, additional infrastructure and the future increase in traffic would impact local amenity for residents of Gumnut Street and neighbouring areas.

Response

A detailed socio-economic impact assessment has been carried out for the project, provided in Technical Paper 9 – Socio-economic and summarised in Chapter 13 of the environmental impact statement. The socio-economic impact assessment considers impacts to the surrounding socio-economic environment such as commercial and residential considerations and it also includes a business impact assessment which identifies potential impacts to business, including direct impacts and impacts from reduced trade.

Section 13.3.1 of the environmental impact statement provides a summary of the construction phase socio-economic impacts from the project. The assessment considered construction impacts on land use and property, socio-demographic profile, impact on the Croom Regional Sporting Complex, change to access and connectivity, amenity and impact on businesses. The assessment concludes that the overall social impact of construction is likely to be minor. A Community Involvement Framework will be prepared to ensure effective communication with affected community members and minimise impacts during the construction of the project.

The environmental impact statement assesses the construction and operational impacts of the project on nearby sensitive receivers, including residents of Gumnut Street and neighbouring areas. Technical Paper 9 – Socio-economic outlines the potential impacts associated with change in access due to the closure of Woollybutt Drive and Durgadin Drive on the surrounding area. Technical Paper 8 – Noise and Vibration assesses the noise impacts of the project on residents of Gumnut Street. A noise wall is proposed between the motorway and the residences in Gumnut Street to minimise operational noise impacts. The environmental impact statement assesses visual, air quality, and flooding and hydrology impacts of the project on residents of Gumnut Street and surrounding neighbourhoods. The socio-economic assessment was revised to determine any potential changes in impacts due to the proposed design refinements. Overall the design refinements are considered to have positive impacts on the socio-economic environment. The assessment is in Section 5.5.7 of this report. Chapter 23 of the environmental impact statement and Section 6 of this report list the environmental management measures proposed to minimise impacts.

2.10.2 BUSINESS IMPACTS

Submission number

25, 48, 91, 94 and 97.

Issues

- 137. The project has potential for substantial economic (operational and sales restrictions) impact to the nearby quarries
- 138. The environmental impact statement states that the acquisition of the nursery may have an indirect impact on the outdoor garden business and shed building business located next door. These businesses would be acquired and therefore be directly impacted (not indirectly impacted)
- 139. The Albion Park Rail bypass would have adverse impacts on Ravensthorpe, which is an important community facility and heritage landmark. Economic impacts may include direct losses of jobs for nine full time employees, 20 part time employees and three apprentices at Ravensthorpe. Other economic impacts would be felt by numerous suppliers, contractors and other businesses in the local area that either directly support Ravensthorpe or provide complementary services
- 140. The project is creating uncertainty for businesses operating in the area, specifically Ravensthorpe, which requires significant advanced notice on decisions that impact on their ability to take bookings years in advance
- 141. Business would be lost if the northbound exit ramp at Oak Flats Interchange has traffic build up or if the Interchange appears dangerous. Travellers would most likely shop elsewhere.

Response

Section 13.3.2 of the environmental impact statement assesses business impacts on the two quarries adjacent to the project. Both quarries currently have approvals for quarrying for the next 20 years. Parts of the landholding of each quarry would be acquired and converted to transport corridor, and the access roads to each would be slightly impacted; however, quarry operations would not be impacted. Access to the quarries would be via the new service road replacing the existing East West Link, to the south of the motorway. All quarry trucks would therefore be able to move between the quarries and the Oak Flats Interchange using this road. It is not anticipated that the project would therefore have any substantial adverse economic impact on quarrying in the area.

Section 4.8.1 of Technical Paper 9 – Socio-economic states that “the project would directly impact upon a nursery and an associated outdoor garden business. The wholesale nursery would be subject to acquisition. The business, while requiring visibility and accessibility, is not site specific and could relocate into new premises elsewhere. However, its acquisition might have an indirect impact on the outdoor garden business and shed building business located next door, as they may attract patronage due to their proximity to the nursery”. The direct impact to these businesses is acknowledged by Roads and Maritime. The indirect impact to the outdoor garden and shed building businesses relates to the potential for them to not be relocated in close proximity to one another.

Technical Paper 9 – Socio-economic identifies potential business impacts to Ravensthorpe, which is recognised as an important cultural facility. The assessment identifies a number of potential impacts to Ravensthorpe, including amenity impacts (particularly regarding noise) and visual impacts. Environmental management measures to minimise noise and visual impacts are

listed in Chapter 23 of the environmental impact statement (and Section 6 of this report), including:

- Measure HH01, which requires the development of a landscape plan to minimise visual impacts on heritage items. It is noted that screening vegetation at Ravensthorpe was installed in October 2016 with large advanced plants
- Measure SE01 which requires the development of a Community Involvement Framework to help minimise uncertainty and ensure ongoing consultation with community members and business owners.

Figure 5-13 of this report summarises the estimated levels of service for the Oak Flats Interchange. The community's concerns about the potential for traffic to queue at the Oak Flats Interchange northbound exit ramp are noted. The detailed traffic modelling reported in Appendix A of this report identifies that the Oak Flats Interchange roundabout would operate at an overall level of service C for the AM peak and level of service B for the PM peak period. It is not anticipated that any queuing would occur even with the adoption of a single lane at the northbound exit ramp. Traffic congestion through the Interchange is not anticipated to act as a deterrent to people entering Albion Park Rail.

2.10.3 ECONOMIC IMPACTS

Submission number

85.

Issue

142. The proposed changes to the Croom Regional Sporting Complex would provide a big boost for a rundown area.

Response

The potential positive social and economic impacts as a result of the reconfiguration of the Croom Regional Sporting Complex are acknowledged by Roads and Maritime. Several clubs within Croom Regional Sporting Complex would benefit from new facilities, including amenities buildings, formalised car parking and new sportsgrounds. As noted in Section 13.3.2 of the environmental impact statement the improved functionality of the complex would provide a substantial benefit for both existing and future generations of users.

Submission number

93.

Issue

143. Any increase in flooding could lead to extravagant insurance policies, inconvenience and damage for Albion Park residents. This is of concern to residents.

Response

As noted in Section 8.4 of the environmental impact statement three properties would experience increased flood levels, one with an increase in over floor flooding. The impacts on these properties will continue to be assessed through the detailed design stage, and for property 2 and 3 (described in Section 8.3.2 of the environmental impact statement), will be re-assessed with an updated flood model being developed by Shellharbour City Council. In the event that these impacts are not further mitigated for property 2 through the detailed design, appropriate flood mitigation would be identified in consultation with the property owner.

Section 8.5 of the environmental impact statement (and Section 6 of this report) detail a comprehensive range of mitigation measures to manage flood impacts on these three properties.

2.10.4 AGRICULTURAL COMMERCIAL ACTIVITIES

Submission number

26, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 56, 57, 60, 61, 62, 63, 64, 65 67, 68, 69, 70 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 91, 92, 93, 100 and 102.

Issues

144. It is considered that there has been inadequate assessment of land use and socio-economic impacts of the project on the dairy enterprise
145. Impacts to the dairy enterprise should be minimised as it has contributed to the education and training of a large number of final year veterinary students, having provided hands-on opportunities and veterinary cases to the university for the past eight years
146. The environmental impact statement states that “the enterprise currently produces 4.5 million litres of milk annually”. The current herd level will produce 5.4 million litres annually and are expected to produce six million litres of milk annually within 12 months
147. The environmental impact statement does not make reference to the family home associated with the dairy enterprise that would be demolished as a result of the project. It is considered that the social impacts of the loss of a residence on the dairy enterprise land has not been adequately assessed
148. The large area of land that is being claimed is paramount to the future running of the dairy operation. The upheaval to their existing dairy, home, sheds etc., and changes to everyday management of their dairy and livestock as well as having to manage the whole rebuilding of the operation is having a huge impact on this extremely well managed farming system

149. This dairy farm is an Illawarra icon, having been in the same family for multiple generations serving the Illawarra and surrounding regions. The project would have a detrimental economic impact on the dairy enterprise, and the livelihoods of the operators. It is considered that the environmental impact statement does not adequately address these socio-economic impacts
150. The dairy enterprise produces a substantial amount of milk for the region and is the second largest producer within 150-kilometre radius of Sydney. The enterprise is one of the best managed, most reproductively successful, productive and profitable dairies within the state. Reducing production capacity will result in redundancies, deplete the ability to supply ever-increasing milk demands, and may force the closure of the farm. Impact of the project to the dairy will have impacts beyond that of the individual enterprise
151. The agricultural land is equally important as environmental aspects, and should be protected accordingly
152. No mention has been made under socio-economic section regarding the impact on the current farming activity in the area. The environmental impact statement fails to acknowledge the positive role that dairy farmers make to the local environment as custodians of the land that their farming businesses rely on. The paddocks are aesthetically appealing because the pastures are well-managed, the farm is virtually odourless and Frazers Creek is inhabited by normal aquatic vegetation – which prevents erosion during times of flood.

Response

Chapters 13 and 15 of the environmental impact statement provide a detailed assessment of the potential socio-economic and land use impacts of the project. This includes acknowledgement of the impacts on the dairying enterprise located near the Illawarra Highway.

Technical Paper 9 – Socio-economic provides a detailed summary of agriculture in the Illawarra region, including a summary of the milk production industry in the Shellharbour local government area. Section 3.3.3 acknowledges the importance of the milk production industry noting that it accounted for \$19.48 million or 72 per cent of the value of all agricultural production in the region in 2012-13, or around 4 per cent of the total value of milk production in New South Wales. Roads and Maritime acknowledge the contribution of the dairy enterprise to milk production in the region, and that production is increasing at the dairy.

Chapter 15 of the environmental impact statement assesses impacts to the dairy enterprise, including change in access, loss of flood free land and loss of dairy infrastructure. High ground would continue to be available to the north of the Macquarie Rivulet, on the southern side of Illawarra Highway, and to the east of the motorway (west of the airport). The dairy would continue to be able to milk at the second established milking area.

The discussion in Chapter 15 focusses largely on the impact to the dairying land use (refer Figure 15-3 of the environmental impact statement). It is acknowledged that the dwelling located on land parcel 31 would be permanently acquired as a result of the project. Identified impacts to the dairying enterprise on the Illawarra Highway include:

- Temporary and permanent land acquisition and loss of infrastructure (dairy shed, fencing, silos and feed pad)
- Temporary and permanent changes to property access, including stock movements and the transport of silage, which are currently undertaken across the Illawarra Highway
- Loss of flood free land, and loss of access by road to flood free land.

Roads and Maritime has carried out a review of the project to minimise impact to the dairy enterprise. A proposed revised layout is proposed in Section 5.2.1 of this report which would

reduce the impact on agricultural land by about 10.3 hectares for the operational boundary and a further reduction of 3.8 hectares for the construction footprint as a result of the removal of the ancillary site AS05. The revised layout includes:

- The northbound entry ramp connecting the Illawarra Highway (Terry Street) to the motorway realigned to reduce its footprint on agricultural land
- The northbound exit ramp connecting traffic leaving the motorway to the Illawarra Highway (Terry Street) relocated to Tongarra Road
- The southbound exit ramp to the Illawarra Highway (Terry Street) realigned to pass over the motorway on a bridge about 200 metres further to the south

The functionality of the interchange would be maintained with no additional impacts on traffic or flooding. These are discussed further in Section 5.5.1 and Section 5.5.2 of this report.

The operation of the dairy enterprise would be altered by the project, however the enterprise would be expected to remain viable. This has now been reduced further based on the project design refinements, as outlined above. Roads and Maritime are committed to ongoing consultation and negotiation with the dairy enterprise.

Section 13.3.2 of the environmental impact statement details the potential social impacts of the proposed changes in land use and access. It states that consultation has identified that the project has caused stress, anxiety and concern in relation to these impacts. It is acknowledged that, due to the long history of farming in the area and the importance of rural values to the community, the social impact of the project on dairying is considered high.

Management measures LU01 and LU02 (refer Section 6 of this report) reflect Roads and Maritime's commitment to consultation and negotiation with affected landowners in relation to land acquisition and altered access, and the subsequent impacts on the viability of the existing use of the land for dairying. This process is ongoing. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

The environmental impact statement provides an assessment of air quality, water quality and flooding impacts as a result of the project. These assessments include consideration of the existing environment and conditions in the surrounding area, including the dairy enterprise.

A detailed landscape character and visual impact assessment has been carried for the project; provided in Technical Paper 10 – Landscape Character and Visual Amenity and summarised in Chapter 14 of the environmental impact statement. The assessment identifies the impact of the project on the rural outlook of the area, including the dairy enterprise. Landscape character zone seven (which largely comprises the dairy enterprise), was found to be highly-moderately impacted by the project. The zone is noted to have been highly modified and generally extensively cleared for agriculture. The assessment acknowledges that the landscape is scenic, with pleasant rural views over pastures. Section 6 of this report outlines the environmental management measures that would be employed to minimise landscape character and visual impacts.

2.11 LANDSCAPE CHARACTER AND VISUAL AMENITY

2.11.1 VISUAL IMPACTS

Submission number

35, 48, 55, 57, 59, 63, 83, 86, 91, 93, 94 and 101.

Issues

153. In close proximity to residential properties near the existing Illawarra Highway the motorway will be built on an embankment which will cater for a continuous stream of traffic causing visual impacts
154. The addition of the entry and exit ramps at the interchange at Albion Park will increase the flow of traffic for nearby residential receivers, creating greater visual impacts
155. The proposed new alignment of Croome Road would bring the bridge closer to residents. The road from the new roundabout to the bridge and on to the northern side of Croome Road will now be elevated, increasing visual impacts to local receivers
156. The rural outlook will be compromised by the motorway
157. The impact of roadside lighting on the Tallawarra Lands should be considered
158. The project will have a visual impact
159. The Larkins Lane area is noted as having a high visual impact. If a noise barrier is not to be erected substantial planting would be required to reduce the visual impact. The location of such planting should be subject of consultation with effected landholders
160. Viewpoint 8 records a high –moderate visual impact. Roads and Maritime staff have stated that the new road level would be consistent with the present level of the road bridge spanning the Macquarie rivulet. The existing industrial buildings ground level is higher than the present road bridge. The description of Viewpoint 8 has the road level below the roof line of the industrial building. This would be about 4 metres higher than the present road level. If the road level described in Viewpoint 8 is correct it would have a major impact for noise, visual appeal, dust and would affect airport operations. This needs to be clarified and the road level reduced to the present bridge level
161. A visual representation of the impact to 29 Larkins Lane should be provided
162. A large part of the appeal of Ravensthorpe is the sweeping views of the escarpment to the west, which will be impacted by the project
163. The dairy enterprise provides local rural views of rolling farmland which are highly valued by the community. Views that they will no longer get to see from the road because they are using valuable farming land to plant screening trees.

Response

A detailed landscape and visual amenity impact assessment has been carried out for the project and presented in Technical Paper 10 – Landscape Character and Visual Amenity, and summarised in Chapter 14 of the environmental impact statement. An addendum to the visual amenity impact assessment has since been revised to include the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix I of this report.

The visual assessments identify the impact of the project on individual views. Viewpoints 12 and 14 are representative of residential properties near the existing Illawarra Highway looking towards the motorway. Viewpoints 14, 15, 16 and 18 provide a viewpoint toward the proposed interchange at Albion Park. The assessments from these viewpoints considered the increased elevation of the motorway, its scale, and the increased dominance of traffic as an element of the landscape. The addendum assessment concluded that the project would have a moderate-low impact on Viewpoint 12 and a high impact on Viewpoints 16 and 18 which is consistent with the environmental impact statement. Viewpoints 14 and 15 were identified as moderate-low, which is a reduction from the potential impacts in the environmental impact statement as moderate. This is due to the proposed relocation of the northbound exit lane resulting in potential for retention of existing vegetation at these viewpoints which would otherwise have been removed as part of the environmental impact design.

Viewpoint 27 assesses the visual impact on nearby residents from the new alignment of Croome Road, noting that the realignment of Croome Road would be uncharacteristic of the neighbourhood environment. An indicative noise wall is situated at this location as a proposed noise mitigation measure. The visual impact of this indicative noise wall is outlined in Appendix I of this report. The assessment concluded that the project would have a high-moderate impact on Viewpoint 27.

Viewpoints 5 to 10 are representative of views toward the motorway from residential properties within the Larkins Lane rural residential area. The assessment found that the project would have a moderate visual impact on Viewpoints 5 to 8, and a high-moderate impact on Viewpoints 9 and 10. These viewpoints are generally representative of the Larkins Lane area, including 29 Larkins Lane. A noise barrier was considered for inclusion between the motorway and the Larkins Lane area. The barrier was not considered further as a noise mitigation solution as it would not achieve the required noise insertion loss (refer Section 12.4.2 of the environmental impact statement). Established trees would screen parts of the project from Viewpoints 5, 7 and 8; and new tree plantings are proposed for the project adjacent to the motorway near the Larkins Lane area (refer Section 4.8 of Technical Paper 10 – Landscape Character and Visual Amenity).

Viewpoint 18 and 19 are representative of the views toward the escarpment from Ravensthorpe. The escarpment would remain visible from Ravensthorpe, with the bypass visible in the foreground. The assessment concluded that the project would have a high and moderate impact on these viewpoints respectively. The impact would be reduced over time as new grassland and woodland plantings are established and mature.

Section 14.5 of the environmental impact statement outlines the environmental management measures that would be employed to minimise visual impacts.

The landscape character and visual impact assessment considers the impact of the project on the rural outlook of the area. Landscape character zones 2, 7 (which largely comprises the dairy enterprise), 8 and 12 are predominantly rural landscape character zones. The assessment considers the rural characteristic of these zones concluding that the project would have a moderate, high-moderate or high impact. These zones have been highly modified and generally extensively cleared for agriculture. However, it is acknowledged that the landscapes are scenic, with pleasant rural views over pastures. Section 14.5 of the environmental impact statement

outlines the environmental management measures that would be employed to minimise impacts on landscape character and visual impacts, use of plantings within the road reserve to screen views of the motorway.

The design of permanent lighting will be undertaken in accordance with AS 1158-1986 and will avoid unnecessary light spill on adjacent residents or sensitive receivers (environmental management measure LC03). This would minimise light spill impacts on any future residential development within the Tallawarra lands land release area.

Viewpoint 8 is located within the Larkins Lane area looking towards the north-east towards the motorway. The road level and view described in Section 14.3.2 of the environmental impact statement for Viewpoint 8 describe the view toward motorway to the south of Yallah Road and north of the Macquarie Rivulet. The road level described in Viewpoint 8 does not refer to the height or level of the twin bridges over the Macquarie Rivulet (BR06 in Figure 5-3) however, it is noted that the proposed twin bridges will be similar in size, shape and form of the existing twin bridges over Macquarie Rivulet. While there would be an adverse impact on landscape character and visual amenity, it is expected any impacts would be reduced over time as new pasture and woodland plantings establish and mature.

2.11.2 URBAN DESIGN AND LANDSCAPING

Submission number

48, 55, 86, 91 and 95.

Issues

164. Fast growing, attractive, native trees should be planted alongside proposed noise walls to reduce the visual impacts for residents and mitigate the likelihood of graffiti
165. Any areas that are revegetated under the project, such as road reserves, but that are outside of the biodiversity offset system, should have a budget for ongoing maintenance to avoid the degradation of these areas as a result of invasion by weed species. Weeds are often distributed along road reserves, often displacing native plants. If weeds are not subject to a suitably funded ongoing management program, they are likely to undermine revegetation efforts associated with the project, as well as allow weeds to spread from road reserves to adjoining natural areas
166. All revegetation works associated with the project should use suitable local plant species, grown from seed sourced locally from multiple plants. This will ensure plants are best adapted to survive in local conditions, and help maintain the genetic diversity of local species. A wide range of local species should be planted, including canopy, mid-storey and understorey species, to help create something as close to the original ecosystems as possible
167. Local contractors with strength in high-quality bush regeneration and practical knowledge and expertise within the local Illawarra context should be selected for construction of the project
168. It is unclear as to how much additional planting will be carried out to shield views of the proposed noise barrier along the northern side of the existing East West Link
169. It is inevitable that graffiti will be adorned on noise barriers and some mitigation of this should be implemented
170. Visual screening planting should include trees and lower level bushy plants
171. The environmental impact statement shows areas of land adjacent to the motorway that would be landscaped and used for tree planting, within the dairy enterprise. Top quality farming land should not be used to grow screening trees, and cattle should be allowed to graze right up to the road side (with the exception of land needed for water quality basins)
172. Planting should be undertaken prior to construction to allow plants to become established.

Response

Technical Paper 10 – Landscape Character and Visual Amenity describes the concept urban design strategy and landscaping proposed for the project. Section 4.7 of Technical Paper 10 – Landscape Character and Visual Amenity outlines the planting strategy for the project, including the planting principles for the project:

- Selection of plant species that are robust, non-invasive and not fire promoting
- Use of local provenance plant material for native revegetation plantings
- Exclusion of all species on weed lists applicable to the local area
- Placement and species selection for planting within the motorway corridor (such as medians and verges) to be in accordance with clear zone and sight stopping distance requirements.

An addendum to the landscape character and visual amenity impact assessment has since been prepared to include the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix I of this report. The addendum presents the revised concept design drawings for the Albion Park Rail bypass which were undertaken in response to feedback following stakeholder consultation (refer Section 5 in Appendix I of this report). The indicative location of noise walls and barriers have been incorporated into the concept design plans with their visual impact assessed in Appendix I of this report.

Planting for the project would strike a balance between screening the works from sensitive visual receptors and maintaining and enhancing key views and vistas to the surrounding landscape. Different planting regimes have been identified for different locations; for example, different planting would be carried out for swampy areas, woodlands and open pasture land. Planting would generally include a mix of trees, shrubs and groundcovers suitable for the location and purpose, and would include a range of plant types to ensure diversity, as summarised in environmental management measure BD04. Environmental management measure BD04 states 'Plantings will be monitored and maintained for at least one year to ensure they survive and become established'.

Plantings selected will be in accordance with the landscape plan. Where possible plantings will be carried out that increase the diversity of the existing vegetation, and improve the connectivity between patches in the landscape. Plantings will be monitored and maintained for at least one year to ensure they survive and become established.

Ongoing weed management will be carried out in accordance with Biodiversity Guidelines: Protecting and Managing Biodiversity on Roads and Traffic Authority projects (Roads and Traffic Authority, 2011).

The construction contractor, once selected, would be required to ensure revegetation and planting is carried out in accordance with the landscape and urban design for the project. This commitment is reflected in environmental management measure BD03:

The construction environmental management plan will include flora and fauna management measures will be prepared for the project, in consultation with the Office of Environment and Heritage and Department of Primary Industries (Fisheries). The construction environmental management plan will describe the management measures to be implemented to limit the impact of the project on biodiversity, in accordance with Biodiversity Guidelines: Protecting and Managing Biodiversity on Roads and Traffic Authority projects (Roads and Traffic Authority, 2011), including, but not limited to:

- Pre-clearing process
- Exclusion zones and fencing or other means to demarcate vegetation to be retained (endangered ecological communities and Eastern Flame Pea populations) in close proximity to the works
- Re-establishment of native vegetation
- Clearing of vegetation and removal of bushrock
- Weed management (see Guide 6)
- Pathogen management (see Guide 7)
- Nest boxes
- Fauna handling
- Aquatic habitats and riparian zones.

As noted in Section 4.3 of Technical Paper 10 – Landscape Character and Visual Amenity, noise walls would be designed in accordance Roads and Maritime’s noise wall design guideline (Roads and Traffic Authority, 2006). The guidelines give consideration to paint types, textures and fixtures to prevent or minimise graffiti, and ensure ongoing maintenance and ease of removal should graffiti occur. New plantings are proposed adjacent to noise walls, screening the wall and inhibiting access. It should be noted the location of the noise walls for the Albion Park Rail bypass are indicative only and have been included as a mitigation measure. Their potential visual impact has been assessed in Appendix I of this report.

In accordance with the design refinements presented in Section 5 of this report, no landscape plantings are proposed on agricultural land, all plantings are located within road reserve.

The majority of planting could not be carried out prior to construction, as the construction phase of the project would result in disturbance of the majority of the construction area. Planting and revegetation will be carried out progressively throughout construction, as committed to in environmental management measure BD05.

Construction programming must show how progressive rehabilitation of disturbed areas will be undertaken to minimise soils exposure and the potential for dust generation, erosion and sedimentation, and visual impacts to return sites to pre-construction state.

2.12 LAND USE

2.12.1 AGRICULTURAL LAND USE IMPACTS

Submission number

26, 28, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 46, 48, 49, 50, 51, 52, 54, 56, 57, 60, 61, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 91, 92 and 93.

Issues

173. It is important that future generations be able to feed themselves with Australian grown produce. Agricultural ground is a precious resource that needs to be protected, and once converted to road corridor cannot be used for production again
174. The environmental impact statement understates the loss of land to the dairy enterprise. In addition to the direct loss of 27 hectares, the loss of access to paddocks and areas of the property increasing the area impact to 23 per cent of the property (rather than the 6.7 per cent stated)
175. The environmental impact statement states that "the direct impacts would potentially include loss of pasture..." etc. The impact to the dairy enterprise is certain, not potential
176. Nowhere in the environmental impact statement does it state that the cowshed on the dairy enterprise would be destroyed
177. The environmental impact statement states that "the land to the south of the existing Illawarra Highway, although not incorporated within either of the registered dairies, forms part of the business and is used for making silage and grazing stock that is not currently milking." This is not correct. This land forms a vital part of the grazing rotation of the herd being milked at the Illawarra Highway dairy
178. We are in an era in which the number of dairy farms has recently decreased in NSW. Impacts to dairies such as that impacted by the project, play an important role in local food security and impacts should be minimised. Coastal agricultural land, such as that in the Illawarra, is highly valuable and productive as it does not require extensive irrigation. It should therefore be valued. We need to support primary industry, support our dairy farmers, support our locals"
179. An ancillary site (AS05) is proposed within the dairy enterprise. The use of this land as an ancillary site was not consulted with the dairy operators. The site would use little remaining high ground as a storage dump for the road.

Response

As discussed in Section 2.10.4, Roads and Maritime has carried out a review of the project to minimise impacts to the dairy enterprise. A revised layout is proposed in Section 5.2.1, which would reduce the impact on agricultural (dairy) land from the environmental impact statement by about 10.3 hectares (based on comparison of operational footprints). Construction impacts on agricultural (dairy) land would reduce by an additional 3.8 hectares with the removal of ancillary site AS05.

Chapters 13 and 15 of the environmental impact statement provide a detailed assessment of the potential socio-economic and land use impacts of the project. This includes acknowledgement of the impacts on the dairying enterprise located near the Illawarra Highway.

Technical Paper 9 – Socio-economic provides a detailed summary of agriculture within the Illawarra region, including a summary of the milk production industry in the Shellharbour local government area. Section 3.3.3 acknowledges the importance of the milk production industry

noting that it accounted for \$19.48 million or 72 per cent of the value of all agricultural production in the region in 2012-13, or around four per cent of the total value of milk production in New South Wales.

Chapter 15 of the environmental impact statement outlines impacts to the dairy enterprise, including change in access, loss of flood free land and loss of dairy infrastructure. The discussion in Chapter 15 focusses largely on the impact to the dairying land use (refer Figure 15-3 of the environmental impact statement). It is acknowledged that the dwelling located on land parcel 31 would be permanently acquired as a result of the project. Identified impacts, as noted in Chapter 15, to the dairying enterprise on the Illawarra Highway include:

- Temporary and permanent land acquisition and loss of infrastructure (dairy shed, fencing, silos and feed pad)
- Temporary and permanent changes to property access, including stock movements and the transport of silage, which are currently undertaken across the Illawarra Highway
- Loss of flood free land, and loss of access by road to flood free land.

It is expected that the operational aspects of the business would require adjustment. It is not anticipated that the project would render the dairy enterprise unviable, and the impact to the milk production industry in the Illawarra is expected to be low. Roads and Maritime are committed to ongoing consultation and negotiation with the dairy enterprise operators.

Chapter 15 of the environmental impact statement describes the direct impact to the dairy enterprise, noting that the direct impacts would likely require acquisition of about 27 hectares of dairying land. This equates to about 6.7 per cent of the area under management by the dairy. This has been further reduced by about 10.3 hectares for the operational boundary and 3.8 hectares for the construction footprint as a result of the proposed design refinements and the removal of ancillary site AS05. It is unclear how the percentages shown in the submission above (point 174) have been derived. The project would not result in sterilisation of land to the east of the Illawarra Highway. It is understood that the land to the east of the Illawarra Highway is used for silage, breeders and dry heifers. Roads and Maritime acknowledge that this land is also used for the milking herd. These uses could continue once the project is operational.

Roads and Maritime has completed a review and design refinement process to minimise impacts to the dairy operation and would continue to consult with the dairy operators to reduce impacts where possible. The 'potential' impacts described in Chapter 15 of the environmental impact statement describe the direct impacts that could result from the project, subject to measures employed to minimise these impacts. Roads and Maritime acknowledge the direct impacts to the dairy enterprise.

Management measures LU01 and LU02 (refer Section 6 of this report) reflect Roads and Maritime's commitment to consultation and negotiation with affected landowners in relation to land acquisition and altered access, and the subsequent impacts on the viability of the existing use of the land for dairying. This process is ongoing. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

To provide the construction contractor with the necessary flexibility in the location of facilities, locations for ancillary sites have been identified and considered in the environmental impact statement (refer Section 5.20.4 of the environmental impact statement). These have been reviewed and changes proposed in Section 5.2.3 of this report. The ancillary site AS05 has been removed from the project due to the landowners requests.

Submission number

48, 57, 62 and 91.

Issues

180. There appears to have been little consideration for the movement of livestock and farm equipment across the proposed bypass
181. Access under the Frazers Creek bridge for movement of cattle and machinery back and forth between Meadow View and Marks Villa would not be feasible as it would be inundated with floodwater in times of rain. An underpass to access to / from Meadowview during floods further to the south of the Frazers Creek bridge underpass should be provided
182. The proposed access to the dairy enterprise at Darcy Dunster Reserve would not be suitable for farm machinery and herd movements. The bridge height would not allow a silage/hay wagon or cattle truck to pass under the bridge. Further the Reserve is closed outside the hours 8.00-5.30 preventing use during this period.

Response

A 150 metre long bridge proposed to cross Frazers Creek (BR07, refer Figure 5-3) was part of the previous design and was identified as allowing underpass passage for livestock and high vehicle underpass access for farm equipment. This structure was identified and assessed as part of the environmental impact statement.

The environmental impact statement states the project would reduce the area of high ground available for cattle to shelter during a flood. In a 20 year ARI event, the area of flood free land between the Illawarra Highway and Macquarie Rivulet would be reduced from 7.6 hectares to 3.6 hectares (slightly better than the 3.3 hectares reported in the environmental impact statement) due to land required for the project. However, the need for high ground for cattle in this area is somewhat reduced because it will no longer be associated with the dairy as this will be removed as part of the project.

Access to agricultural land via the Darcy Dunster Reserve would be suitable for vehicles and emergency access. The bridge at this location allows at least 3 metres clearance and so is suitable for vehicular access but would not be able to be used for larger vehicles such as tractors etc.

Submission number

48 and 91.

Issues

183. The environmental impact statement attempts to downplay the importance of the dairy enterprise by stating that it is not shown on Biophysical Strategic Agricultural land maps and not listed in strategic documents for the area. Biophysical Strategic Agricultural land mapping was started to protect agriculture from mining interests. It is at a high, state and regional level
184. The environmental impact statement attempts to downplay the importance of the dairy enterprise by stating that it is not listed in strategic documents for the area. Later the environmental impact statement contradicts this by outlining the importance of the farm both to the local area and the NSW dairy industry (refer page 396 of the environmental impact statement, and pages 27 and 11 of Technical Paper 9).

Response

The importance of agricultural land in the Illawarra, as evidenced by the Agricultural Land Classification Maps and the Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015), formerly the Draft Illawarra Regional Growth and Infrastructure Plan (Department of Planning and Environment, 2014), is acknowledged by Roads and Maritime. Chapter 13 and Chapter 15 of the environmental impact statement recognise that the Draft Illawarra Regional Growth and Infrastructure Plan (Department of Planning and Environment, 2014) identifies the southern part of the Region as home to a range of economically viable rural enterprises including dairy, organic produce, beef, cut flowers and fruit. These agricultural industries support a range of other value adding industries such as milk and cheese factories, abattoirs and wineries (some of which operate in the Illawarra or in nearby regions). It is recognised that agricultural land contributes to the attractive landscape of the region that is enjoyed by both residents and tourists. The Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015) also identifies the demand for transport associated with projected population growth and the need for good transport connections throughout the region as detailed in the Illawarra Regional Transport Plan (Transport for NSW, 2014).

The Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015) identifies the West Lake Illawarra Release Areas (incorporating West Dapto, Calderwood and Tallawarra) as major land release areas under the Illawarra Urban Development Program. Urban development is considered to be one of the most viable and effective future uses of this land under the Illawarra Regional Strategy (Department of Planning, 2007). Due to these future demands adequate infrastructure needed to be developed to cater for the associated population growth.

Submission number

48, 54, 57 and 91.

Issue

185. The motorway would take the limited amount of high ground in Meadowview and include demolition of the farm's sheds, milking shed, feedpad and the farmer's family home. The location of this type of farm infrastructure on high ground is vital to the productivity and viability of a dairy farm. Much of Meadowview is vulnerable to flooding and unsuitable for this type of farm infrastructure. The project would impact the most productive land within the dairy enterprise, adversely impacting its overall operations.

Response

A detailed hydrology and flooding impact assessment has been carried out for the project; present in Technical Paper 3 – Hydrology and Flooding, and summarised in Chapter 8 of the environmental impact statement.

In a 20 year ARI event, the area of flood free land between the Illawarra Highway and Macquarie Rivulet is reduced from 7.6 hectares to 3.6 hectares (up from 3.3 hectares in the environmental impact statement) as a result of the project. It is noted that this reduction in flood free area is primarily due to the land required for the project, not due to changes in the flood extent.

A revised flooding assessment was carried out to determine potential changes to impacts due to the proposed design refinements undertaken since the environmental impact statement was exhibited. The assessment is summarised in Section 5.5.2 and forms Appendix C of this report. The assessment found there would be minimal changes to the impacts detailed in the environmental impact statement. The environmental impact statement set criteria for acceptable increases in water level within agricultural land of less than 250 millimetres with localised increases of up to 400 millimetres acceptable over areas less than five hectares in the 20 year and 100 year ARI flood event. The current design meets this criteria.

The project would require acquisition of high ground within the dairy enterprise adjacent to the Illawarra Highway. High ground would continue to be available to the dairy enterprise to the north of the Macquarie Rivulet, on the southern side of Illawarra Highway, and to the east of the motorway (west of the airport). The proposed access way at Frazers Creek Bridge and 150 metre long bridge at Frazers Creek would allow access to high ground for cattle to shelter during a flood (see Section 5.5.2).

The dairy enterprise currently operates two dairy complexes. The project would directly impact the Meadowview dairy shed. The second shed, the Meadows, would not be impacted by the project and would be accessible during flood events. Cows could continue to be milked in the Meadows dairy shed during all-weather events.

Roads and Maritime will carry out ongoing consultation with affected landowners (including the dairy enterprise) during detailed design including in relation to any change in flood impacts to those identified during the environmental impact statement. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

Submission number

48 and 91.

Issue

186. It is noted that where impact to an endangered species or endangered ecological community is unavoidable, offsets are proposed. Why aren't agricultural land offsets proposed when scarce agricultural land is taken? Why is it considered of a lesser value than endangered species? The 85 hectares of agricultural land should be replaced by the government.

Response

Biodiversity offsets for the project have been identified in accordance with the NSW Biodiversity Offset Policy for Major Projects (NSW Office of Environment and Heritage, 2014b). The NSW Biodiversity Offsets Policy for Major Projects commenced on 1 October 2014 and applies to State significant infrastructure under the *Environmental Planning and Assessment Act 1979*. Roads and Maritime have carried out a review of the project to minimise impacts to the dairy, however no formal offset policy or requirements are in place requiring the offset of agricultural land. Compensation for agricultural land owners will be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

2.12.2 OTHER LAND USE IMPACTS

Submission number

75 and 101.

Issues

187. The proposed alignment of the connecting roads and ramps between Yallah Bay Road, Cormack Avenue, Princes Highway and the motorway encroach on the Tallawarra Land and in particular the design of the Central Precinct
188. Properties that would be adversely impacted by the project should be compensated, even if there is not direct land use impact to the property.

Response

The Tallawarra development would be located immediately east of the motorway. Chapter 15 of the environmental impact statement provides a detailed assessment of the land use impacts associated with the project. Section 13.3.2 of the environmental impact statements notes that the project would directly impact on about 9.9 per cent of the proposed Tallawarra land release area (land parcel 13). It is noted that consultation with the land owner of Tallawarra Lands has led to a reduction in the impact to this property including the removal of a stockpile compound site.

The project would support and facilitate future changes in land use across the region, including the Tallawarra Lands land release areas, by creating consistent travel conditions for through traffic travelling between Sydney and Nowra. It would improve travel times and efficiency for local traffic and improve east-west connectivity locally. As discussed in Chapter 7 of the environmental impact statement, the project would substantially improve the reliability of journey times in the future, particularly during peak travel periods, and reduce congestion.

Management measures LU01 and LU02 (refer Section 15.5 of the environmental impact statement and Section 6 of this report) reflect Roads and Maritime's commitment to consultation and negotiation with affected landowners in relation to land acquisition and altered access, and the subsequent impacts on the viability of the existing use of land. This process is ongoing. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*. Measures to minimise impacts to affected properties, both those directly and indirectly impacted, are listed in Chapter 23 of the environmental impact statement.

Submission number

48, 59 and 91.

Issues

189. The environmental impact statement states that "the motorway design maintains access to the business park via the Illawarra Highway...." This is not true. There has never been access to the Business Park via the Illawarra Highway on any of the approved plans
190. The road design includes access for Sydney Water to access a sewer point south of the Larkins Lane area. This issue is not addressed in the environmental impact statement.

Response

It is acknowledged that the access arrangement to the Illawarra Business Park is not proposed via the Illawarra Highway and access to the park would not be provided as part of the project. The business park would be accessed via Tongarra Road. It is noted that under Section 95 of the *Environmental Planning and Assessment Act 1979* a development consent lapses after five years from which it operates. Approval was granted to the Illawarra Business Park development in 2009, and no works have subsequently commenced. It is therefore understood that the development consent has lapsed. This project is only at concept design level and so cumulative impacts would need to be determined by the Business Park Project during design approval when details on the levels of impacts are known.

Issue 185 refers to sewerage infrastructure said to be located to the south of the Larkins Lane area. Continued access will be provided to the pumping station as part of the proposed development. It is noted that the utilities relocations are being considered. However, these do not form part of the project and will be assessed under a separate environmental approval.

2.13 SOILS AND WATER QUALITY

Submission number

16.

Issues

191. No mention has been made on the inevitable run-off during the construction phase and its impact on Frazers Creek or Macquarie Rivulet
192. The environmental impact statement notes that most agricultural users of surface waters are located upstream of the project, and are unlikely to be impacted. The dairy enterprise uses water from the Macquarie Rivulet and Frazers Creek for stock and irrigation. Any contamination of these waterways would adversely impact agricultural water supply.

Response

The potential impacts of the project on surface water quality is assessed in Chapter 16 of the environmental impact statement. Potential impacts on water quality are discussed in Section 16.3.

The water treatment strategy for the operational phase is discussed in Section 5.11 of the environmental impact statement and the location of water quality treatment devices are mapped in Figures 5-1 to 5-7 of the environmental impact statement.

The water quality management strategy for the construction phase involves a range of measures as discussed in Sections 5.20.6 and 16.5 of the environmental impact statement, including adoption of a series of temporary water quality treatment devices as mapped in Figures 5-20 to 5-26. It is anticipated that, with the implementation of the mitigation measures (in accordance with Managing Urban Stormwater: Soils and Construction (the Blue Book) and relevant Roads and Maritime specifications), there would be minimal construction phase impacts on water quality in watercourses within the project area, including Frazers Creek and the Macquarie Rivulet.

Roads and Maritime notes the dairy operator's comment with respect to their ongoing use of water from Frazers Creek and the Macquarie Rivulet for stock and irrigation. Impacts on water quality in these watercourses beyond the project boundary (including downstream of the project) are expected to be avoided via implementation of the construction phase water quality management measures, and impacts on the dairy operation such as stock watering and irrigation are expected to be negligible. For the operational stage, the approach to providing an efficient and effective operational water quality design is to include 'reasonable and feasible' measures that provide an acceptable overall level of performance and mitigation of water quality impact. The following outlines the primary water quality control measures for the operational phase:

- Water quality basins – sediment basins that function to achieve effective pollutant removal of sediments and some nutrients
- Grassed swales – open channels used to convey runoff and provide water quality treatment.

The proposed water quality measures would improve overall water quality compared to the existing Princes Highway, which does not include any water quality treatment measures. The project operational phase water quality treatment strategy would produce a net benefit over the existing situation by reducing the amount of total suspended solids, nutrients and gross pollutants delivered to Lake Illawarra on an annual basis.

2.14 AIR QUALITY

Submission number

54, 55, 57, 62 and 75.

Issues

193. No mention has been made of the atmospheric dust generation during the construction phase
194. Nearby sensitive receivers will be seriously affected by dust during the construction period. What measures are going to be put in place to ensure no dust pollution is caused during construction and operation?
195. The earthworks and construction of the Croome Road roundabout, the Croome Road Bridge, new East West Link Road and motorway will result in extended and intense exposure to dust for nearby residents. Receivers located on Gumnut Street will be seriously affected by major noise and dust during the construction period, with continued noise pollution after completion. These properties (families) will be more affected when winds are coming from the west and around to the south-east
196. Air monitoring should be undertaken along the recreational zone to the north of the existing East West Link
197. There will be a lot of heavy machinery in use during construction, causing pollution from diesel exhaust particles
198. Can ancillary sites AS12 and AS13 be combined and either moved further east or into the Croom Regional Sporting Complex with a view to reducing construction phase traffic, noise and air quality impacts on nearby residents?
199. In close proximity to residential properties near the existing Illawarra Highway the motorway will be built on an embankment which will cater for a continuous stream of traffic causing vehicle fumes.

Response

The potential impacts of the project on air quality is assessed in Chapter 18 of the environmental impact statement and Technical Paper 12 – Air Quality.

The environmental impact statement acknowledges the likelihood of dust emissions from construction activities and the potential for these and other construction-related emissions to impact on receivers in the immediate and wider localities.

Management measure AQ01 (refer Section 18.4 of the environmental impact statement) provides for the development of a strategy to manage air quality during construction. This will include the use of mitigation measures to suppress dust and monitoring to ensure compliance with air quality objectives. The location of the monitoring sites will be carefully considered during development of the plan, and would likely target high risk areas, such as the residential area north of the East West Link.

Section 7.3 of the environmental impact statement acknowledges that emissions from construction plant and equipment including heavy vehicles and off-road equipment may impact air quality during construction. Emissions from diesel construction plant would be managed via the air quality management plan that would form part of the construction environmental management plan.

Air emission standards for mobile non-road diesel plant and equipment are identified in the NSW Government Resource Efficiency Policy (NSW Office of Environment and Heritage,

2014c). These will be integrated into procurement activities for the project. In accordance with the Policy, the successful contractor will be required to report on the use and performance of off-road diesel plant and equipment.

It is noted that existing Australian design rules for heavy duty engines and vehicles relate to on road vehicles and currently there are no Australian Standards for emissions from off-road diesel plant and equipment.

The use of ancillary site AS13 (refer Figure 5-5) has been reviewed and would be retained in the current design. Ancillary site AS12 has now been removed from the design due to a detention basin now proposed in this area.

Technical Paper 9 – Air Quality within the environmental impact statement assessed the potential impacts of the motorway on surrounding residents. This assessment considered nitrogen oxides and particulate matter emissions. This assessment concluded that the regional impacts to air quality as a result of the project would be negligible and undetectable in any ambient air quality measurement at surrounding locations.

2.15 SUSTAINABILITY

Submission number

22.

Issues

200. The design fails the test of sustainability. The document notes that “the present generation should ensure that the health, diversity, and productivity of the environment are maintained or enhanced for the benefit of future generations.” (page 579) This road project is having a direct detrimental impact on future generations being able to feed themselves. The NSW milk market is already desperate for more milk and this project will directly reduce the amount of milk able to be produced by current and future generations
201. The project does not meet the objectives of the *Environmental Planning and Assessment Act 1979* (page 612) “to encourage the proper management, development and conservation of natural and artificial resources, including agricultural land.....”. This road design does not properly manage, develop OR conserve agricultural land. Instead it takes the best quality land and buries it under a road.

Response

Chapter 22 of the environmental impact statement presents a discussion of the principles of ecologically sustainable development, and how they have been applied to the project, including the principle of intergenerational equity. The assessment found that the project has been developed in accordance with these principles (refer Table 22-2 of the environmental impact statement).

Following consultation during preparation of the environmental impact statement, and in response to issues raised during exhibition of the environmental impact statement, Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise on the Illawarra Highway (refer Section 5 of this report). In response, changes to the interchange at Albion Park are now proposed to reduce the impact on agricultural lands in this location. The alignment of the interchange has been designed in consultation with the landowner, and the proposed design refinement would substantially reduce the amount of agricultural (dairy) land impacted by the project (by about 10.3 hectares for the operational boundary and an additional 3.8 hectares for the construction footprint with the removal of ancillary site AS05). Roads and Maritime are committed to ongoing consultation and negotiation with the dairy enterprise operators, and other impacted agricultural property owners.

Chapter 15 of the environmental impact statement provides a detailed assessment of the land use impacts of the project, including impact to agricultural properties. The assessment found that operation of the project would result in a number of land use changes, including:

- Eight agricultural land parcels, comprising six enterprises, would be partially impacted by the project with a portion of each land parcel converted to transport corridor. A dairy enterprise would experience impacts to several parcels, however, all six enterprises would remain viable
- Eight agricultural land parcels would be wholly impacted by the project and converted to road corridor. Six of these properties are owned by Roads and Maritime.

Identified impacts, as noted in Chapter 15, to the dairying enterprise include change in access, loss of flood free land and loss of dairy infrastructure. It is expected that the operational aspects of the business would require adjustment. The operation of the dairy enterprise would be altered by the project, however the enterprise would be expected to remain viable. Roads and Maritime

is in consultation with the dairy operator to appropriately manage the impacts to the dairy. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

2.16 OTHER / GENERAL ISSUES

Submission number

11 and 12.

Issue

202. How many environmental impact statement have been done? How much money has been wasted on studies and statements over the years.

Response

Roads and Maritime Services has prepared only one environmental impact statement for this project, as publicly exhibited by the Department of Planning and the Environment. A copy can be viewed on the Department's webpage:

www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6878.

Chapter 2 of the environmental impact statement describes the legislative assessment process for the project. Section 2.1 of the environmental impact statement summarises the approval process for the environmental impact statement, in accordance with the *Environmental Planning and Assessment Act 1979*.

Chapter 4 of the environmental impact statement describes the project development process followed to identify a preferred route and interchange arrangements for the project. The project has undergone a robust process of reviews, investigations, planning, community and stakeholder consultation, and design work, dating back to the 1990s. This has ensured that the preferred outcome for the project has considered a range of environmental and social constraints, and has considered stakeholder feedback.

Further information on the assessment process is available on the Department of Planning and Environment webpage (www.planning.nsw.gov.au/).

Submission number

98 and 99.

Issues

- 203. An exit ramp at Kanahooka Road in the vicinity of the Dandaloo shopping centre would replace a dangerous pedestrian crossing at the Caltex garage and a troublesome intersection with a set of traffic lights to regulate pedestrian and traffic through an already dangerous section of Kanahooka Road with a reduction of Princes Highway traffic past the top end of Dapto
- 204. There is a need for northbound exit ramps and southbound entry ramps at Fowlers Road and Kanahooka Road. This would remove traffic from the Princes Highway and improve safety.

Response

Both Fowlers Road and Kanahooka Road are outside of the scope of the project, to the north of the project area.

The M1 Princes Motorway – improvements between Figtree and Dapto is a separate project that Roads and Maritime are currently undertaking to investigate options to address the future needs of local roads in the region. Information on the progress of this separate project can be

found on the Roads and Maritime project page available at the following link:

www.rms.nsw.gov.au/projects/illawarra/m1-princes-motorway/improvements-between-figtree-to-dapto.html.

Submission number

48 and 91.

Issue

205. There are many typos and inaccuracies throughout the main document.

Response

Roads and Maritime acknowledges the minor typographical errors within the environmental impact statement. Please refer to Section 4 of this report for corrections and clarifications from the environmental impact statement.

Submission number

55.

Issue

206. Local residents have in recent years been impacted by the construction of the East West Link (the area was rolling hills, with horses and other grazing livestock). If there is any way to ease the impact of all this new infrastructure, then it should be seriously considered.

Response

The local resident's concerns regarding changes in land use associated with the East West Link are acknowledged.

Chapter 4 of the environmental impact statement describes the process that has been carried out to select a preferred project for the Albion Park Rail bypass. The outcome of options development, assessment and selection process is described in more detail in the preferred option report (Roads and Maritime, 2014) on the Roads and Maritime project web page: (www.rms.nsw.gov.au/documents/projects/illawarra/albion-park-rail-bypass/albion-park-bypass-preferred-option-report.pdf). This report was placed on public exhibition in October 2014.

The preferred option was identified following consideration of a range of factors, including:

- Engineering feasibility
- Functionality (connectivity, layout and safety)
- Traffic performance (network performance, flexibility, interchange performance, amenity)
- Socio-economic impacts (noise, property, heritage, visual amenity, connectivity, community facilities, business, and flooding)
- Environmental (terrestrial and aquatic ecology)
- Relative cost estimates.

The options assessment process sought to weigh the relative positive and negative impacts of the options considered, and identify the option with highest cost-benefit ratio.

Following selection of the preferred option, a concept design was developed. Further opportunities to avoid or minimise negative impacts have been identified during this process. Section 4.5 of the environmental impact statement describes some of the design refinements adopted on the basis of community feedback.

The environmental impacts of the preferred option (such as noise, air quality, flooding and hydrology, and visual) on residential receives adjacent to the existing East West Link have been assessed as part of the environmental impact statement. Chapter 21 of the environmental impact statement provides a cumulative impact assessment for the project and other proposed developments within the region. Chapter 25 of the environmental impact statement and Section 6 of this report summarise the environmental management measures proposed to minimise any potential impacts on residents in this area.

Submission number

24 and 53.

Issues

207. Once the motorway is complete the Left turn Only Signs on Miall Way and Creole Road for traffic entering the Princes Highway should be removed to allow vehicles to turn right onto the highway
208. Northbound heavy vehicles leaving the industrial / commercial estate east of the Princes Highway initially travel southbound, then turn right onto Airport Road, do a U-turn at the roundabout, and then turn left onto the Princes Highway. There is opportunity to widen the Princes Hwy then provide a left turn lane that merges into the northbound traffic on the highway.

Response

Roads and Maritime will review traffic volumes following the completion of construction of the bypass. During this review, opportunities to modify local connecting roads through changes such as lane modifications and signage can be considered.

Submission number

9, 55 and 59.

Issues

209. The impact of the construction which is estimated to last for three to four years may be greater than the resultant operational road and therefore requires special consideration
210. Studies have included the area of Haywards Bay but not Yallah. There will be minimal impact to Haywards Bay as the roadway will move further away than where it is presently located. The impact to Yallah residents will be increased as the roadway moves to the west and closer to Yallah. The impacts to Yallah should be specifically identified, considered and addressed
211. The health, wellbeing and financial impacts of residents should be a primary focus for the project moving forward, as well as cost
212. Not enough information has been provided regarding the Illawarra Highway at Yallah Hill; the crossing of the Macquarie Rivulet or crossing the dairy enterprise.

Response

Roads and Maritime acknowledge the potential for construction impacts to arise as result of the project. A detailed of assessment of the construction impacts associated with the project is provided in the environmental impact statement.

Section 2.5 of this report and Section 6.6 of the environmental impact statement detail the ongoing consultation that will be undertaken by Roads and Maritime during construction. Ongoing consultation will be undertaken in accordance with the project Community Involvement Framework, a draft of which is provided as Appendix B to the environmental impact statement.

Residential areas within Yallah, including the Larkins Lane residential area and properties on Yallah Road, and properties on and near Semillon Place have been assessed as part of the project to determine any potential noise and vibration (Chapter 12), land use (Chapter 15), visual (Chapter 14), hydrology and flooding (Chapter 8) and air quality (Chapter 18) impacts.

The environmental impact statement provides a comprehensive assessment of the socio-economic impacts of the project on nearby residents; including consideration of health, wellbeing and financial impacts, as detailed in Chapter 13.

A detailed description of the project is provided in Chapter 5 of the environmental impact statement. Section 5.13 of the environmental impact statement describes that the project would replace the function of, and physically sever, the Illawarra Highway. The Illawarra Highway would be terminated in a cul-de-sac at Croome Lane. Remnants of the existing Illawarra Highway could be retained for maintenance and private property access.

In response to issue 207, the project would cross the Macquarie Rivulet via bridge BR06 (Figure 5-3). The motorway would be aligned roughly parallel and about 150 metres upstream of the existing bridge. A bridge approximately 200 metres long is proposed, which would extend across the majority of the floodplain at this location. The environmental impact statement considers the potential construction and operational impacts, such as water quality and flooding impacts, which may be caused by this bridge.

Chapter 13 and 15 of the environmental impact statement provide a detailed assessment of the impact of the project on the dairy enterprise. This includes the proposed socioeconomic and land use impacts associated with the removal of rural land uses such as the dairy industry.

Chapter 25 of the environmental impact statement, and Section 6 of this report, summarise the environmental management measures proposed to minimise any potential impacts.

3 RESPONSE TO AGENCY SUBMISSIONS

This section addresses submissions received from government agencies or advisory bodies (submissions from the community are addressed in Section 2 of this report). These agency submissions were received from:

- Civil Aviation Safety Authority
- Department of Primary Industries
- Environment Protection Authority
- Office of Environment and Heritage
- Shellharbour City Council
- Shoalhaven City Council
- Wollongong City Council.

3.1 OVERVIEW OF AGENCY ISSUES RAISED

Issues raised by government agencies generally relate to their respective statutory responsibilities as follows:

- Civil Aviation Safety Authority: Management of the Illawarra Regional Airport's operational requirements, particularly the project's impacts on the obstacle limitation surface
- Department of Primary Industries: Protection and management of agricultural lands
- Environment Protection Authority: Issues primarily relate to management of traffic and transport, and noise and vibration impacts
- Office of Environment and Heritage: Assessment and management of hydrology and flooding, biodiversity, and Aboriginal heritage impacts
- Shellharbour City Council: Covers a wide range of issues. A large number relate to traffic and transport, hydrology and flooding, biodiversity and non-Aboriginal heritage. Other issues relate to socio-economic impacts, landscape character and visual amenity and land use
- Wollongong City Council: Covers a range of issues. These primarily relate to hydrology and flooding, biodiversity, traffic and Aboriginal heritage impacts, non-Aboriginal heritage, and land use impacts.
- Shoalhaven City Council: Expressed their general support for the project, raising few issues. Issues that were raised related primarily to traffic and transport and construction staging of the interchange at Yallah

Responses to government agencies and local councils have been provided in Sections 3.2 to 3.8.

3.2 CIVIL AVIATION SAFETY AUTHORITY

3.2.1 AVIATION

Issue 1

The technical paper, on page 20, identifies four proposed penetrations of the future OLS: Civil Aviation Safety Authority advises that infringements of the take-off / climb surface should be considered unacceptable.

Response 1

A detailed aviation assessment has been carried out for the project; provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement. An addendum to the aviation assessment has since been produced to assess the potential impacts associated with the proposed design refinements described in Section 5 and is included at Appendix B of this report.

Section 4.1.1 of Technical Paper 2 – Aviation and Section 3.2 of the aviation assessment addendum (Appendix B) describes locations where the project penetrates the aspirational obstacle limitation surface. These locations are listed below and shown in Figure 3-1 and Figure 3-2:

- At Yallah Road, approximately 120 metres east of Larkins Lane, the proposed intrusion to the aspirational obstacle limitation surface does not produce a greater intrusion than already presented by the existing situation
- At Yallah Road, at the intersection with the local access to the TransGrid substation, two light poles would penetrate the aspirational obstacle limitation surface for the Runway 34 take-off climb surface
- The new section of Croome Road to be constructed as part of the project would penetrate the aspirational obstacle limitation surface however, the proposed intrusion to the aspirational obstacle limitation surface does not produce a greater intrusion than already presented by the existing Croome Road
- The Runway 34 take-off climb surface would be limited by a 4.6m vehicle envelope between the points approximately 150 metres south of the existing roundabout on the Illawarra Highway and extending for a distance of approximately 190 metres to the north (refer Section 3.2.1 of Appendix B)
- The Runway 16 approach surface would be infringed by a 4.6 metres vehicle envelope from a point approximately 100 metres south of the existing roundabout along the Illawarra Highway to a point approximately 35 metres to the north of this point (refer Section 3.2.2 of Appendix B).

A number of existing and proposed facilities in the Croom Regional Sporting Complex would also intrude on the aspirational obstacle limitation surface, however this would not produce a greater intrusion than already occurs.

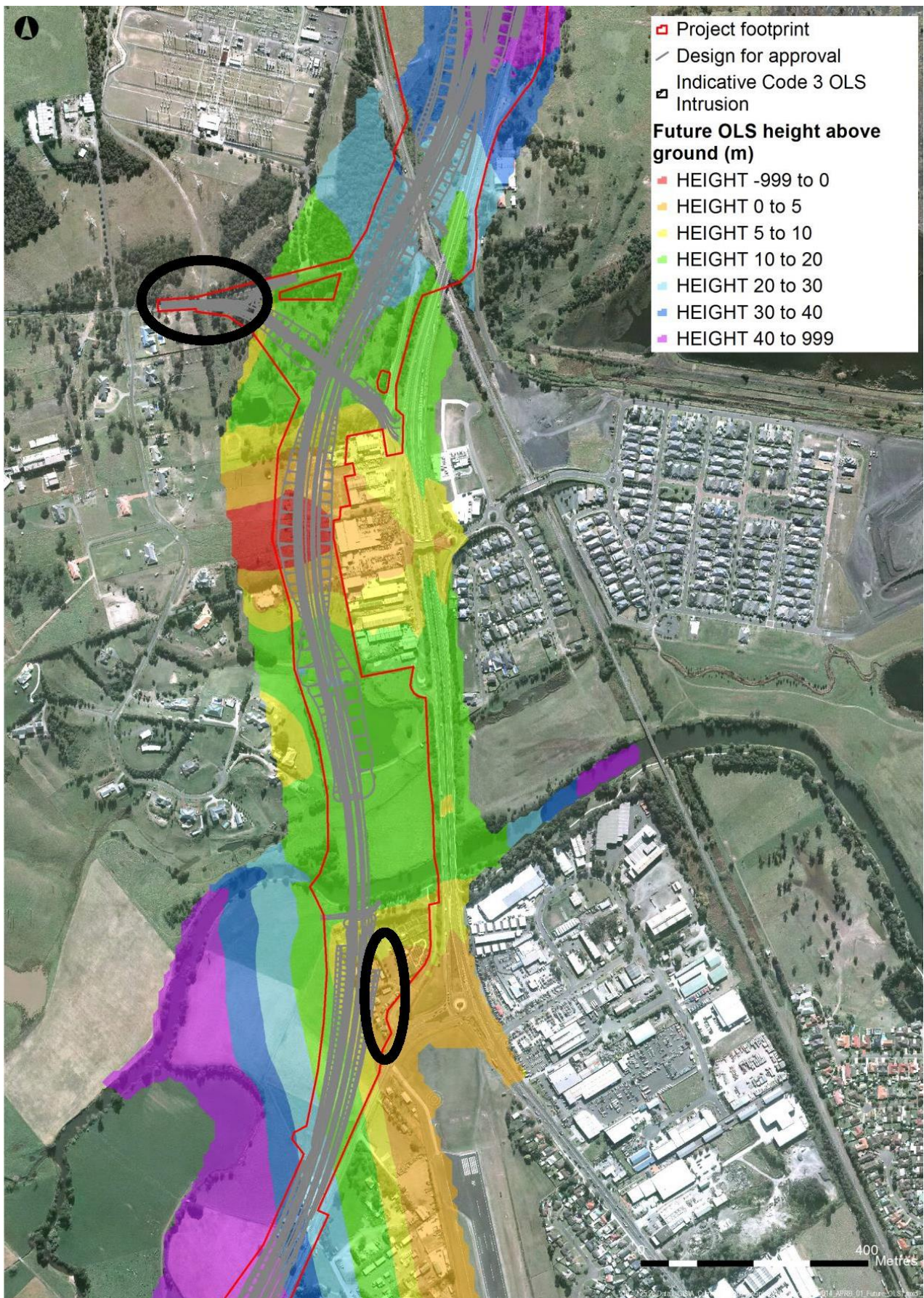


Figure 3-1 Indicative aspirational (Code 3) obstacle limitation surface intrusions - 1

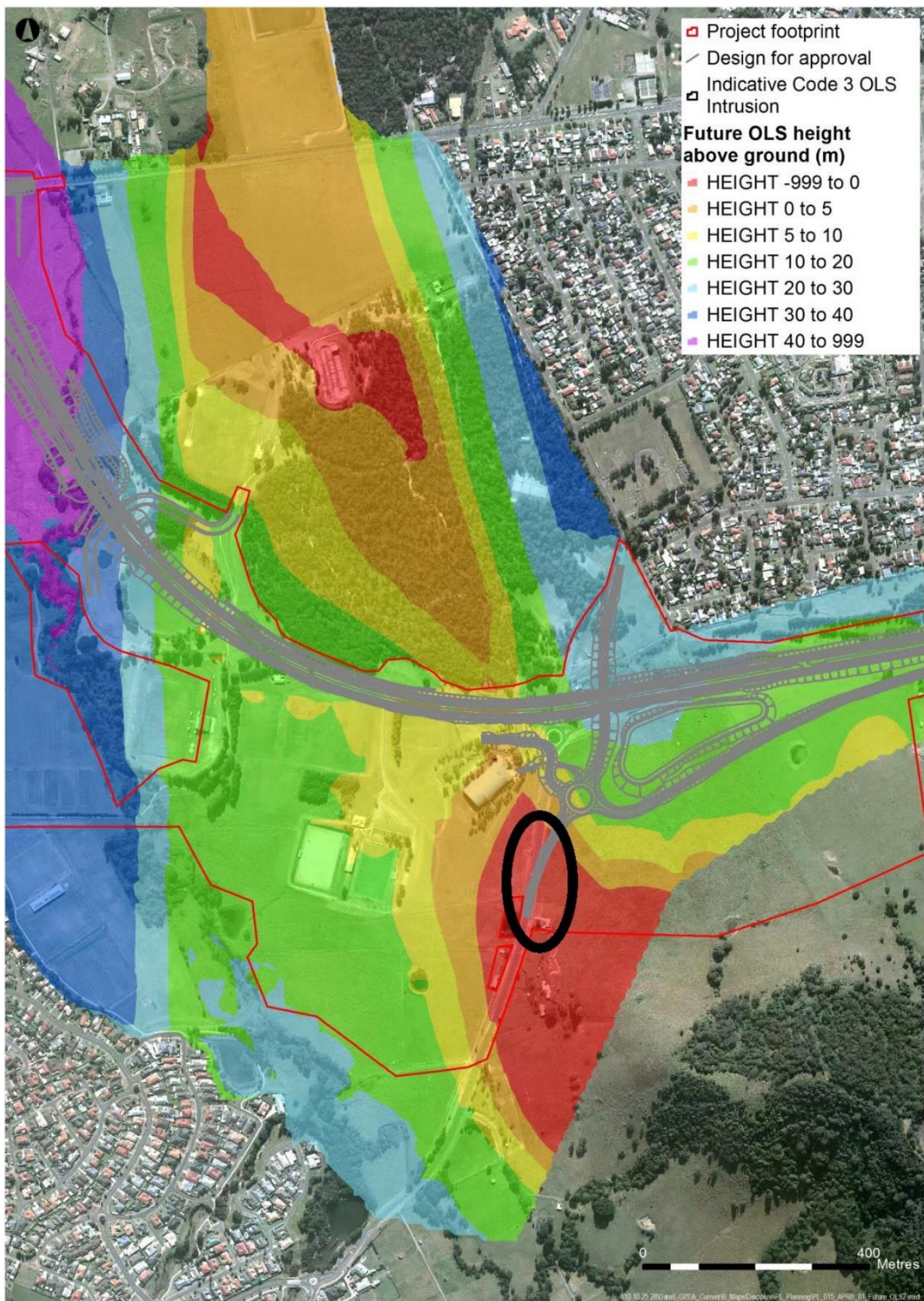


Figure 3-2 Indicative aspirational (Code 3) obstacle limitation surface intrusions - 2

The project would extend into the aspirational obstacle limitation surface in three areas. Two of the intrusions relate to areas where the motorway is proposed to connect with existing local roads that already intrude into the aspirational obstacle limitation surface. In these locations, the project would not result in a greater penetration than currently occurs. The third intrusion would only occur when a 4.6 metre high vehicle parks in an 80 metre section on the southbound shoulder of the motorway. This area will be marked as no stopping to ensure that it remains free on any intrusions on the aspirational obstacle limitation surface (management measure TT06).

These reduced clearances would potentially result in some restrictions in non-standard operations of the airport, however the overall impact on future aircraft operations, compared to the existing situation (without the motorway), is minimal and no impacts to existing airport operations are expected. It is not anticipated that this would impact on the current operation of the airport and would not affect the safety of future aspirational operations.

Any risk associated with the intrusions of the obstacle limitation surface would be managed as per management measure TT04 (refer Section 6 of this report), whereby the detailed design of the project would aim to comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport.

Issue 2

The technical paper does not identify impacts of the proposal on the current obstacle limitation surfaces. Civil Aviation Safety Authority recommends that this should be investigated. Civil Aviation Safety Authority would be pleased to provide additional comment on receipt of this advice.

Response 2

A detailed aviation assessment has been carried out for the project; provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement. Technical Paper 2 includes an assessment of the project clearance to both the aspirational and existing obstacle limitation surface identified through the utilisation of relevant aviation guidelines and standards. This has been revised as the aviation assessment addendum (Appendix B) to assess the potential impacts associated with the proposed design refinements described in Section 5. The assessment concluded that vehicles and street poles would not infringe the existing obstacle limitation surface, PANS-OPS surfaces or the obstacle assessment surfaces for the precision approach path indicator system.

Issue 3

Civil Aviation Safety Authority advises Roads and Maritime of the need for street lighting and signage associated with the proposed motorway, to comply with the requirements the National Airports Safeguarding Framework (NASF) Guideline E 'Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports'.

Response 3

Roads and Maritime acknowledges the need for compliant design and management of street lighting and signage. As identified in Section 4.7 of Technical Paper 2 – Aviation and in environmental management measure TT05, street lighting would be designed to meet the restrictions applicable to the respective light control zone in accordance with Section 9.21 of the Civil Aviation Safety Authority Manual of Standards Part 139 and National Airports Safeguarding Framework Guideline E: Managing the Risk of Distraction to Pilots from Lighting in the Vicinity of Airports (Department of Infrastructure and Regional Development, 2014b).

Issue 4

Impacts of the light beams from vehicles on pilots during take-off and landing (for example distraction and glare to pilots from head beams on the sloping motorway, entry / exit roads and roundabouts) should be considered and controlled during the detailed design stage of the project.

Response 4

Section 7.2.4 of Technical Paper 2 – Aviation assesses the potential impacts from lighting distraction and glare including vehicle headlights, concluding that no impact is anticipated for pilots. Any street lighting within a six kilometre radius of the airport (subject to Section 9.21 of Civil Aviation Safety Authority Manual of Standards Part 139) will be designed to meet the restrictions applicable to the respective light control zone (refer to management measure TT05 in Section 7.5 of the environmental impact statement). Restrictions may relate to colour, position, pattern or intensity of light emission. The most effective manner of meeting these restrictions would be considered during the detailed design.

Issue 5

NASF Guideline B 'Managing the Risk of Building Generated Windshear and Turbulence at Airports' provides guidelines for the assessment of the structures in the vicinity of runways and their impact on aircraft operations due to generated windshear and turbulence.

Response 5

Section 7.2.4 of Technical Paper 2 – Aviation assesses the potential impacts of windshear and turbulence in accordance with the National Airports Safeguarding Framework Guideline B (Department of Infrastructure and Regional Development, 2013). As discussed in Section 7.2.4 of Technical Paper 2 - Aviation and Section 7.3.4 of the environmental impact statement, the preliminary assessment found that the risk was likely to be low. Given the results of the preliminary assessment against the NASF Guideline B '1:35' rule, further mitigation of windshear and turbulence is not considered necessary.

Issue 6

Civil Aviation Safety Authority recommends that the potential for the three impacted structures to create windshear and turbulence that could affect operations at Wollongong Airport should be investigated. Civil Aviation Safety Authority would be pleased to provide additional comment on receipt of this advice and would also be pleased to discuss this issue at an early date.

Response 6

This response should be read in conjunction with the response to Issue 5 above.

Two bridges (BR06 and BR08 in Figure 5-3 and 5-4 of this report – for both east and west abutments) have been identified in the aviation assessment as not passing the preliminary assessment as defined in National Airports Safeguarding Framework Guideline B (refer Section 7.2.4 of Technical Paper 2) (Department of Infrastructure and Regional Development, 2013).

Road structures for the project include a number of measures to reduce windshear and turbulence recommended by National Airports Safeguarding Framework Guideline B (Department of Infrastructure and Regional Development, 2013):

- Wake disruption through surrounding roughness (as a result of vegetation)
- Natural contours including rounded or tapered edges (of embankments, cuttings and abutments)
- Flow relief through openings in structures.

The preliminary risk assessment found that the risk presented by road structure-generated windshear and turbulence in relation to aircraft operations at Illawarra Regional Airport is anticipated to be low.

The need for further investigation of these three structures would be reviewed at the detailed design stage, once the structural form and geometry of the project are more clearly defined. However, on the basis of the preliminary assessment, further work is not expected to be warranted.

Issue 7

The proposed motorway rest areas, in the vicinity of aerodrome, and relocated sports facilities should not provide an environment for bird and animal congregation. Any increased risks of bird strikes should be mitigated at the design stage. For example, storage solutions for food scraps need to be addressed in the early stages of the project.

Response 7

Section 7.3.4 of Technical Paper 2 – Aviation, which provides a detailed assessment of the impacts of the project on aviation, reviews the potential impacts of wildlife hazards, concluding that the project would not result in an increased risk of wildlife attraction.

The review found that the project is not a land use which Attachment 1 of National Airports Safeguarding Framework Guideline C (Department of Infrastructure and Regional Development, 2014a) indicates a risk in attracting birds. The most similar use identified in the National Airports Safeguarding Framework Guideline C (Department of Infrastructure and Regional Development, 2014a), car parks, is indicated as 'Very Low' wildlife attraction risk.

Sports facilities are indicated as a 'Moderate' wildlife attraction risk within Attachment 1 to National Airports Safeguarding Framework Guideline C (Department of Infrastructure and Regional Development, 2014a). The Croom Regional Sporting Complex is immediately south of the airport and the motorway would travel through the facility, to the south-west of Croom Reserve which is located north of the sporting complex. The existing level of wildlife attraction risk would not change as a result of the project.

Issue 8

Civil Aviation Safety Authority agrees that construction restrictions should be identified and resolved at the planning stage and the detailed design of the project. Civil Aviation Safety Authority recommends that the proponent provide a detailed aeronautical study for construction activities. The study should include input from all stakeholders (such as Shellharbour City Council, Airservices and aircraft operators) and it should address any concerns raised by the stakeholders.

Response 8

Once a contractor is appointed, Roads and Maritime will require a Method of Working Plan to be prepared in accordance with the Civil Aviation Safety Authority Manual of Standards Part 139 (refer management measure TT02 in Section 6 of this report). The Method of Working Plan will set out the arrangements for carrying out all works which may impact on aviation safety, any necessary restrictions to aircraft operations, how these would be implemented, administered and managed to ensure safety. The Method of Working Plan will be agreed with the aerodrome operator (Shellharbour City Council) and subject to consultation with all stakeholders including regulatory agencies (CASA, Airservices Australia) and all aircraft operators at Illawarra Regional Airport prior to the commencement of works which may affect operations at the airport.

Any construction impact on the airspace operational requirements of the Illawarra Regional Airport will be managed in consultation with Shellharbour City Council and incorporated into the construction environmental management plan.

3.3 DEPARTMENT OF PRIMARY INDUSTRIES

3.3.1 LAND USE AND SOCIOECONOMIC IMPACTS

Issue 1

The key issue for Department of Primary Industries is the impact on high quality agricultural land and a major dairy enterprise, and further consultation with Department of Primary Industries Agriculture is requested to assist with the mitigation of impact to the dairy industry.

Department of Primary Industries Agriculture advises that the proposed motorway will have significant impact on dairy land. The attached submission highlights some of the critical aspects of the proposal including the loss of highly fertile land to agriculture, access for dairy cows to the dairy and flood free land, flooding and potential erosion issues as well as the placement of the underpass and entry and exit ramps. These issues have a direct impact on the operational and financial aspects of a dairy.

Department of Primary Industries Agriculture requests consultation with the proponent in relation to the impacts identified.

A dairy farm will be significantly impacted by the Albion Park Rail bypass. It should be noted that currently the farm is well positioned to expand and grow to meet the requirements of the ever increasing demand for milk from the cities. It is the second largest milk supplier within 150 kilometres of Sydney markets and major processors; it has an established business scale and all weather access to allow milk collection during flooding events. The dairy farm will be impacted significantly by the bypass through increased area of land subjected to flooding, restricted access, a substantial land loss of highly fertile land and loss of one of the dairies that will impact on the operational aspects of the business, its functionality and scale.

With the demolition of dairy number two proposed, the farmer will need to expand the operations of dairy number one on Calderwood Road. There will be significant costs involved in undertaking that upgrade including dairy expansion, laneway development and crossings required to operate the dairy. The necessary expansion and the financial aspects of that impact on the business will need to be considered by Roads and Maritime in consultation with the farmer to ensure continuation and profitability of the farming enterprise.

Entry and exit ramps at Frazers Creek will impact on the high quality dairy land. The area of impact is the most fertile land of the entire dairy that produces a higher volume of dry matter than any other area on farm. That land is classified as class 2 on the Agricultural Land Classification Maps undertaken by the Department of Agriculture in 1986. Class 2 land is "Arable land having a very good capability for agriculture. Minor to moderate constraints to sustained high level of production are present." That land is some of the best land in the state.

A more suitable proposal would be to locate the entry and exit ramps to Frazers bridge on land at the intersection of land parcel 35 and the southern part of 37 where there is swampy ground and of much less agricultural value.

Page 474 of the environmental impact statement mentions the direct impacts the project would have on the dairy enterprise adjacent to the Illawarra Highway, including:

- Loss of pasture land
- Loss of dairy infrastructure, such as milking sheds, fencing, silos and feed pad facilities
- Change in access across the Illawarra Highway for stock movements and silage transport
- Loss of flood free land

- Loss of access by road to flood free land.

However, the loss of the residence on the dairy farm is not mentioned and should be included as it is a significant impact.

Impacts on the farm of reduced areas of fertile land will be a reduction in the quality of home grown feed and having to purchase feed or reduce numbers reducing milk production. The farm currently produced 4.5 million litres from milking 440 cows in 2013 (as stated in the environmental impact statement).

However, production in 2015 is 5.4 million litres, milking 570 cows and projections for growth in the business were to milk 650 to 660 cows in 2016 with a production target of 6 million litres in order to meet increasing milk demands from the market.

The land take of the most highly fertile land of the farm for the bypass will clearly have a high impact on the projected production levels for the farm into the future.

While the socio-economic paper of the environmental impact statement (appendix, page 110 to 111) states the importance of dairying and milk to the Illawarra region, the significance of that commodity requires further explanation.

The environmental impact statement provides figures on the numbers of dairy farms and hectares under dairying rather than considering actual milk production figures. The number of dairy farms in the Shellharbour local government area is declining and the area of dairy farms is also decreasing overall as stated in the report, but the actual production value of the farms remaining is increasing. Between 2000 and 2005, milk value increased by \$200,000. Between 2006 and 2011 milk value increased by \$300,000. Milk production in the Shellharbour local government area is therefore growing. There has been an increase in milk production value by \$500,000.

Since deregulation, those farms that remain in production have had to increase their efficiencies to hedge against the deregulated market. Efficiencies in cattle movements, feed, property, water and heat management, as well as many other aspects, have been addressed by dairy farmers. Those efficiencies continue to be implemented for the dairy industry to remain viable, productive and profitable. Aspects such as allowing access to minimise cattle movements at critical times is fundamental to the operations of a dairy farm. This is further discussed under the heading "Access" above.

It is important to note that Illawarra milk production is important for the expanding Sydney and Wollongong markets. Ready access to milk for those large population centres is critical, particularly as the dairy is located within 150 kilometres of the Sydney market and is the second largest milk supplier in that radius.

Response 1

Roads and Maritime has carried out a review of the project to minimise impact to the dairy enterprise. The refined design described in Section 5.2.1 would reduce the impact on agricultural (dairy) land by about 10.3 hectares for the operational boundary and a further 3.8 hectares for the construction footprint as a result of the removal of ancillary site AS05 (Figure 5-20). The revised layout, in accordance with recommendations from Department of Primary Industries (Agriculture), includes:

- The northbound entry ramp connecting the Illawarra Highway (Terry Street) to the motorway realigned to reduce its footprint on agricultural land
- The northbound exit ramp connecting traffic leaving the motorway to the Illawarra Highway (Terry Street) relocated to Tongarra Road
- The southbound exit ramp to the Illawarra Highway (Terry Street) realigned to pass over the motorway on a bridge about 200 metres further to the south

The functionality of the interchange would be maintained with no additional impacts on traffic or flooding. These are discussed further in Section 5.5.1 and Section 5.5.2 of this report.

Chapters 13 and 15 of the environmental impact statement provide a detailed assessment of the potential socio-economic and land use impacts of the project. This includes acknowledgement of the impacts on the dairying enterprise located near the Illawarra Highway. These impacts have been reconsidered due to the proposed design refinements and are discussed in Sections 5.7.7 and 5.7.9 of this report.

Technical Paper 9 – Socio-economic provides a detailed summary of agriculture within the Illawarra region, including a summary of the milk production industry in the Shellharbour local government area. Section 3.3.3 acknowledges the importance of the milk production industry noting that it accounted for \$19.48 million or 72 per cent of the value of all agricultural production in the region in 2012-13, or around 4 per cent of the total value of milk production in New South Wales.

Chapter 15 of the environmental impact statement outlines impacts to the dairy enterprise, including change in access, loss of flood free land and loss of dairy infrastructure. High ground would continue to be available to the north of the Macquarie Rivulet, on the southern side of Illawarra Highway, and to the east of the motorway (west of the airport). The dairy would continue to be able to milk at the second established dairy infrastructure.

The discussion in Chapter 15 focusses largely on the impact to the dairying land use (refer Figure 15-3 of the environmental impact statement). It is acknowledged that the dwelling located on land parcel 31 would be permanently acquired as a result of the project. Identified impacts to the dairying enterprise on the Illawarra Highway include:

- Temporary and permanent land acquisition and loss of infrastructure (dairy shed, fencing, silos and feed pad)
- Temporary and permanent changes to property access, including stock movements and the transport of silage, which are currently undertaken across the Illawarra Highway
- Loss of flood free land, and loss of access by road to flood free land.

It is expected that the operational aspects of the business would require adjustment. Roads and Maritime are committed to ongoing consultation and negotiation with the dairy enterprise operators to minimise impact of the project on the dairy enterprise.

Section 13.3.2 of the environmental impact statement details the potential social impacts of the proposed changes in land use and access. It states that consultation has identified that the project has caused stress, anxiety and concern in relation to these impacts. It is acknowledged that, due to the long history of farming in the area, and the importance of rural values to the community, the social impact of the project on dairying is considered high.

Management measures LU01 and LU02 (refer Section 6 of this report) reflect Roads and Maritime's commitment to consultation and negotiation with affected landowners in relation to land acquisition and altered access, and the subsequent impacts on the viability of the existing use of the land for dairying. This process is ongoing. Any compensation would be determined in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.

Issue 2

Maintaining land for agricultural industries is a key policy of NSW Agriculture. Key aspects of that policy are:

- Land for agricultural production is a limited resource in NSW and should be maintained for future generations
- Agricultural land should not be alienated directly through lands being used for non-agricultural purposes and indirectly by incompatible developments on adjacent land restricting routine agricultural practices
- Agricultural industries are a fundamental asset to the State of NSW as they provide a long term means of providing employment, raw materials and fresh safe secure food while supporting regional communities.

The Illawarra Regional Plan 2015 identified agriculture as one its important goals for the Illawarra. That is “Goal 4 - A Region makes appropriate use of its agricultural and Resource Lands.” Agriculture has clear importance in the region. There are clear priorities within that plan to retain important agricultural land including actions within the plan:

Action 4.1.1

- Identify land on a map that is highly suitable for leading agricultural land and industries in the region to better inform strategic and local planning processes
- Develop profiles of leading agricultural industries to guide future investment decisions. It should be noted that land taken for the bypass at the dairy is classified as class 2 on the Agricultural Land Classification Maps undertaken by the Department of Agriculture in 1986. Class 2 land is “Arable land having a very good capability for agriculture
- Minor to moderate constraints to sustained high level of production are present.” That land is some of the best land in the state.

The environmental impact statement states that there is no dairy land that is identified as Biophysical Strategic Agricultural land. It is important to note that the Biophysical strategic agricultural land mapping was undertaken to address land use conflicts between agricultural land uses and mining activities at the state level and was not intended for planning at the regional level. The Albion Park Rail Bypass would be a classic case of planning at the regional level. Also, as outlined above, actions have been included in the Illawarra Regional Plan to address the retention of agricultural land as a limited resource.

Response 2

A statement of the objectives of the project, including a description of the strategic need, justification, objectives and outcomes for the project, is provided in Chapter 3 of the environmental impact statement.

The importance of agricultural land in the Illawarra, as evidenced by the Agricultural Land Classification Maps and the Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015), formerly the Draft Illawarra Regional Growth and Infrastructure Plan (Department of Planning and Environment, 2014), is acknowledged by Roads and Maritime. Chapter 13 and Chapter 15 of the environmental impact statement recognise that the Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015) identifies the southern part of the Region as home to a range of economically viable rural enterprises including dairy, organic produce, beef, cut flowers and fruit. These agricultural industries support a range of other value adding industries such as milk and cheese factories, abattoirs and wineries (some of which operate in the Illawarra or in nearby regions). It is recognised that agricultural land contributes to the attractive landscape of the region that is enjoyed by both residents and tourists.

The Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015) identifies the West Lake Illawarra Release Areas (incorporating West Dapto, Calderwood and Tallawarra) as major land release areas under the Illawarra Urban Development Program. Urban development is considered the most viable and effective future use of this land under the Illawarra Regional Strategy (Department of Planning, 2007). The Illawarra Shoalhaven Regional Plan (Department of Planning and Environment, 2015) also identifies the demand for transport associated with projected population growth and the need for good transport connections throughout the region as detailed in the Illawarra Regional Transport Plan (Transport for NSW, 2014).

Roads and Maritime has carried out a review of the project to minimise impact to the agricultural land, in particular the dairy enterprise. A revised layout of the interchange at Albion Park is proposed which would result in a reduced impact on agricultural land by about 10.3 hectares for the operational boundary and a further reduction of 3.8 hectares for the construction footprint as a result of the removal of ancillary site AS05. Details of the proposed refinement are in Section 5.2.

Issue 3

It is understood from the environmental impact statement that there is a proposed cycleway on the motorway itself that joins with the cycleway at Lake Illawarra and another proposed cycleway at ground level which goes through the proposed underpass at Frazers Creek.

In other sections of the environmental impact statement, it is noted that the Frazers Creek bridge is intended to be used as an underpass for stock movements, tractor and silage carting to allow the farmer to access both sides of the property for operational requirements of their dairy business. It appears that cyclists, cows and farm machinery will all have access to the Frazer's Creek underpass. Allowing combined use of the underpass for agricultural machinery, cows and pedestrians / cyclists will be potentially hazardous, and consideration will need to be given to appropriate safety measures.

There are serious safety implications for that proposal. Farm machinery is dangerous, big and bulky and is not designed to be used in the vicinity of pedestrians or cyclists. Manure for instance, can cause slip hazards, carting hay and silage is equally hazardous with the potential for collisions with cyclists as fast moving cyclists could collide with slow moving trucks and cows. Cows, also, cannot be quickly stopped or redirected should a cyclist be approaching. Cows can also take a fright at an approaching cyclist and scatter or stampede putting the cyclist in a dangerous situation.

Appropriate safety measures should be put in place, preferably to separate the cyclist / pedestrian path from farm machinery and cows.

It is understood however that a cycleway is an integral part of the proposal. An alternative for the cycleway could be to have a small ramp near Darcy Dunster Reserve that joins the proposed cycleway (on the motorway) with the existing cycleway to Lake Illawarra. The proposed cycleway at ground level underneath Frazers bridge will also remove further productive land from the dairy.

Response 3

Submissions received from adjacent property owners and other dairy industry representatives raised concerns regarding the safety of the interaction between pedestrians and cyclists and cattle crossing the alignment along this section of the existing Illawarra Highway.

Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise. The proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities. Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings.

Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project).

The shared path to be constructed as part of the project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement.

Issue 4

Presently, flooding impacts only a small area of the dairy farm. With the proposed bypass, the Dairy will be flooded to a higher level, as a result of Frazers Creek bridge, which will impact on the operations of the farm and their dairying business. The environmental impact statement indicates that the flood impact will be less than 250 millimetre increase, localised up to 400 millimetres over areas less than five hectares in 20 and 100 year ARI (Table 8.10).

However, it is understood that is a general assessment and the full impacts will be known once the Macquarie Rivulet flood model undertaken by Shellharbour Council is completed. It is critical that Roads and Maritime provide detailed information on flood impacts to the farmer in order that the dairy farmers are able to assess the direct impacts on the dairying operations, including for milking, feeding, watering, pasture loss and animal health and welfare. It is critical that the discussions between Roads and Maritime and the dairy farmers include direct impacts on the financial aspects of the business and access arrangements that are suitable for the continuation and expansion of the dairy farm operation as proposed by the farmer. Discussions to address those issues will need to be undertaken and Department of Primary Industries Agriculture will be pleased to assist with those discussions.

There are some critical aspects in relation to flooding and access that are evident at this stage and need to be addressed for the dairy to be operational. Firstly, there is limited high ground that cows can retreat to in times of flood. Those areas include:

- Land parcel numbers 33 and the northern part of 37 (north of the western runway of the airport) as well as above Marshall Mount Creek (as per the map on page 481 of the environmental impact statement)
- Land parcel 33 and north of 37 is highly suitable for dairy cows, being highly fertile land with the highest dry matter yield for the dairy
- Land to the north of Marshall Mount Creek is used for dry cows and the farmer is currently discussing right of way access to that paddock.

In flood, there is no access to land parcel 33. It should be noted that in times of flood milking cows need to be managed to ensure there is adequate feed and clean water, and to manage health and milking issues. That means enabling access for trucks for feed and milk collection.

Cows for instance need to be milked daily. They are highly susceptible to mastitis and other health issues as well as losing their ability to produce milk if left unmilked. This has serious financial implications for the farmer. Land parcel 33 currently houses dairy number 2 on high ground which enables the farmer to milk and manage the herd in times of flood. However, the proposed bypass will result in the demolition of that dairy.

NSW Department of Primary Industries has a Primefact on Livestock Flood Refuge Mounds, Number 961, October 2009 that covers the management and requirements of dairy cattle in flood events. The document can be accessed at <http://www.dpi.nsw.gov.au/agriculture/emergency/flood/refuge-mounds>. A summary of the key points of that document are provided in Appendix 1."

Response 4

A detailed hydrology and flooding impact assessment has been carried out for the project; presented in Technical Paper 3 – Hydrology and Flooding, and summarised in Chapter 8 of the environmental impact statement. Section 8.3.2 of the environmental impact statement summarises the change in water level as a result of the project, indicating that 3.8 hectares of the dairy land would experience an increase of 50 to 100 millimetres and up to 120 millimetres (refer Figure 8-12 of the environmental impact statement) in a 20 year ARI flood event. Five hectares of land within the dairy enterprise is expected to experience minor decreases in flood levels of around 30 millimetres. There would be no newly flooded areas as a result of the project.

A revised flooding assessment was carried out to determine potential changes to impacts due to the proposed design refinements. The assessment is summarised in Section 5.5.2 and forms Appendix C of this report. The assessment included an updated flood model and found there would be a reduction in some flood impacts as a result of the design refinements. The environmental impact statement set criteria for acceptable increases in water level within agricultural land of less than 250 millimetres with localised increases of up to 400 millimetres acceptable over areas less than five hectares in the 20 year and 100 year ARI flood event. The current design meets this criteria.

The project would require acquisition of high ground within the dairy enterprise adjacent to the Illawarra Highway. High ground would continue to be available to the dairy enterprise to the north of the Macquarie Rivulet, on the southern side of Illawarra Highway, and to the east of the motorway (west of the airport). The project would sever access by road to high ground. Flood events are of short duration and stock would be inaccessible by road for short periods (hours) (as identified in Chapter 8 of the environmental impact statement). General access across the motorway for dairy activities would be allowed to occur via the access under Frazers Creek bridge (BR07).

The dairy enterprise currently operates two dairy complexes. The project would directly impact the Meadowview dairy shed. The second shed, the Meadows, would not be impacted by the project and would be accessible during flood events. Cows could continue to be milked within the Meadows dairy shed during all-weather events.

Roads and Maritime will continue to consult with affected landowners (including the dairy enterprise) during detailed design including in relation to any change in flood impacts to those identified during the environmental impact statement.

Issue 5

Page 223 of the environmental impact statement states that no modelling of flood impacts has been done for the construction phase. This will be important to undertake because there is a risk of scouring of the bed and bank erosion will impact water quality and sedimentation of the watercourse and therefore quality of the pastures that cows graze, reducing the size of the area able to be grazed. Erosion management measures will need to ensure there is minimal disturbance to pastures and an agreement entered whereby such impacts are managed by Roads and Maritime in the event there is an erosion event.

Response 5

Technical Paper 3 – Hydrology and Flooding and Chapter 8 of the environmental impact statement provide an assessment of potential for scour as a result of the project. Water quality impacts are assessed in Chapters 8 and 16 of the environmental impact statement.

Construction phase impacts on flood behaviour were not modelled as part of the environmental impact statement, but would be considered during detailed design in accordance with management measure HF01 (refer Section 8.5 of the environmental impact statement and Section 6 of this report). Should construction staging require a temporary departure from the design (such higher embankments for preloading, temporary diversions or temporary crossings), flood impacts will be assessed before finalising the approach. Reference is also made to management measures HF02 to HF04, which require further consideration of the potential for flooding during construction, specifically in relation to:

- Temporary stockpiles (HF02)
- Contingency planning for flood events for ancillary sites lower than the 20 year ARI flood level (HF03)
- Temporary watercourse crossings (HF04).

As detailed in Section 16.5 of the environmental impact statement, a number of environmental management measures have been identified to minimise risk of erosion during construction of the project, including:

- SW01, which requires the implementation of erosion and sediment controls. These controls will be established before the start of construction and maintained in effective working order for the duration of the construction period until the site is restored
- SW02, which requires the inclusion of a construction soil and water quality management plan to manage potential impacts on soils and receiving watercourses as part of the construction environmental management plan.

The implementation of these measures will effectively manage the risk of erosion and associated impacts on grazing.

The potential for scour would be assessed during detailed design and specific mitigation measures developed accordingly. These would be incorporated in the construction soil and water management plan.

Issue 6

As the dairy number two on land parcel 33 (page 481 of the environmental impact statement) will be demolished, cows will need to access dairy number one which is located on Calderwood Road. The critical issue for the farmer is accessing the dairy with minimal walking distance for the cows to minimise the loss of cow condition and reduction in milk production. Current stock permit enables cattle crossing at several points along the Illawarra Highway depending on stock rotation requirements. The proposed underpass at Frazers Creek bridge limits the access to dairy number one from paddocks the other side of Macquarie Rivulet (due to cow time travel distance) and is therefore not suitable for milker movements.

The underpass under Frazers Bridge that would allow cows to cross to the dairy will result in an additional one kilometre walk each way for the cows. Significant research has been undertaken by the dairy industry that links cow condition and milk production. Losses in time (as a result of herding cows) and a reduction in cow condition will have significant financial implications for the dairy business.

An alternative location for a crossing would be over the Macquarie Rivulet at land parcel 32. That would enable cows from 37 to cross to the dairy at Calderwood with a significant reduction in distance for milking.

It is noted that an additional access for cows and machinery across Macquarie Rivulet has been proposed in the environmental impact statement at Darcy Dunster Reserve. However, the reserve is not suitable for farm machinery (that is hay, cattle truck, tractors or other farm machinery) due to the minimal bridge height of three metres. As previously outlined also, it is not flood free, so cows could not cross during a flood event.

Darcy Dunster Reserve is marked as a Reserve on the map. It is unclear from the environmental impact statement what that land is zoned and therefore what land uses are permitted on the reserve. Regardless, we understand that people visit the area for relaxation as it is adjacent to the River. Cows and vehicles crossing the Macquarie Rivulet could potentially cause conflicts with people visiting the reserve. Cows cause odour, dust, flies and manure and noise from tractors and other machinery. There is also a public safety issue for the farmer if people get too close or cows get a fright and suddenly move or stampede. Gates to the reserve are also locked each afternoon and access is only available by arrangement for a key or when council unlock it.

Darcy's reserve is therefore generally unsuitable for the purposes of a cow crossing.

The environmental impact statement states (page 147) that 27 hectares of dairy will be converted to transport land uses. Also, the environmental impact statement states that land lost to milking herd is 6.7 per cent. It is important to note that the land loss is much higher due to portions of the farm being unable to be used due to the lack of suitable underpass at Frazers Bridge and Darcy Dunster Reserve and the inability to access that land. It should also be calculated based on the land for the milking herd, not breeders or dry heifers. The farm for the milking herd would be impacted by 37 per cent if no bridge were provided and 23 per cent if a bridge is provided (land parcel 33 would be unusable in flood). This is not a small loss as outlined on page 406. If a bridge were provided at lot 32, only 12 per cent of the farm would be impacted.

To achieve minimal impact, a bridge at lot 32 to cross the Macquarie rivulet is the preferred option.

Response 6

Section 15.3.2 of the environmental impact statement provides a summary of the proposed access arrangements for the dairy enterprise.

Access via Darcy Dunster Reserve would be primarily for vehicle access to the farm as additional agricultural lands are not accessible immediately through Darcy Dunster Reserve. Cattle movements through the reserve are not likely to occur. An additional bridge to cross Macquarie Rivulet for cattle is not considered within the scope of this project as adequate access for cattle has been provided across the site.

It is expected that the operational aspects of the business would require adjustment as a result of the project and the altered access arrangements. Roads and Maritime are committed to ongoing consultation and negotiation with the dairy enterprise operators to minimise impact of the project on the dairy enterprise during both construction and operation.

It is unclear how the percentages shown in the submission have been derived. The project would not result in sterilisation of land to the east of the Illawarra Highway. It is understood that the land to the east of the Illawarra Highway is largely used for silage and breeders and dry heifers. This use could continue once the project is operational.

Issue 7

The environmental impact statement states (page 485) that property access will be maintained or alternative arrangements made in consultation with the affected landowners. To date this has not been achieved as the alternative arrangements will result in an unacceptable impact to the operations of the farm.

Response 7

Environmental management measure LU02 (see Section 6 of this report) refers to the provision of alternate access arrangements during the construction phase of the project, to be agreed in consultation with the affected landowner.

Section 15.3.2 of the environmental impact statement summarises the proposed alternate access arrangements for the dairy enterprise during operation of the project, including the proposed underpass of Frazers Creek bridge (BR07, refer to Figure 5-3 of this report) and provision of an access road along the existing Illawarra Highway connecting the two bridge crossings. Roads and Maritime is currently in negotiation with the affected landowner on the proposed alternative accesses.

3.3.2 HYDROLOGY, FLOODING, SOILS AND WATER QUALITY

Issue 8

Department of Primary Industries Lands, Water and Fisheries are broadly satisfied, and ongoing consultation throughout the project construction is requested with Department of Primary Industries Water and Fisheries in relation to work around watercourses, as outlined further below.

Department of Primary Industries - Lands is satisfied that the environmental impact statement sufficiently addresses the protection of Crown waterways affected by the development, being Macquarie Rivulet and Duck Creek, however note that ongoing engagement is requested with Department of Primary Industries Water and Fisheries (see below).

Response 8

The potential impacts of the project on watercourses and aquatic biodiversity are discussed in the following sections of the environmental impact statement:

- Chapter 8 and Technical Paper 3 – Hydrology and Flooding
- Chapter 9 and Technical Papers 4 – Biodiversity
- Chapter 16 – Soils and Surface Water Quality
- Chapter 17 – Groundwater.

The potential impacts of the proposed design refinements on watercourses and aquatic biodiversity are discussed in the following sections of this report:

- Section 5.5.2 and Appendix C – Additional Hydrology and Flooding Assessment
- Section 5.5.3 and Appendix D – Biodiversity Assessment Report and Appendix E – Biodiversity Offset Strategy.

There are a range of measures developed to mitigate impacts on watercourses, including measure HF05, which requires ongoing consultation with Department of Primary Industries on the adjustment of Frazers Creek.

Roads and Maritime would continue to consult with the Department of Primary Industries during detailed design.

Issue 9

Identification of water supply: It is noted that the environmental impact statement confirms that groundwater extraction is not proposed for the purposes of water supply during construction works and that water will be obtained from other sources.

Department of Primary Industries Water recommends that adequate and secure water supply from other sources is identified for the life of the project and that water can be sourced from an appropriately authorised and reliable supply.

Response 9

Section 5.20.3 of the environmental impact statement states that extraction of water for construction purposes, whether from groundwater or surface waters, is not proposed. Water supply for the project may be sourced from a range of options, including the town potable and/or recycled water supply. This would be confirmed during detailed design and construction.

Issue 10

Department of Primary Industries Water is supportive of ongoing engagement through the detailed design and construction phases of the project as outlined in the environmental impact statement and supporting documents.

Specific areas of interest include:

- Detailed design of permanent and temporary creek crossings
- Detailed design of creek realignments and reconstruction works
- Preparation of Vegetation Management Plans for riparian revegetation works
- Soil and water management design and management.

Response 10

Roads and Maritime would continue to consult with the Department of Primary Industries (Water) during detailed design of the project. Future consultation is outlined in Section 2 of this report.

Issue 11

Department of Primary Industries (Fisheries) supports a policy of Neutral or Beneficial impact to receiving waters resulting from developments. Department of Primary Industries (Fisheries) concur with the proposed safeguards and mitigation measures outlined in Section 16.5 of the environmental impact statement and request that a copy of the construction environmental management plan (ID no: SW02) and sedimentation basin plan (ID No: SW03), be provided to the Department for review prior to the commencement of works.

Response 11

Chapter 16 of the environmental impact statement provides an assessment of the project's impacts on soils and water quality. The assessment concludes that the project catchment would experience a net reduction in pollutant export of all pollutants assessed compared to the existing condition. The water quality treatment strategy designed for the operational phase is expected to result in an improvement (or net reduction) in stormwater pollutant loadings entering Lake Illawarra.

Environmental management measures during construction for soils and water quality are provided in Section 6 of this report. As described in management measure SW02, a construction environmental management plan would be prepared for the project, including a construction soil and water quality management plan. The construction environmental management plan would be provided to the Department of Primary Industries for review prior to finalisation.

Issue 12

Monitoring, auditing and reporting requirements should be designed to ensure that outcomes predicted in Table 16-3 are achieved. It is requested that the use of bioremediation tools (e.g. s200 oil gone) rather than disbursement methods be investigated in relation to emergency spill response procedures.

Response 12

The risk of accidental spills during the construction and operation of the project is considered in Sections 16.3.2 and 16.3.3 of the environmental impact statement. Management measure SW04 (refer Section 16.5 of the environmental impact statement and Section 6 of this report) provides for preparation of an emergency spill response procedure. The use of bioremediation tools would be considered during the development of the procedure as an alternative to, or in addition to more traditional spill management procedures.

Issue 13

Department of Primary Industries (Fisheries) concurs with the environmental management measures detailed in Section 9.5 of the environmental impact statement to manage impacts to biodiversity, in particular those relating to aquatic habitat. It is requested that designs for watercourse crossings (both temporary (ID no: HF04), and permanent (Table 5-3)) be provided to the Department for comment and approval prior to the commencement of works.

Response 13

The designs for the temporary and permanent watercourse crossings would be provided to the Department of Primary Industries (Fisheries) for review during detailed design prior to finalisation.

The project, including both temporary and permanent watercourse crossings, would be determined by the Department of Planning and Environment as the relevant consent authority under Part 5.1 of the *Environmental Planning and Assessment Act 1979*

Issue 14

Department of Primary Industries (Fisheries) concurs with the commitments outlined in Table 9-14, in particular the revegetation of the riparian zone along Macquarie Rivulet and for the design and features of the Frazers Creek realignment to be developed in conjunction with our Department. Section 5.14 identifies the potential for other small watercourse or waterbodies to be subject to minor realignment or adjustment as part of the project.

It is requested that any such realignments or adjustments located within Key Fish Habitat be referred to the Department for comment and approval. All such works should be designed in accordance with the principals outlined in ID no. HF05.

Response 14

Any other minor adjustments to watercourses in Key Fish Habitat would consider the requirements of the Policy and Guidelines for Fish Habitat Conservation and Management (NSW Department of Primary Industries, 2013) in consultation with Department of Primary Industries (Fisheries) and the Department of Primary Industries (Water).

3.4 ENVIRONMENT PROTECTION AUTHORITY

3.4.1 TRAFFIC AND TRANSPORT

Issue 1

The environmental impact statement states the local road network would need to be used for:

- Hauling materials from quarries and borrow sources to work areas
- Hauling materials from one section of a work area to another
- Providing access for the delivery of all construction materials and consumables
- Providing access for the workforce to the various locations along the project, particularly to the project laydown areas and project site office.

The Environment Protection Authority recommends that heavy construction vehicles do not use the local road network where possible and that alternate options are investigated.

Response 1

Roads and Maritime recognises the need to appropriately manage construction traffic impacts and will refine the proposed construction vehicle movements as the construction program and detailed design are refined. A traffic management plan will be prepared in accordance with management measure TT01, to include measures to manage and minimise impacts of construction vehicles on the local road network.

3.4.2 NOISE AND VIBRATION

Issue 2

Community concerns may arise from noise impacts associated with extended construction hours during the summer months. The Environment Protection Authority recommends that construction hours are restricted to standard hours unless permitted by an Environment Protection Licence. As the construction phase of the project will require licensing by the Environment Protection Authority, it would be appropriate for the Environment Protection Authority to negotiate any extended construction hours with the licensee.

Response 2

The environmental impact statement identified extended works hours for certain construction activities in some areas of the project to reduce disruption to motorists and shorten construction time.

During exhibition of the environmental impact statement, additional assessment and consultation was carried out to identify the potential impact of implementing extended work hours across all project construction activities and locations to maximise the project and community benefits of reduced construction time. The outcomes of the additional consultation indicate that 84 per cent of survey respondents support extended work hours.

Based on the outcomes of the consultation, extended work hours are proposed to be the implemented as standard construction hours for the project. The consultation process and findings are presented in Section 1.2.3 of this report. Consultation undertaken with the Environment Protection Authority regarding the proposed construction hours for the project has indicated that the Environment Protection Authority is supportive of this approach.

Construction noise impacts during standard construction hours for the project would be managed in accordance with the construction noise and vibration management plan (management measure NV01). This would include:

- Construction timetabling to minimise noise impacts
- Procedures for notifying receivers of construction activities that may affect them
- Contingency procedures to be implemented in the event of non-compliances and / or noise complaints.

Out of hours work would be carried out in accordance with relevant conditions of the project approval and any Environment Protection Licence for construction of the project. Prior to out of hours work being carried out, all affected receivers would be notified of relevant details of the proposed activities. Notifications would include information on the proposed noise management measures, how to provide feedback on the proposed out of hours work, how to lodge complaints, and the relevant contact details to provide any such feedback or complaints. This process would be documented in the project construction noise and vibration management plan.

Issue 3

Community concerns may arise from noise impacts associated with the early arrival and idling of construction vehicles at the development site and in the area surrounding the site. The proponent should be required to ensure construction vehicles do not arrive at the project site or in surrounding areas outside approved construction hours.

Response 3

The construction noise and vibration management plan (management measure NV01) would address queueing and idling construction vehicles outside of the project standard construction hours. Management measure NV01 (Table 6-1) has been revised to incorporate this requirement.

Issue 4

The Environment Protection Authority has identified the noise from 'beeper' type plant movement alarms to be particularly intrusive and is aware of feasible and reasonable alternatives. At other projects several contractors have undertaken safety risk assessments of alternatives to the traditional 'beeper' alarms. Each determined that adoption of 'quacker' type movement / reversing alarms instead of traditional beepers on all plant and vehicles would not only maintain a safe workplace but also deliver improved outcomes of reduced noise impacts on surrounding residents. Interim Construction Noise Guideline Appendix C provides additional background material on this issue.

The proponent be required to undertake a safety risk assessment of construction activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers, without compromising safety.

Response 4

As identified in Section 12.6 of the environmental impact statement a construction noise and vibration management plan would be prepared for the project (management measure NV01 included in Section 6 of this report). The plan would provide details of noise and vibration management measures and procedures to be carried out during construction to minimise and manage noise impacts on sensitive receivers in accordance with the relevant guidelines and standards such as the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009).

Roads and Maritime will require the construction contractor to conduct a safety risk assessment of construction activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers without compromising safety.

Issue 5

Recommended Condition of Consent:

Noise and vibration control measures must be developed and managed in accordance with:

- The Interim Construction Noise Guideline (2009)
- Assessing Vibration: a technical guideline (2006)
- NSW Road Noise Policy (2011).

Response 5

Section 6 of this report includes the environmental management measures to be implemented for the project. The measures will be undertaken generally in accordance with the guidelines and policies described above. The proposed project standard construction hours extend beyond the standard construction hours identified in the Interim Construction Noise Guideline (2009), as described in Section 1.2.3 of this report.

Issue 6

The environmental impacts associated with off road diesel equipment can be a major source of fine particles. The Environment Protection Authority recommends that the proponent assess the environmental impacts associated with heavy vehicles including off road diesel equipment and plant used in the construction of the project. This should include but is not limited to:

- Compliance with relevant and current emission standards as prescribed in Australian Design Rules for heavy duty engines and vehicles
- Strategies for minimising air emissions from off road diesel equipment including but not limited to graders, bulldozers, loaders etc.
- Confirmation that all off road diesel equipment will meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible.

The Environment Protection Authority recommends the unnecessary idling of engines be further reduced. Diesel plant engines should be turned off when not in active use and truck engines should be turned off during periods of inactivity and while waiting to load or unload material for three minutes or more.

Response 6

Air emission standards for mobile non-road diesel plant and equipment are identified in the NSW Government Resource Efficiency Policy (NSW Office of Environment and Heritage, 2014c). These will be integrated into procurement activities for the project. In accordance with the policy, the successful contractor will be required to report on the use and performance of off-road diesel plant and equipment.

It is noted that existing Australian design rules for heavy duty engines and vehicles relate to on road vehicles and currently there are no Australian Standards for emissions from off-road diesel plant and equipment.

A detailed air quality impact assessment has been carried out for the project; provided in Technical Paper 12 - Air Quality, and summarised in Chapter 18 of the environmental impact statement. The assessment concluded that exhaust emissions from on-site plant and construction vehicles are unlikely to have a significant impact on local air quality, and in the majority of cases will not need to be quantitatively assessed.

As noted in Section 5.3.1 of Technical Paper 12, construction plant and equipment will be maintained in good working conditions to limit impacts on air quality. Where practicable, vehicles will be fitted with pollution reduction devices and switched off when not in use. Further, the construction environmental management plan will include a strategy to manage air quality during construction (management measure AQ01 included in Section 6 of this report).

Issue 7

The proponent must ensure that during the construction phase of the project all works are carried out by such means as may be necessary to minimise dust emissions on the premises and to minimise the release of dust from the premises. This includes:

- Proactive controls to help ensure that the project does not cause exceedances of relevant particle impact assessment criteria
- Reactive management strategies to ensure that the project impacts are acceptable under adverse conditions, including adverse weather or elevated background concentrations.

Recommended Condition of Consent:

- The proponent must ensure that construction work is carried out by such practicable means as may be necessary to minimise dust emissions on the premises, and prevent dust emissions from the premises.

Response 7

The detailed air quality impact assessment provided in Technical Paper 12 - Air Quality, and summarised in Chapter 18 of the environmental impact statement, includes consideration of dust impacts generated by the project during construction.

Roads and Maritime's commitment to minimising dust generation and managing any air quality impacts associated with the construction activities is identified in management measure AQ1 in Section 6 of this report.

Issue 8

Erosion and sediment control measures should be developed and managed in accordance with Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom (the 'Blue Book') and Volume 2D Main Road Construction published by DECC (2008). Volume 2D advises that main road construction requires a stronger emphasis on some management principles, particularly:

- Erosion control as a pollution prevention strategy
- Runoff separation by diverting 'clean' stormwater runoff around the site or away from operational areas management and maintenance of long-term controls.

Recommended Condition of Consent

- Erosion and sediment control measures must be developed and managed in accordance with Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom (the 'Blue Book') and Volume 2D Main Road Construction published by DECC (2008).

Response 8

Chapter 23 of the environmental impact statement provides a summary of the environmental management measures that would be implemented on the project, including measure SW01:

Industry standard erosion and sediment controls would be designed and implemented in accordance with the following specifications and guidelines:

- Managing Urban Stormwater: Soils and Construction (Landcom, 2004) (the 'Blue Book')
- Roads and Maritime's Erosion and Sedimentation Management Procedure (PN143)
- Roads and Maritime's Soil and Water Management Specification (G38)
- The Department of Primary Industries (Water) guidelines for Controlled Activities
- Managing Urban Stormwater: Soils and Construction : Volume 2D Main Road Construction published (Department of Environment and Climate Change, 2008).

These controls would be established before the start of construction and maintained in effective working order for the duration of the construction period until the site is restored. Management measure SW01 has been updated accordingly as included in Section 6.

Issue 9

Recommended Condition of Consent

- The Proponent shall not cause or permit any waters to be polluted, as defined under Section 120 of the *Protection of the Environment Operations Act 1997*.

Response 9

The project would be constructed and operated in accordance with all legislative and regulatory requirements.

3.5 OFFICE OF ENVIRONMENT AND HERITAGE

3.5.1 HYDROLOGY AND FLOODING

Issue 1

With regard to flood risk, we commend Roads and Maritime Service on its efforts in assessing the flood risk management implications of the proposal and its initiatives to involve and inform the local community however there are elements of the environmental impact statement that warrant comment. We understand that the proposed road cannot be raised due to the height limitations associated with the Illawarra Regional Airport. However, this should not lead to the inflated reporting of flood design standards. Best practice in engineering and floodplain risk management practice incorporates a freeboard to account for uncertainties when discussing flood standards. Without the adoption or inclusion of a freeboard to determine the design level of the carriageways, the potential design standard of the road would be reduced from the anticipated 100 year ARI to 20-50 year ARI flood event based on the modelling provided for present day conditions and even less when climate change and cumulative development impacts are taken into account. Detailed comments on flood risk management are provided in Attachment A.

Response 1

The Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005) defines a freeboard as "...a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain...and other effects such as...climate change". The flood planning level for a development is based on the design flood level and may or may not include some amount of freeboard. The flood planning level may vary for different types of development, and is a standard requirement for residential development. A freeboard is not a standard requirement for road infrastructure, and is has only been adopted by Roads and Maritime on selected projects across New South Wales. On this project the flood model has been calibrated to recorded events and is considered to be a relatively accurate model compared to models used on other road infrastructure projects. In addition the project is targeting a desirable 100 year ARI immunity which inherently includes freeboard above the project objective of 20 year ARI immunity. Lifting the alignment to include freeboard to the 100 year ARI event would result in additional flood impacts which is not desirable. Given the above, freeboard to the 100 year ARI event has not been included on this project.

Section 8.3.2 of the environmental impact statement identifies that the majority of the main carriageways would be above the current 100 year ARI flood level, with the project alignment achieving immunity in a 20 year ARI flood incorporating climate change (that is, a 20 per cent increase in rainfall intensity and 0.91 metre increase in Lake Illawarra water levels). There is not expected to be any flood impacts arising due to the cumulative impact of the motorway and the land use change arising in future development areas. In fact, much of the main carriageway would be more than 0.5 metres higher than the current 100 year ARI flood level. This is a significant improvement on the existing condition, in which the existing road network is subject to closures due to flooding every year, as described in Section 3.2.2 of the environmental impact statement.

There is also the need to achieve a balance between avoiding negative flood impacts on surrounding areas and maximising the flood immunity of the project. These may be incompatible objectives; for example, the use of fill in the floodplain can have negative upstream flood impacts, even when incorporating appropriate cross-drainage into the design. There are also a range of other environmental aspects that need to be considered, and the design has been optimised in terms of the feasible level of flood immunity that could reasonably be achieved.

This is in accordance with the merit-based approach of the NSW Flood Prone Land Policy, which forms Appendix A of the NSW Government Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005).

It is noted that the flood immunity criteria adopted for the project is based on comparing the flood levels and the motorway levels and does not account for freeboard. However, the Addendum Hydrology and Flood Assessment Report (Appendix C) describes the freeboard achieved at critical points along the motorway. The revised design generally achieves 0.5 metres freeboard to the 20 year ARI flood levels.

The flood levels and freeboard achieved at the critical points along the motorway are summarised in Table 3-1.

Table 3-1 Flood immunity details

Location	20 year ARI Flood Level	100 year ARI Flood Level	Edge of Lane Level	Freeboard to 20 year ARI Level	Freeboard to 100 year ARI Level
Duck Creek Bridge, low point	8.55m	9.52m	9.27m	0.72m	-0.25m
South of Macquarie Rivulet Bridge, low point	6.07m	6.87m	7.01m	0.94m	0.14m
Central Interchange, low point	6.23m	7.00m	7.93m	1.70m	0.93m
South of Tongarra Road, low point	10.05m	10.98m	13.14m	3.09m	2.16m
Green Meadows Basin, low point	24.21m	24.51m	24.66m	0.45m	0.15m

As discussed in Section 8.2 and 8.3 of the environmental impact statement, the project would realise a range of flood benefits:

- There would be a significant improvement in access during flood conditions over the existing condition, with the majority of the new motorway being flood free in the 100 year ARI event, except for a small section at Duck Creek, which would be flood free in the 50 year average recurrence interval event. Currently, sections of the road network are closed due to flooding as much as seven times each year
- Access for local and through traffic would be improved during a flood event
- There would be improved access for emergency services and evacuation for both regular and rare flood events because the new motorway would be higher than the existing road network, which is regularly inundated by flood waters; currently the project area does not have designated flood evacuation routes (State Emergency Service, 2008 and 2010)
- There would be an improved level of flood immunity at Tongarra Road, increasing flood immunity from 2 year ARI in the existing condition to the 5 year ARI
- Existing flood risk would be mitigated by constructing a new detention basin upstream of the bypass near Croome Road, resulting in 23 properties in the Horsley Creek catchment becoming no longer flood impacted. This would bring significant social and economic benefit to the community

- The project also incorporates emergency crossovers to enable traffic to continue should one of the carriageways be closed during a traffic incident.

Additional work would be undertaken during detailed design to avoid or further minimise the identified negative flood impacts through a process of iterative flood modelling and design refinement. It is possible that additional flood benefits may be realised through this process. Section 6 of this report details a comprehensive range of mitigation measures to manage any residual flood impacts.

Issue 2

As the Albion Park Rail bypass is affected by flooding (changing flood behaviour both up and downstream), and will be utilised by flood affected communities in times of flood crisis, it should be considered in accordance with the NSW Government's Flood Prone Land Policy (Policy) as set out in the Floodplain Development Manual, 2005. The Office of Environment and Heritage notes that Roads and Maritime has sought and been provided technical advice on flood risk management issues associated with this proposal.

Response 2

Roads and Maritime acknowledges this requirement. Consultation undertaken following the environmental impact statement exhibition period is summarised in Section 5.4 of this report.

Issue 3

From a review conducted of environmental impact statement Technical Paper 3 - Hydrology and Flooding, it is suggested the Department of Planning and Environment further consider and be satisfied that the following have been adequately addressed with relation to floodplain management:

- The impact of flooding on the proposed development. From the documentation available the inundation depths and durations of the road are not easily ascertained. It is suggested at key locations, the depths and duration of flooding over the road be provided for the full range of floods. This will not only assist Department of Planning and Environment to understand the impact of flooding on the development but provide insight into the capacity of the new road to provide egress for current and future users including the local community and emergency management authorities in times of flood. Further advice regarding this issue should be sought from the State Emergency Service
- The impact of the proposed development on flood behaviour. It is evident that the bypass will increase flood affectation to a number of industrial, commercial, agricultural and residential properties as well as existing infrastructure. Whilst this occurs to a lesser extent for frequent floods, it is particularly evident for the 100 year ARI design flood event and above. This is an important consideration with context to the NSW Flood Prone Land Policy and Floodplain Development Manual and liabilities associated with adverse impacts. Where adverse impacts are identified, measures to offset these impacts should be explored for implementation as part of the project
- The impact of the proposal on creek stability. The location and geomorphic nature of the watercourses are potentially affected by the proposal given the identified velocity changes. However, there does not appear to be an adequate assessment of these impacts or how they will be managed. This may create issues regarding structural stability of crossings and bridges due to bed and/or bank erosion, but may also have adverse impacts on natural stream functions and flood behaviour. This should be further clarified in the environmental impact statement
- The future impacts (cumulative development, climate change etc) on the proposed design, flood behaviour and estimated flood levels. The 200 year and 500 year ARI design flood events provide a proxy indication of a 10 per cent and 30 per cent respective increase in rainfall intensity and thus the potential future impacts of and on the road. There is limited discussion as to how future adverse impacts of the proposal on flood behaviour will be managed
- The impacts of blockage. This includes not only structure openings but auxiliary features such as railings and sound barriers which appear to have not been incorporated. The Illawarra has a long history of blockage affecting the hydraulic efficiency of waterway openings during floods and as such auxiliary features should be considered as they can create adverse flood impacts.

Response 3

The Department of Planning and Environment has commissioned an independent review of Technical Paper 3 – Hydrology and Flooding by an independent and suitably qualified expert, and the comments provided to Roads and Maritime. Roads and Maritime is consulting with the Department of Planning and Environment on this matter and has provided a response to all review comments.

The environmental impact statement addresses the points listed. The relevant sections of the environmental impact statement are listed below:

- Impact of the project on flood behaviour – refer to the objectives and criteria in Section 8.1 and 8.3.2
- Consultation with the State Emergency Service – refer to Section 6.3.2 and 6.4.1
- Mitigation measures to address identified flood impacts – refer to Section 8.5
- Impact of the project on creek stability – refer to Section 8.3.2

- Future impacts of the project on flood behaviour – refer to the cumulative impact assessment in Section 8.3.2
- Impacts of blockage – refer to the criteria in Section 8.3.2.

The additional hydrology and flooding assessment (Appendix C of this report) also addresses the listed points in relation to the proposed design refinements outlined in Section 5 of this report.

The impact of flooding on the proposed development:

The motorway achieves 100 year ARI flood immunity (which means the road level is higher than the 100 year ARI flood level) for the full extent of the project with the exception of a low point south of the Duck Creek Bridge, where the project uses the existing bridge. At this location two of the three north bound lanes will be flooded in the 100 year ARI event, but the motorway will remain trafficable to emergency vehicles.

In the probable maximum flood, the motorway would be un-trafficable for up to three hours at Duck Creek, up to three hours in the Macquarie Rivulet floodplain, up to two hours at the proposed Croome Road detention basin, and up to three hours at the Green Meadows Basin.

The State Emergency Services has been consulted regarding emergency management and evacuation.

The impact of the proposed development on flood behaviour:

The flood impacts from the project in industrial, commercial and agricultural lands are within the adopted design criteria in the 100 year ARI event and are not considered to be substantial. Impacts on residential areas are within the design criteria with the exception of three properties where adverse impacts are predicted. Measures to reduce these impacts have been explored and are presented as mitigation measures in the environmental impact statement.

The impact of the proposal on creek stability:

In the Duck Creek and Horsley Creek catchments, the concept design extends or upgrades existing culvert and bridge structures, which is expected to have minor impacts on creek stability. In the Macquarie Rivulet, velocities are generally low due to the nature of the floodplain and the impact of the project on flow velocities are predicted to be minor.

The structural stability of drainage structures will be investigated as part of the detailed design and scour protection will be provided as required.

The future impacts:

The use of the 200 year and 500 year ARI design flood events as proxies for an increase in rainfall is not required when a hydrological model is used. To account for a 20 per cent increase in rainfall, the rainfall has been increased by 20 per cent in the hydrological model. To account for land use change, the land use change has been incorporated in the hydrological model. The environmental impact statement reports that the impacts of land use change on the project are not predicted to be significant. The environmental impact statement also reports that the project would achieve the minimum requirement of 20 year ARI immunity if rainfall intensities were to increase by 20 per cent.

It is noted that dry catchment conditions (initial loss greater than zero millimetres) was assumed for the existing scenario in assessing the impacts of land use change. As such, the land use change assessment accounts for the increase in impervious area.

The impacts of blockage:

The impact of blockage has been taken into account in the flood modelling. Blockage of bridge and culvert structures in the Duck Creek catchment has been included based on the Wollongong City Council blockage policy. Blockage of bridge and culverts within the Macquarie Rivulet has been set to 20 per cent for large culverts and 100 per cent for smaller culverts. Blockage of culverts and bridges in the Horsley Creek catchment has been included based on the blockage values adopted in the Horsley Creek flood study. Blockage of open railings on bridges has been set to 50 per cent and the location of sound barriers has been adjusted to minimise impacts on flooding.

Issue 4

As raised on numerous occasions, reporting terminology such as ‘flood immunity’ without consideration of uncertainty creates false design expectations. It is understood the proposed road cannot be raised due to the obstacle limitation surface associated with the Illawarra Regional Airport however, this should not lead to the inflated reporting of flood design standards. Best practice in engineering and floodplain risk management practice incorporates a freeboard to account for uncertainties when discussing flood standards. Without the adoption or inclusion of a freeboard to determine the design level of the carriageways, the potential design standard of the road would be reduced from the anticipated 100 year ARI to 20-50 year ARI flood event based on the modelling provided for present day conditions and even less when climate change and cumulative development impacts are taken into account. Similarly, the 50 year ARI design standard nominated for Duck Creek without freeboard may also be reduced to approximately 10-20 year ARI standard for present day conditions. As a result the reporting should incorporate freeboard provisions when referring to a flood design standard so as to not create any false expectations of road performance or design levels of ‘flood immunity’ during times of flood.

Response 4

This response should be read in conjunction with Response 1 with respect to the discussion on freeboard.

Uncertainty in the flood modelling is addressed via a range of means, including by calibrating the flood models against historical events, as described in the relevant flood studies (refer Section 3.3 of Technical Paper 3 – Hydrology and Flooding):

- Duck Creek Flood Study (BMT WBM, 2012)
- Macquarie Rivulet Flood Study (WMAwater, in preparation)
- Horsley Creek Flood Study (Rienco, 2011).

Uncertainty associated with climate change was directly assessed by considering a future climate change scenario (refer Section 6.4.1 of Technical Paper 3 – Hydrology and Flooding), adopting:

- 20 per cent increase in rainfall intensity
- 0.91 metre sea level rise in Lake Illawarra.

The term ‘flood immunity’ is used in the environmental impact statement to describe whether or not the design element (such as carriageway, other roads or cycleways) is above the relevant design flood level (refer Section 3.2.1 of the environmental impact statement). If the design element has flood immunity in the 100 year ARI event, it is flood free in the 100 year ARI flood level at that location.

The Addendum Hydrology and Flood Assessment Report (Appendix C) describes the freeboard achieved at critical points along the motorway. The revised design is generally achieved 0.5 metres freeboard to the 20 year ARI flood levels. The flood levels and freeboard achieved at the critical points along the motorway are summarised in Table 5-1 of the Addendum Hydrology and Flood Assessment Report (Appendix C).

In the Duck Creek catchment, there is one section of the main carriageway around 160 metres long near the Duck Creek bridge (BR01 in Figure 5-1 of this report) over which two of three northbound lanes would be inundated to a depth of up to 0.25 metres in the 100 year ARI flood event (refer Table 6-1 of Technical Paper 3). This section would be flood free in the 50 year ARI flood.

The level of the main carriageway could not be raised higher in this location due to the need to tie into the level of the existing bridge, which is currently inundated in the 100 year ARI flood event. This is consistent with existing conditions. In the event of a flood of this magnitude, this section of the bypass would be classified as being low hazard under the Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005), and would remain passable for emergency vehicles.

Issue 5

As the functioning of the proposed road during flood events will become increasingly relied upon by emergency management authorities for evacuation, rescue, fire and medical emergency, it is considered prudent that any opportunity to increase the road height and thus improve flood immunity should be pursued during the detailed design stages. Office of Environment and Heritage remains unaware of any joint Roads and Maritime meeting with key flood planning and emergency response authorities (e.g. Department of Planning and Environment, Office of Environment and Heritage, Councils, State Emergency Service, Health, Police, Ambulance, Fire etc.) regarding the planning of road requirements for local communities in times of extreme flood as previously recommended. This recommendation remains in place to facilitate appropriate flood access strategies for existing and future communities in this part of the Illawarra Region.

Response 5

Roads and Maritime acknowledges the importance of consultation with the community and key stakeholders responsible for floodplain management. As described in Chapter 6 of the environmental impact statement, consultation was undertaken with the abovementioned agencies on the following occasions:

- The project flood focus group was convened on four occasions. The group included representatives of the community, Wollongong City Council, Shellharbour City Council, and the Office of Environment and Heritage. Representatives of the Department of Environment and Planning also attended some meetings
- Regular meetings with Wollongong City Council
- Over 20 meetings with Shellharbour City Council
- Three meetings with the Southern Region, Department of Planning and Environment
- Four meetings with the Office of Environment and Heritage
- Two meetings with the Illawarra Local Emergency Management Committee
- One meeting with the Rural Fire Service and the Fire Brigade.

Consultation has continued since exhibition of the environmental impact statement, as summarised in Section 2 of this report.

It is understood that both Wollongong and Shellharbour City Councils are progressing through the floodplain management process prescribed under the Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005) for the three floodplains intersected by the proposed bypass. It is anticipated that further work would be undertaken as part of this process on coordination of floodplain-wide flood planning and emergency response consistent with the requirements of the Floodplain Development Manual. Roads and Maritime form part of the floodplain risk management committee and will use this platform to ensure adequate consultation in undertaken.

Chapter 8 of the environmental impact statement, Technical Paper 3 – Hydrology and Flooding and the additional hydrology and flooding assessment (Appendix C of this report) describes the flood impacts of the project, and the beneficial outcomes with respect to improved flood immunity, as provided above in response to this Issue.

3.5.2 BIODIVERSITY

Issue 6

The Secretary's Environmental Assessment Requirements require that biodiversity assessment and offsets be assessed in accordance with the Framework for Biodiversity Assessment and the NSW biodiversity assessment and offsets have been prepared with guidance from the Framework for Biodiversity Assessment, and the NSW Biodiversity Offsets Policy for Major Projects. We recognise this is the first application of this assessment framework for Roads and Maritime in the region and some limitations with the assessment undertaken by NGH Environmental (October 2015) are outlined in Attachment B. We hope these can be reviewed and amended.

Response 6

Roads and Maritime has met with the Office of Environment and Heritage several times to discuss the biodiversity assessment for the project, documented in the environmental impact statement, Technical Paper 4 – Biodiversity Assessment Report and Technical Paper 5 – Biodiversity Offset Strategy. This includes a discussion of those matters raised in Attachment B of the submission. There is ongoing discussion with the Office of Environment and Heritage about the biodiversity assessment and offsets, as required, in accordance with management measure BD01 of Section 9.5 of the environmental impact statement. The biodiversity assessment report and biodiversity offset strategy have been updated based on this consultation and the revised design, and are included in Appendix D and Appendix E of this report.

Issue 7

To comply with the Framework for Biodiversity Assessment and Major Projects Policy we recommend the following amendments be made to the biodiversity assessment and offsetting components of the project. Some additional measures are also sought to compensate for impacts to the Croom Voluntary Conservation Agreement.

Response 7

Reference is made to Issues 8 to 12 in Section 3.5.2 of this report.

The Framework for Biodiversity Assessment (Office of Environment and Heritage, 2014a) and NSW Biodiversity Offsets Policy for Major Projects (Office of Environment and Heritage, 2014b) were introduced part way through the environmental impact assessment for the project, and Roads and Maritime was required to transition data collected under the previous biodiversity assessment process into the new framework. Roads and Maritime has actively engaged with the Office of Environment and Heritage throughout the preparation of the environmental impact statement to obtain advice on applying the framework. The revised Biodiversity Assessment Report and Biodiversity Offset Strategy are included as Appendix D and Appendix E of this report.

Roads and Maritime recognises the importance of the Croom Voluntary Conservation Agreement and have been working with Shellharbour City Council in regards to the Framework for Biodiversity Assessment and Major Projects Policy. The current preference is to transfer the conservation agreement to a BioBanking agreement for the site. Any modification to the existing agreement would be undertaken in accordance with the requirements of relevant legislation (refer to Section 5.5 of Appendix D of this report).

Issue 8

Fauna survey

Regarding the two bats, Large-eared Pied Bat and Grey-headed Flying-fox, that were recorded on site and added as species credit species, more justification is required for their removal from the assessment.

Currently there is no justification provided. Section 9.3 of the Framework for Biodiversity Assessment does not provide for the opportunity to remove species found on site. However, due to the current issues with the tool, inability to add ecosystem species and knowledge of the habitat on site, Office of Environment and Heritage is prepared to evaluate such a justification during the transitional period of the Framework for Biodiversity Assessment. This justification should form an explicit component of the Biodiversity Assessment Report and include discussion, at minimum, on the following points:

- Estimated size of the local population or presence of the species in the locality (for example Wildlife Atlas and Atlas of Living Australia records) and how the project records relate to this
- Extent of habitat for the species in the locality (foraging and roosting)
- Amount of habitat to be lost – to justify the current comment within the Biodiversity Assessment Report and of “no adverse impact”
- The overall likely impact on the species (considering biology etc.).

Discussion regarding the geographic feature in the tool relating to Large-eared Pied Bat of land north of Batemans Bay in the Bateman Catchment Management Authority subregion should not be included. This relates to the Bateman Catchment Management Authority subregion and the current project is in the Illawarra Catchment Management Authority subregion where there are no geographic restrictions. Presumably this has occurred as a result of another issue with the tool. This information on species geographic restrictions for subregions is freely available on the species profiles on the Office of Environment and Heritage webpage.

Response 8

As detailed in footnote 3 of Technical Paper 4 – Biodiversity Assessment Report, at the time the project was initially assessed in the Office of Environment and Heritage biodiversity credit calculator, the two bat species were not included in the calculator as being predicted on-site or requiring survey. These two species have now been incorporated into the tool in a subsequent update to the calculator by Office of Environment and Heritage. As reported in Section 4.2.5 of Technical Paper 4 – Biodiversity Assessment Report, these two species were recorded in the development footprint, and it was considered that the project would be unlikely to adversely impact these species.

The biodiversity assessment report has been updated to address Issue 8 and is included in Appendix D. It is understood that the references to the Batemans Bay Catchment Management Authority reflect an error in the biodiversity credit calculator and have been excluded from the updated biodiversity assessment report.

Issue 9

Vegetation survey

There are several problems with the vegetation survey component:

- Five vegetation zones have had site data duplicated or manufactured in the Biodiversity assessment report. The use of benchmark, or manufactured data does not comply with Section 5 of the Framework for Biodiversity Assessment
- Section 5.2.1.7 of the Framework for Biodiversity Assessment requires per cent foliage cover scores be collected at the development site plots. This is used in the site value score. Many sites are missing per cent foliage cover scores on field data sheets, we now understand that this was because some sites were completed before the Framework for Biodiversity Assessment commenced. In future, site data should be collected to fully demonstrate compliance with the Framework for Biodiversity Assessment
- There are some inconsistencies between site scores reported in the credit calculator, and the field survey sheets. For example some spurious scores include 100% weed cover, which is an unlikely field situation, and in some instances not supported by the raw field survey data sheets submitted (site MR1). This should be amended in the site value scores.

We note that during the transitional implementation period the Major Projects Policy allows for a flexible approach to deal with any practical implementation issues. With this in mind, we seek that the vegetation survey data be completed in accordance with the Framework for Biodiversity Assessment for three of the five vegetation zones missing field survey data. The zones requiring offsetting need to meet the prescribed survey Requirements; SR669 Woollybutt – White Stringy Bark- Forest Redgum, and SR536 Coastal Freshwater Lagoons. We also seek that the survey requirements for Forest Redgum – Thin-Leaved Stringybark be complied with to justify its exclusion as a Threatened Ecological Community, given the extent of impact on this type.

This will require that the amended site data is used in a revision of the credit calculations. We recommend amending the Biodiversity assessment report to explicitly address that the acceptance of manufactured data in this instance is generally not supported, and has only been accepted by Office of Environment and Heritage for some vegetation zones in this assessment because they do not require offsetting, and the extent of impact is very limited. Completing the survey requirements for the other two outstanding zones in this instance would add additional cost for no material benefit.

Response 9

Roads and Maritime acknowledges the Office of Environment and Heritage's flexible approach during the transition period, and has appreciated the opportunity to discuss the new methodology as applied to this project.

Seven additional plots have been surveyed and the floristic data used to replace that associated with the manufactured plots and additional sites required. This is reported in Section 3.1.3 of the updated biodiversity assessment report (refer Appendix D of this report).

Roads and Maritime has in place a quality management system that requires appropriate data control and review on their projects. In accordance with that system, further quality checks have been undertaken to identify the cause of any apparent inconsistencies and the information has been updated or a clarification provided as required. The updated biodiversity assessment report is provided in Appendix D of this report.

Regarding the second point raised in Issue 9, Roads and Maritime understands that future projects would need to be assessed in accordance with the Framework for Biodiversity Assessment (Office of Environment and Heritage, 2014a).

Issue 10

Landscape score – linear assessment module

The approach to assessing perimeter area ratio needs to be amended to comply with the Framework for Biodiversity Assessment. In the current Biodiversity assessment report, patches that are not impacted have been included. For example, Patch A includes several polygons which are not affected. This may have been an artefact of how these polygons were classified as 'multipart features' in GIS. We provided technical advice on correcting this assessment on 11th November, 2015. The amended score should be updated in the credit calculator.

Response 10

As discussed in Chapter 2 of Technical Paper 4 – Biodiversity Assessment Report, linear development assessment is most appropriate for this type of project. An updated formula for calculation of the perimeter area ratio has now been provided by the Office of Environment and Heritage, and the perimeter area ratio calculations have now been updated, as reported in Section 2.8 and Section 2.9 of the updated biodiversity assessment report (Appendix D of this report).

Issue 11

Impacts on the Croom voluntary conservation agreement

The Biodiversity Assessment Report states that 0.22 hectares of land within the area the subject of the Croom voluntary conservation agreement will be impacted, constituting one per cent of the voluntary conservation agreement area. The proposed use of Croom Reserve as an offset site is not a preferred option by Office of Environment and Heritage. The land is already reserved and in an in-perpetuity agreement this means that 'additionally' will apply as described at clause 4 of the Biobanking Regulation and section 7.2, meaning there will be significant credit discounts at this site to offset existing management obligations. Office of Environment and Heritage also has further funding earmarked for this site, which may incur further discounts to credits from this site.

While the direct impacts of the above are included in the offset calculations, Office of Environment and Heritage seeks that Roads and Maritime provide additional funds to offset the impacts of this by:

- Funding the amendments to the existing conservation agreement. This will involve ecological and spatial survey, preparing documentation for Ministerial approval and registering the new area on land title (expense estimated at \$20,000)
- Providing additional funds to manage any indirect impacts arising from adjoining construction and improve the conservation area.

Response 11

As discussed in Section 5.5 of Technical Paper 4 – Biodiversity Assessment Report, part of the Croom Regional Sporting Complex has been protected through a voluntary conservation agreement between Shellharbour City Council and the NSW Minister for the Environment since 2002. Sections 5.1 and 5.2 of Technical Paper 4 detail the investigations undertaken in an effort to avoid impacting the land that is the subject of the agreement. It was not possible to entirely avoid the Croom Voluntary Conservation Agreement due to the need to consider the full range of impacts, including social and private property impacts and impacts on other environmentally sensitive areas. It should be noted the impact area listed by the Office of Environment and

Heritage has been revised in the context of the proposed design refinements outlined in Section 5 of this report. A total of 0.15 hectares of the land would be directly impacted, representing less than one per cent of the total area protected by the conservation agreement and has been included in the credit calculations. This impact is therefore required to be offset.

Whilst it is appreciated that the preference is not to use this site for offsetting, the BioBanking assessment methodology specifically allows BioBanking agreements to be made on land subject to a Conservation Agreement as long as the Conservation Agreement was entered into before 10 March 2009. Both Roads and Maritime and Shellharbour City Council believe that there is an opportunity to significantly improve conservation of this land as a result of a BioBanking agreement being in place for this land. It is however likely that a discount would apply to the number of credits created at this site because of existing obligations for Council in regards to this land being a council reserve (obligations under the *Local Government Act 1993* and *Crown Lands Act 1989*).

It is noted that the Croom Voluntary Conservation Agreement was signed prior to the gazettal of the *Threatened Species Conservation (Biodiversity Banking) Regulation 2008*. Roads and Maritime understands that this means a modification to the current agreement would be required to account for these direct impacts. The preferred option is to remove the existing conservation agreement and create a BioBanking agreement for the site. We note that, as part of a BioBanking agreement, management funds would be agreed to as part of the BioBanking credit pricing mechanism, which would incorporate management of both direct and indirect impacts on the Voluntary Conservation Area.

Section 5.2.3 of Technical Paper 4 lists a range of potential indirect impacts during the operational phase, including:

- Light spill from motorway lighting
- Weed encroachment
- Increase in pest animals specialising in edge habitats
- Road traffic noise
- Road pollutants entrained in stormwater runoff.

Mitigation measures to address these impacts are detailed in the environmental impact statement. It is understood that providing additional funds to manage any indirect impacts arising from adjoining construction is not required in accordance with the Framework for Biodiversity Assessment.

It is noted that the edge effects resulting from clearing of 0.15 hectares of Croom Reserve would not result in substantially different edge effects than those that occur at present.

Issue 12

Biodiversity offset strategy

While the biodiversity offset strategy does identify a range of potential sites for offsetting, it does not resolve the proposed offset sites or mechanisms for offsetting into these sites to the standard specified by the Framework for Biodiversity Assessment and Major Projects Policy. We recognise that Roads and Maritime is currently in negotiations with a number of landholders to resolve offset options. We request that the biodiversity offset strategy be resolved in consultation with Office of Environment and Heritage to comply with the standard specified within the Framework for Biodiversity Assessment and Major Projects Policy to identify:

- The properties that will be secured, how they will be secured and when they will be secured
- Written agreement from the landholder that the land will be made available for this purpose
- The credits from the market that will be secured
- Where credits are to be secured from the market, written agreement from the credit holder to commit these credits for this purpose
- Where negotiations are not finalised, the biodiversity offset strategy should identify remaining candidate offset sites in the priority order in which they will be secured and timeframes within which negotiations will be completed or terminated.

Response 12

Section 2.4 of Technical Paper 5 – Biodiversity Offset Strategy articulates the process Roads and Maritime will be following to develop the strategy in consultation with the Office of Environment and Heritage as the project progresses through detailed design. This commitment is covered in management measure BD01 in Section 9.5 of the environmental impact statement. The biodiversity offset strategy has been updated since the environmental impact statement was exhibited and forms Appendix E of this report.

Issue 13

Recommended conditions of approval

The comments above highlight that some amendments to the Biodiversity assessment report and Biodiversity offset strategy are required. However, we highlight recommended conditions of consent to consider when these matters are resolved.

- Costs incurred by any amendments to the Croom voluntary conservation agreement be funded by Roads and Maritime
- Prior to the start of construction, Roads and Maritime shall implement the approved Biodiversity offset strategy to fulfil the specified number and type of credits required (yet to be refined in an updated Biodiversity offset strategy)
- The development must comply with conditions relating to on site measures specified in the Biodiversity assessment report
- Fencing shall be erected to protect areas of cultural sensitivity in the Macquarie Rivulet area, and all areas of native vegetation during construction.

Response 13

Roads and Maritime notes the Office of Environment and Heritage's recommendations to the Department of Planning and Environment. Reference is made to relevant mitigation measures in Section 9.5 of the environmental impact statement (and Section 6 of this report), which include:

- Commitment to develop and implement the biodiversity offset strategy (BD01)
- Reduction in the extent of clearing required for construction, where feasible (BD02)
- Incorporation of flora and fauna management measures into the construction environmental management plan (BD03), which specifies requirements to establish exclusion zones and fencing to demarcate vegetation to be retained
- Identification and fencing of sensitive areas (BD06)
- Progressive site rehabilitation, species selection and maintenance of plantings (BD04 and BD05)
- Management of impacts on, and rehabilitation of, riparian areas (BD08 and BD09).

Roads and Maritime considers that the implementation of the approved biodiversity offset strategy to fulfil the specified number and type of credits required is not required at the pre-construction stage.

The requirement to fence the area of cultural sensitivity near the Macquarie Rivulet is identified in management measure AH03 (refer Section 10.5 of the environmental impact statement and Section 6 of this report). This mitigation measure is deemed suitable and accurate based on consultation undertaken during the environmental impact assessment stage.

The project would comply with any relevant statutory and regulatory requirements, including the project conditions of consent issued by the Department of Planning and the Environment.

3.5.3 ABORIGINAL HERITAGE

Issue 14

Office of Environment and Heritage supports the use of anthropological research to identify the cultural heritage values within the study area. This research provided cultural and historical information on the broader cultural landscape of the region and has enriched the archaeological analysis. In general, we support the environmental management measures proposed for Aboriginal heritage under Section 10.5 in the environmental impact statement. Our detailed comments on the Aboriginal Cultural Heritage assessment are included in Appendix C.

Response 14

Roads and Maritime acknowledges the Office of Environment and Heritage's support for the methodology adopted for the assessment of Aboriginal cultural heritage in the environmental impact statement.

Responses to individual matters raised in Appendix B of the submission are addressed in Responses 15 to 18.

Issue 15

Office of Environment and Heritage supports the recommendation for an Aboriginal heritage management plan to be developed in conjunction with the construction environment management plan. Office of Environment and Heritage recommends that the Aboriginal heritage management plan is prepared in conjunction with Office of Environment and Heritage and the registered Aboriginal parties.

Response 15

The Office of Environment and Heritage's submission is noted and reference is made to Section 10.5 of the environmental impact statement, in particular management measure AH01 which requires the preparation of an Aboriginal heritage management plan. Specific inclusions in the plan are also required in relation to:

- Protection of identified cultural sites (AH02 and AH03)
- Delineation of sensitive areas (AH04)
- Archaeological salvage (AH05)
- Management of unexpected finds such as human remains (AH06).

Ongoing consultation with the Office of Environment and Heritage and the registered Aboriginal parties would be undertaken in accordance with the requirements of the:

- Procedure for Aboriginal Cultural Heritage Consultation and Investigation (Roads and Maritime, 2012)
- Aboriginal Heritage Consultation Requirements for Applicants (Department of Environment, Climate Change and Water, 2010).

Additional measures are also proposed for Site B: Macquarie Rivulet as follows:

- The erection of temporary fencing for the protection of the old growth eucalypt identified within this site, to be undertaken in consultation with a heritage specialist
- The separation and stockpiling, if possible within the adjacent ancillary area, of the topsoil
- Reinstating the topsoil to the site
- Rehabilitation of the site with locally native vegetation
- Interpretative signage and a booklet developed by a heritage specialist in consultation with the Aboriginal knowledge holders prior to the start of any construction with the potential to impact Site B.

The revised management measures are included in Section 6 of this report.

Issue 16

We support the proposed reburial of the retrieved artefact assemblage from all stages of archaeological investigation at one location. However, we recognise this is dependent on the results of the salvage excavation and the wishes of the community.

Response 16

Office of Environment and Heritage's preference for reburial of any salvaged artefacts in one location is noted and would be taken into consideration by Roads and Maritime.

Issue 17

We support the salvage excavation of YTOF AS 4 and YTOF AS 5 and the methodology that provides flexibility regarding the total area excavated at each site.

Response 17

Roads and Maritime acknowledges the Office of Environment and Heritage's support for the proposed management measure (AH05), which is required to minimise impacts on Aboriginal heritage items.

Issue 18

We endorse the recommendation to use high visibility fencing to protect sites during construction work. However, given the cultural sensitivity of the Macquarie Rivulet area, we request that the portions of the cultural area that exists outside the construction footprint are fenced off, not just old growth eucalypt as described in management measure AH03.

Response 18

Roads and Maritime would arrange for this fencing to be provided. Any such fencing outside of the land acquired or leased for the project by Roads and Maritime would need to be negotiated with the landowner.

3.6 SHELLHARBOUR CITY COUNCIL

3.6.1 ASSESSMENT PROCESS

Issue 1

The environmental impact statement fails to acknowledge that the proposed bypass also transects lands that have been deferred from *Shellharbour Local Environment Plan 2013* and are currently under *Shellharbour Local Environment Plan 2000*, *Shellharbour Local Environment Plan 2004*. This generally does not have any impact on the findings of the report. Nevertheless, the assessment needs to take this into consideration.

Response 1

Roads and Maritime acknowledges the omission. As stated within the submission, the conclusions regarding land use zoning are still valid. The project is State significant infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979*. Although local environmental plans do not specifically apply to State significant infrastructure an assessment of the project against the provisions of the relevant local environmental plan is provided below.

A portion of the project traverses land that has been deferred from *Shellharbour Local Environmental Plan 2013* and falls under the *Shellharbour Local Environmental Plan 2000* and *Shellharbour Local Environmental Plan 2004*. Under the Shellharbour Rural Local Environmental Plan 2004 – Illawarra Regional Business Park site the land is zoned as:

- E2 – Environmental Conservation
- IN2 - Light Industrial.

Roads are identified as permitted with consent within both the IN2 and E2 zones, however, the motorway would only traverse land zoned E2. An objective of zone E2 is to prevent development that could destroy, damage or otherwise have an adverse effect on areas of high ecological, scientific, cultural or aesthetic values. The project seeks to achieve the intention of this objective as the motorway and associated structures are designed to ensure minimal adverse impacts on ecological, cultural and aesthetic values, as discussed in Chapter 4 of the environmental impact statement.

An assessment of the impacts of the project on ecological, cultural and aesthetic values are provided in Chapters 9, 10, 11 and 14 of the environmental impact statement. Management measures to minimise impacts from the project are summarised in Section 6 of this report.

3.6.2 RECONFIGURATION OF CROOM REGIONAL SPORTING COMPLEX

Issue 2

With regard to the Croom Regional Sporting Complex, Council has worked cooperatively with Roads and Maritime on a master plan for the complex. This has also involved sporting groups located at Croom. The master plan was publicly exhibited and has been endorsed by Council. Council notes that the following requests have been agreed to by Roads and Maritime:

- All directly impacted sporting facilities would be replaced with similar facilities
- Council as owner of the facility would work directly with Roads and Maritime in the more detailed design phase on the amenities, car parking and other infrastructure to be replaced or in addition to what is currently there (such as lighting and irrigation)
- There would be vehicle and pedestrian access throughout the Croom Regional Sporting Complex
- There would be the addition of a single land vehicle access into the complex from the western Terry Reserve sporting area into the Croom Regional Sporting Complex
- Access to the Croom Stadium would be available at all times
- New sporting facilities for AFL and cricket would be constructed; horse arenas and junior rugby league fields would be reconfigured; public horse arenas would be relocated; and new grass netball courts would be constructed as per the concept plan that was provided by Roads and Maritime and endorsed by Council.

Response 2

As identified in the submission, Roads and Maritime has worked closely with Shellharbour City Council (the facility owner), and the sporting groups that use the facilities, to develop a master plan for reconfiguring the Croom Regional Sporting Complex. A revised version of this master plan is included in Figure 5-9 of this report.

Roads and Maritime acknowledges the agreement that includes the items listed above. The reconfiguration of the Croom Regional Sporting Complex would include construction of new sporting fields and associated buildings and amenities to replace those directly impacted by the bypass, as well as new internal roads, pedestrian / cycle paths and parking.

Roads and Maritime would continue to work with Council and these user groups to minimise impacts on users of the venue during the construction period. This commitment is reflected in environmental management measure SE03 in the environmental impact statement:

The construction planning for the reconfiguration of the Croom Regional Sporting Complex will be developed in consultation with Shellharbour City Council and the Sporting Complex user groups so as to minimise impacts on the ongoing use of the Sporting Complex during construction. It is also noted that the access to the complex from the western Terry Reserve sport area would be dependent on an agreement to cross the Eastern Gas Pipeline which is managed by Jemena. It is understood that Council will be responsible for obtaining this agreement with Jemena.

Management measure SE03 has been updated to address the request to consult with Council during construction. It is presented in Section 6 of this report.

Issue 3

Council would like the opportunity to explore stormwater reuse options with Roads and Maritime to use run off to irrigate the neighbouring sports fields and bush regeneration areas.

Response 3

Roads and Maritime has been working with Shellharbour City Council to determine potential opportunities for stormwater reuse. This process will continue during detailed design.

3.6.3 TRAFFIC AND TRANSPORT

Issue 4

Continuing Council support for this project is contingent upon the installation of the south facing access ramps at the interchange at Albion Park.

Council is committed to working with the Roads and Maritime Services to ensure that Tripoli Way is in place and operational to coincide with the opening of the Yallah to Oaks Flats M1 Motorway Extension.

Response 4

Roads and Maritime acknowledges Shellharbour City Council's support for the project contingent on installation of the northbound exit ramp and the southbound entry ramp at the interchange at Albion Park. This is incorporated in the design as identified in Figure 5-1 to Figure 5-7 of this report.

Roads and Maritime have continued to undertake regular consultation with Council during the development of design refinements at the interchange at Albion Park, as described in Section 5.2.1 of this report. Roads and Maritime will continue to consult with Council regarding the timing and connection of the motorway to the bypass of Albion Park (Tripoli Way).

Issue 5

In terms of traffic modelling, only West Lake Illawarra is addressed. There is no evidence in this chapter, Chapter 7 (traffic and transport) or its appended technical paper, Chapter 21 (cumulative impacts and interactions) that regional infill growth or growth outside Shellharbour / Wollongong local government areas is factored in. This growth may or may not be factored into the modelling. The determining authority needs to ensure the accuracy of existing populations / trip generation and relevant growth estimates. There is no indication in either Chapters 7 or 21 of a planning period for the works, i.e. when their capacity may be reached and whether additional capacity is or needs to be factored into the works.

Response 5

The focus of the future land use revision undertaken (see Appendix A) during the design refinements process was in the West Lake Illawarra region (see Appendix A), as the major development sites in this area will have the biggest impact on future traffic volumes in the vicinity of the Albion Park Rail bypass. Employment and residential projections were based on the full development potential of the Calderwood, West Dapto (including Marshall Mount), Tullimbar and Tallawarra future development areas, as per the Secretary's Environmental

Assessment Requirements. The updated forecasts were based on information supplied by Wollongong City Council and the Department of Planning and Environment in relation to the pace of historical development to date and most likely staging of development going forward. Council endorsed the revised land use projections prior to the commencement of traffic modelling associated with the proposed design refinement. It should also be noted that the traffic modelling used for the design development of the project was underpinned by a much larger strategic model, covering the whole of Wollongong and Shellharbour local government areas that was developed by Roads and Maritime, Wollongong and Shellharbour City Councils. The most recent Bureau of Transport Statistics employment and land use projections were used as the basis for growth in the wider local government areas. Given the size of the strategic model, the above approach to the future year forecasting and modelling is considered robust, and sufficient for the purposes of this project.

The traffic assessment methodology presented in Section 4 of the addendum traffic and transport report (Appendix A) complies with the Roads and Maritime requirement to consider the traffic impacts with and without the project at a twenty years after opening, which in this case is 2041.

These estimates were also addressed in the up to date modelling presented in the additional traffic and transport assessment (Appendix A).

Roads and Maritime acknowledges that it is important to consider how land use change both in and beyond the study area may impact the traffic objectives of the project. The results presented in Appendix A indicate that the bypass will have capacity up to 2041 to accommodate any increases in traffic volumes related to forecast development yield. The level of assessment presented in Technical Paper 1 – Traffic and Transport and the addendum traffic and transport assessment (Appendix A) is considered adequate for the assessment of this project.

Issue 6

Page 20 of the aviation paper in the last paragraph of the clearance to vehicles states that there will be no impact on current operations but effects on aspirational operations, with some restrictions on north take off. The exact extent of these impact and possible actions to be taken will need to be considered in the detailed design stage and that all incursions into the surfaces, current and aspirational need to be assessed by Council. The design stage should allow for this in its program and if possible a hold point be put on approval of heights pending assessment of the impact and mitigation measures. It needs to be noted that this process is estimated to take six to eight weeks. Any adjustments required to the airport infrastructure or flight procedures should be at the cost of the project. This comment also applies to the last paragraph on page 20.

Council requests a confirmation of any increases in penetration of the obstacle limitation surface and visual slope segment so that we can work with the Civil Aviation Safety Authority and Air services on the impact of the flight operations. This information should include details of any shielding that may exist from existing constructions. Also where possible if Roads and Maritime can assist in the reduction of existing obstructions that may lie within its area of work.

Response 6

A detailed aviation assessment has been carried out for the project (provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement) and responses to the Civil Aviation Safety Authority comments on the environmental impact statement are also provided in Section 3.2 of this report. An addendum to the aviation assessment has been produced to assess the potential impacts associated with the proposed design refinements described in Section 5 and is included at Appendix B of this report.

Roads and Maritime's commitment to considering impact to the airport operations are reflected in environmental management measure TT04:

- The detailed design of the project will comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport.

Roads and Maritime will continue to consult with Shellharbour City Council during detailed design and construction to ensure the impact to the airport's operations are minimised.

As noted in Section 4.1.1 of Technical Paper 2 – Aviation, where structures or lighting have limited clearance to the existing obstacle limitation surface they would be monitored and controlled during detailed design to ensure no penetration occurs.

The aviation assessment addendum (Appendix B) concluded that reduced clearances may result in some restrictions on take-off to the north by larger aircraft in the rare event that this may be required, however the overall impact on future aircraft operations, compared to the existing situation (without the motorway), is minimal. It is not anticipated that this would impact on the current operation of the airport and would not affect the safety of future aspirational operations.

Some existing local roads already intrude into the aspirational future obstacle limitation surface for the airport. In these locations, the project will not result in a greater penetration than currently occurs. There is also shielding by terrain that impacts on airport operations. Given the nature of existing constraints, it is not considered feasible for the project to assist in reducing all existing obstructions.

Issue 7

The mitigation measures in this section need to be addressed and work has commenced on some items in here and these should be considered as hold points in the process. It is noted that Roads and Maritime has commenced consultation with Council and the operators on management of impacts of construction on flight operations.

Response 7

Section 7.5 of the environmental impact statement outlines Roads and Maritime's commitment to manage the impacts on the operation of the airport. Roads and Maritime would continue to consult with Shellharbour City Council during detailed design and construction of the project.

Issue 8

The report has addressed the wildlife impact and the noted actions need to be passed onto the project that is the use of trees and shrubs in landscaping that does not attract wildlife and consideration in the planning of carparks, particularly considering waste management. Council also needs further information on the proposed ponds and the impact on wildlife attraction and the impact on flights.

Response 8

As identified in Technical Paper 2 – Aviation, the motorway and local roads are not land uses which are identified as presenting a risk of wildlife attraction which may result in wildlife strikes to aircraft.

The existing Croom Reserve and the Croom Regional Sporting Complex are a moderate risk in relation to wildlife strike. This risk would not be altered following the changes to the Croom Regional Sporting Complex and Croom Reserve proposed as part of the project.

Site landscaping would be complementary to the existing environment and would avoid the use of trees and shrubs that would alter the wildlife regime in the vicinity of the airport. The proposed plantings are discussed in Technical Paper 10 – Landscape Character and Visual Amenity.

Any impacts to wildlife behaviour would be monitored in accordance with the requirements of National Airports Safeguarding Framework Guideline C (Department of Infrastructure and Regional Development, 2014a).

Roads and Maritime would continue to consult with Shellharbour City Council during detailed design and construction of the project.

Issue 9

No assessment has been made of any impacts on the proposed adjustments to the Croom Complex as part of the environmental impact statement review, this development will need to be assessed for lighting, height and wildlife impacts as part of the design and construction planning process.

Response 9

The proposed adjustments to the Croom Regional Sporting Complex are described in Section 5.18 of the environmental impact statement, and the impacts of these works were comprehensively assessed including impacts to the neighbouring airport.

A detailed aviation assessment has been carried out for the project; provided in Technical Paper 2 - Aviation, and summarised in Chapter 7 of the environmental impact statement. The assessment includes consideration of the impacts of the reconfiguration of the Croom Regional Sporting Complex on the operation of the airport.

An addendum to the aviation assessment has been produced to assess the potential impacts associated with the proposed design refinements described in Section 5 and is included at Appendix B of this report. Section 4.3 of Technical Paper 2 - Aviation identifies light control zones surrounding the airport where lighting (including sports field lighting) will be designed to meet applicable restrictions. Section 4.1.1 of Technical Paper 2 provides an assessment of impact of relocating assets within the Croom Regional Sporting Complex, including three lights for the junior rugby league field that would be located about 30 to 40 metres south of their existing positions. These lights would not extend into either the existing or aspirational obstacle limitation surface.

A number of existing and proposed facilities in the Croom Regional Sporting Complex would intrude on the aspirational obstacle limitation surface, however this would not produce a greater intrusion than already occurs.

Section 7.3.4 of Technical Paper 2 assesses the potential impacts of wildlife hazards, concluding that the project would not result in an increased risk of wildlife attraction. Sports facilities are indicated as a 'Moderate' wildlife attraction risk within Attachment 1 to National Airports Safeguarding Framework Guideline C (Department of Infrastructure and Regional Development, 2014a). The Croom Regional Sporting Complex is immediately south of the airport and the motorway would travel through the facility, to the south-west of Croom Reserve. Wildlife attraction risks would not change as a result of the project.

3.6.4 HYDROLOGY AND FLOODING

Issue 10

Project objectives – a 20 year Average Recurrence Interval (ARI) flood immunity objective is considered too low for a project of this scale and significance. Council considers that a minimum flood immunity of 100 year (1 per cent Annual Exceedance Probability) plus a consideration of freeboard be considered for design. Council is unsure what flood immunity is being achieved in design at various locations and as whole, with and without climate change impacts considered. It may also be worth considering whether part of the road can be trafficable in events greater than the design flood immunity event in order to understand how emergency services vehicles can use the motorway in extreme events. The objectives need to be determined through assessment of the damages and effects on people, property and infrastructure.

Response 10

The impact of the project on flooding has been assessed in accordance with the Secretary's Environmental Assessment Requirements (refer to Chapter 8 of the environmental impact statement and Technical Paper 3 – Hydrology and Flooding). The flood objectives for the project are presented in Section 8.1.2 of the environmental impact statement.

Section 5 of the additional hydrology and flooding assessment (Appendix C of this report) identified the motorway achieves 100 year ARI immunity for the extent of the project with the exception of the low point south of the Duck Creek bridge. At this location, two of the three northbound lanes will be flooded in the 100 year ARI event. The flood immunity achieved at different locations of the motorway are shown in Figure 5-18 in Section 5.5.2 of this report. When incorporating climate change and changes to land use, the project alignment achieves immunity in a 20 year ARI flood (that is a 20 per cent increase in rainfall intensity and 0.91 metre increase in Lake Illawarra water levels). Much of the main carriageway would be more than 0.5 metres higher than the current 100 year ARI flood level. This is a significant improvement on the existing condition, in which the existing road network is subject to short-term closures due to flooding every year, as described in Section 3.2.2 of the environmental impact statement.

There is also the need to achieve a balance between avoiding negative impacts on surrounding infrastructure and maximising the flood immunity of the project. These may be incompatible objectives; for example, further maximising the flood immunity of the project would require incursions into the airspace requirements for the Illawarra Airport therefore affecting the flightpath of aircraft take off and landing. This would have an overall impact on future aircraft

operations, compared to the existing situation. There are also a range of other environmental aspects that need to be considered, and the design has been optimised in terms of the feasible level of flood immunity that could reasonably be achieved. This is in accordance with the merit-based approach espoused in the NSW Flood Prone Land Policy, which forms Appendix A of the NSW Government Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005).

It is noted that the flood immunity criteria adopted for the project is based on comparing the flood levels and the motorway levels and does not account for freeboard. However, the Addendum Hydrology and Flood Assessment Report (Appendix C) describes the freeboard achieved at critical points along the motorway. The revised design generally achieves 0.5 metres freeboard to the 20 year ARI flood levels. The flood levels and freeboard achieved at the critical points along the motorway are summarised in Table 5-1 of the Addendum Hydrology and Flood Assessment Report (Appendix C).

Additional work would be undertaken during detailed design to avoid or further minimise the identified negative flood impacts through a process of iterative flood modelling and design refinement. It is possible that additional flood benefits may be realised through this process. A comprehensive range of mitigation measures to manage any residual flood impacts, and additional mitigation measures are provided in Table 6-1 of this report.

Issue 11

Flood impact objectives on Agricultural Lands – The flood impact objectives of 400 millimetres for agricultural lands should be reviewed. Council is of the view that this would have significant impacts on the usability of the land for agricultural purposes. Remedial works such as widening the opening between bridge abutments or stock refuge mounds should be considered.

Response 11

The flood impact objectives for agricultural land listed in Section 8.1.2 of the environmental impact statement and utilised in the additional hydrology and flooding assessment (Appendix C of this report), are that any increase in flood levels should generally be less than 250 millimetres for the 20 and 100 year ARI events, with localised (less than five hectares) increases of up to 400 millimetres acceptable. This objective is considered tolerable because agricultural land can support higher flood levels for short periods of time (a few hours) without any substantial increase in land damage or decreased use of land.

It should be noted that the identified agricultural land is routinely inundated by flooding under existing conditions (see Figure 8-4 and Figure 8-5 of the environmental impact statement) with the project expected to marginally increase flood depths in these areas (see Figure 3-3 and Figure 3-4 of Appendix C). Flood duration is not expected to be substantially changed as a result of the project, as shown in the flood duration example provided for the confluence of Frazers Creek and Macquarie Rivulet in Figure 3-3 of the additional hydrology and flooding assessment (Appendix C of this report). For this example, in the existing case flood waters are greater than five metres AHD for six hours and five minutes during the nine hour 100 year ARI event. In the proposed case this is increased by five minutes to six hours and ten minutes. The project is considered unlikely to have a substantial impact on the duration of soils remaining waterlogged after a flood event.

Issue 12

Access in and out of Albion Park in a 1 per cent Annual Exceedance Probability Event – It appears from the current design that access in and out of Albion Park in a 1 per cent Annual Exceedance Probability Event will not be achieved. This could be addressed by raising the access road adjacent to Green Meadows Basin to above the required level.

Response 12

A one per cent annual exceedance probability event corresponds roughly to the 100 year ARI flood event (refer Table 8-3 of the environmental impact statement). As detailed in Section 6.2 and 6.3 of Technical Paper 3 – Hydrology and Flooding, access in and out of Albion Park via the bypass would be achievable in the 100 year ARI flood event via the proposed bypass.

The flood impact of the project on local roads servicing Albion Park would be as follows:

- To the east of Terry Street, Tongarra Road, which is currently inundated in the 2-5 year ARI event, would benefit from reduced flood levels, and would be flood free up to the 5 year ARI event.
- The project would have a minor impact to flooding at Taylor Road, which would still be flooded
- The flood immunity of the Illawarra Highway is not expected to change as a result of the project, and the road would continue to be inundated in regular flood events
- The proposed service road replacing the existing East West Link would maintain the same low level of low flood immunity.

The project would not negatively impact access in and out of Albion Park in the 100 year ARI flood event.

At present the East West Link functions as the spillway for the Green Meadows detention basin. As per the existing situation, the new service road would act as the spillway for the basin, and raising the level of the road would have consequences for downstream properties (mainly residential properties) in a dam break scenario. Raising the road level may also have negative flood impacts on upstream properties. For these reasons, an improved level of flood immunity for the new service road that is replacing the East West Link is not feasible.

Issue 13

Potential Dam Safety Committee Prescribed Dams including Green Meadows Basin – A Dam Break Analysis is expected and this must include a consequence category assessment for all proposed basins, particularly Green Meadows Basin and the proposed Basin at Croome Road. It would be appreciated if Council could be consulted on any correspondence received from the Dam Safety Committee on these matters.

Response 13

Prescribed dams are those listed in Schedule 1 of the *Dams Safety Act 1978* with Green Meadows Retarding Basin listed as a prescribed dam under this schedule. Management measure HF09 (refer Section 8.5 of the environmental impact statement) provides for a dam break assessment of the reconfigured Green Meadows detention basin.

In the event the new detention basin at Croome Road is identified as requiring a dam break analysis in accordance with Dam Safety Committee discussions and requirements, the necessary assessment would be undertaken.

Roads and Maritime has undertaken consultation with both Shellharbour City Council and the Dam Safety Committee, as detailed in Chapter 6 of the environmental impact statement. Consultation would continue during detailed design and construction as required in relation detention basins. Any further consultation with the Dam Safety Committee will be in conjunction with Shellharbour City Council.

Issue 14

Reserve downstream of Green Meadows Basin - It is noted that there are numerous (at least 10) proposed discharge points into this reserve. Thought needs to be given at detailed design stage as to how all of these discharge points are to be managed in the reserve. There are concerns regarding the long term maintenance liability for Council and we seek discussions on this.

Response 14

Roads and Maritime acknowledges Shellharbour City Council's position with respect to potential long-term maintenance liability issues for the spillway and low-flow outlets for the reconfigured Green Meadows detention basin, and would undertake consultation with Shellharbour City Council regarding the proposed discharge points during detailed design.

Issue 15

Potential for basin upstream of Oak Flats interchange – It is unclear whether the basin upstream of the Oak Flats interchange has been considered in the assessment. This basin is identified in the Draft Horsley Creek Floodplain Risk Management Study and has been endorsed by Sydney Trains / RailCorp. It also provides benefits for the Princes Highway downstream. Preliminary investigations identify that a basin could be incorporated into the Albion Park Rail bypass.

Response 15

A comprehensive assessment of the potential impacts of the project on flood behaviour is provided in Technical Paper 3 – Hydrology and Flooding, Chapter 8 of the environmental impact statement and the additional hydrology and flooding assessment (Appendix C of this report). A series of measures are proposed to manage the flood impacts of the project; these are listed in Section 8.5 of the environmental impact statement and Section 6.2 of the additional hydrology and flooding assessment.

The detention basin proposed by Shellharbour City Council for a location upstream of the Oak Flats interchange was not included in the model as it has not yet been constructed and does not form part of the Albion Park Rail bypass project. The project would not preclude the construction of the basin by Shellharbour City Council or Sydney Trains / RailCorp.

Issue 16

Proposed Croome Road basin – Council notes the provision for a new basin at this location. It is preferred that the discharge from this basin be directed to Frazers Creek as per the final mitigation option identified in the Draft Horsley Creek Floodplain Risk Management Study and Plan. Council seeks clarification on who will be responsible for the ongoing maintenance of the basin. It is stated that "A total of 23 properties in Albion Park Rail would now be flood free due to the provision of a detention basin near Croome Road." By definition this would mean that these 23 properties will no longer be flooded in all events up to the probable maximum flood, this should be confirmed. It would be appreciated if Council could have the details of these properties.

Response 16

A description of the proposed detention basin is provided in Section 6.3.1 of Technical Paper 3 – Hydrology and Flooding and Section 5.10 of the environmental impact statement. As stated in Table 6-7 of Technical Paper 3, there are 23 properties in the Horsley Creek catchment that would become flood free in the 100 year ARI event as a result of the project. There are around 16 properties that would become flood free in the probable maximum flood event. Roads and Maritime would provide Shellharbour City Council with the details of these properties.

Roads and Maritime would undertake consultation with Shellharbour City Council regarding the Croome Road basin discharge configuration during detailed design. The new detention basin at Croome Road would be handed over to Shellharbour City Council on completion. Shellharbour City Council would be responsible for any ongoing management and maintenance of the basin.

Issue 17

Water quality treatment and management – reference is made to detail in the environmental impact statement, however Council is unaware as to how water quality impacts will be managed and what / if any devices are proposed and where they will be located. In managing the stormwater it is anticipated that the Roads and Maritime will create and maintain any and all stormwater treatment ponds.

Response 17

Section 5.11 of the environmental impact statement details the road drainage and water quality controls that would be incorporated into the construction and operation of the project and they are mapped in Figure 5-1 to 5-10 of the environmental impact statement. The assessment of the effectiveness of the proposed water quality treatment strategy in mitigating the water quality impacts of the project is discussed in Section 16.3.2 of the environmental impact statement.

The existing road network has limited provision for treating stormwater runoff. The project's water quality treatment strategy would produce a net benefit over the existing situation by reducing the amount of total suspended solids, nutrients and gross pollutants delivered to Lake Illawarra on an annual basis.

The operational phase stormwater treatment devices located within the road reserve would be maintained in agreement developed in consultation with Council.

Issue 18

Transverse Drainage and Flood Mitigation Structures – For those structures that council currently maintains that are proposed to be extended or augmented e.g. Green Meadows basin, East West Link – Council seeks clarification on whether the ongoing maintenance of these assets be the responsibility of Roads and Maritime.

Response 18

Roads and Maritime would continue to consult with Shellharbour City Council regarding the ongoing maintenance of the traverse drainage and flood mitigation structures.

Issue 19

Taylor Road – Council is unclear on what options have been considered to manage impacts on Taylor Road regarding flood levels and duration of flooding. It is evident from the modelling that there are detrimental impacts in some events particularly more frequent flood events. Consideration should be given to what options are available to reduce the flood vulnerability at this location. Any detrimental impact on flood behaviour at this location is considered unacceptable given the frequency of flooding and vulnerability of flooding.

Response 19

Section 6.2.3 of Technical Paper 3 – Hydrology and Flooding details the impact of the project on flooding at Taylor Road. The intersection of the Illawarra Highway and Taylor Road is currently flooded in the 2 year ARI and this situation would not change as a result of the project. The project would result in:

- No change in flood levels at Taylor Road for the 2, 5 and 50 year ARI flood events
- A decrease in flood levels for the 100, 200 and 500 year ARI events, and for the probable maximum flood
- Minor increases in flood depth of three centimetres for the 10 and 20 year ARI events.

The duration of inundation would be subject to minor increases as follows:

- From 30 minutes to 45 minutes in the 2 year ARI event
- From 110 minutes to 130 minutes in the 5 year ARI event
- From 135 minutes to 160 minutes in the 10 year ARI event
- From 245 minutes to 265 minutes in the 20 year ARI event
- From 335 minutes to 370 minutes in the 50 year ARI event.

These minor negative impacts on flooding at Taylor Road would be offset to an extent by the positive impacts for the larger flood events. This includes a decrease in the flood level of up to 30 millimetres in larger storm events at this location.

Additional work would be undertaken during detailed design to avoid further identified negative flood impacts through a process of iterative flood modelling and design refinement.

Issue 20

2013 Bureau of Meteorology Intensity Frequency Duration Data – The process of preparing the Macquarie Rivulet flood study has identified significant issues with the 2013 Bureau of Meteorology Intensity Frequency Duration Data. It is recommended that Roads and Maritime avoid the use of the data until further advice from Shellharbour City Council, NSW Office of Environment and Heritage and Engineers Australia.

Response 20

Technical Paper 3 – Hydrology and Flooding explains that the hydrological model uses intensity–frequency–duration design rainfall data from the 1987 issue of Australian Rainfall and Runoff (Engineers Australia, 1987). Revised intensity–frequency–duration data was released by the Bureau of Meteorology in 2013, based on an updated rainfall data set. Australian Rainfall and Runoff (Engineers Australia, 1987) is also under review and will guide the use of the revised intensity–frequency–duration data. This current assessment falls within the two-year transition period set by Australian Rainfall and Runoff (Engineers Australia, 1987), during which either 1987 or 2013 intensity–frequency–duration data may be adopted.

Shellharbour City Council's advice regarding the 2013 Bureau of Meteorology data is noted by Roads and Maritime. The flood models used for the project include the rainfall data from the 1987 version of Australian Rainfall and Runoff.

Issue 21

Flood Impacts – It is noted that two properties are detrimentally impacted in Macquarie Rivulet and that the impacts reported relate to overfloor flooding. What is unclear is what impacts are expected over private properties including impacts on garages etc, in addition to habitable areas of dwellings. Council is of the view that identification of the location of these impacts and proposed remediation is important.

Response 21

Roads and Maritime would continue further investigation of the potential flood impacts arising from the project and available mitigation options for properties 1, 2 and 3 located in the Macquarie Rivulet catchment.

Technical Paper 3 – Flooding and Hydrology and Chapter 8 of the environmental impact statement and the additional hydrology and flooding assessment (Appendix C of this report) provides a comprehensive assessment of the potential impacts of the project on flood behaviour in the Macquarie Rivulet catchment. Section 3.3.4 of the additional hydrology and flooding assessment states that at property 2 (dwelling 1), there would be an increase in the depth of over-floor flooding in the 100 year ARI event of 35 millimetres. The dwelling is flood free in the 50 year ARI event both with and without the project. At property 3 (dwelling 2), there would be an increase in flood depths for the 100 year ARI event with the project, but this would remain below the floor level of the dwelling.

The impacts of flooding on any structures (such as sheds) on the properties was not explicitly assessed in the environmental impact statement, but can be inferred by examining the revised flood mapping in the additional hydrology and flooding assessment (Appendix C of this report). Floor level survey of any structures would be required during detailed design to identify flood impacts.

A comparison with the 2016 draft Macquarie Rivulet Flood Study found that flow rates and flood levels for a range of design storm events are lower in the July 2016 draft flood model compared to the model used in the environmental impact statement resulting in a reduction to the potential impacts on properties 2 and 3 (refer Section 2.3 of Appendix C). In the event the impact on these properties cannot be reduced during detailed design, mitigation measure HF06 (refer Table 6-1 of this report) commits Roads and Maritime to working with the affected property owners to identify suitable site-specific mitigation measures to address the identified impacts.

Issue 22

Geomorphic assessment should be completed in conjunction with flood modelling if the aim is to minimise changes to natural stream flow and velocity, especially at critical locations where creek alignment or function is proposed to change. There is significant evidence that the soils in the project area are very erosive if not stabilised sufficiently. Reference to Dr Gerald Nanson's (University of Wollongong) paper on the Geomorphology of the Illawarra streams may be of assistance. Assessments to consider flow behaviour, including depth, velocity and direction, resistance of material to scour, including soil shear stress, particle size and vegetation and other land uses (e.g. is access required across scour protection area) should be considered.

Response 22

The potential impacts of the project on watercourses in the project area are assessed in Technical Paper 3 – Hydrology and Flooding and Chapter 8 of the environmental impact statement. Chapter 16 on soils and surface water quality considers the potential impacts of erosion.

The potential for the project to result in increased scour and erosion of watercourses is recognised. The changes in flow velocities during flood events are expected to be minor and, consequently, impacts on bed and bank stability are expected to be minor, and associated largely with the flood mitigation and drainage structures.

Reference is made to management measure HF07 in Section 8.5 of the environmental impact statement and Section 6.2 of the additional hydrology and flooding assessment (Appendix C of this report), which provides for further geomorphological assessment at the detailed design phase for all watercourses, with the aim of minimising changes to natural stream flow and velocity. This further assessment would consider existing information on geomorphology including soil erosivity, such as the study provided by Shellharbour City Council in Issue 22.

Chapter 8 of the environmental impact statement states that an assessment of the bed and bank stability and potential for scour would be undertaken as part of detailed design (environmental management measure HF08). This assessment would occur during detailed design to make certain the findings are fed directly into the design process, ensuring that measures are incorporated in the design to adequately protect bank stability. Roads and Maritime appreciates the provision of the reference regarding geomorphology of Illawarra streams.

3.6.5 BIODIVERSITY

Issue 23

There is no consideration of the impact of fauna passage to / from Croom Reserve and Frazers Creek and vegetation to the south (mining land). Fauna studies conducted in 2014 showed a population of wallabies that utilise the reserve. An underpass will be provided for traffic travelling within the reserve. However, it will not be constructed specifically for fauna passage.

Construction of the bypass without dedicated fauna passage will prevent fauna passage to / from the escarpment via Frasers Creek and mining land to the south which will decrease available fauna habitat and impact genetic diversity of the species and other dependent species.

Response 23

Shellharbour City Council's concerns about the potential impacts on connectivity for wallabies using Croom Reserve are noted.

The occurrence of wallabies in the Reserve is not identified in Technical Paper 4 - Biodiversity Assessment Report. It is expected that the wallabies would be able to use the proposed shared path under the Frazers Creek bridge (BR11) to travel through the study area. It is not anticipated that there would be such high volumes of pedestrian traffic under this bridge to prevent them from using it if required. Riparian vegetation plantings along Frazers Creek will encourage the continued movement of fauna through this underpass. The resulting environment will be similar to the existing environment at this location.

The Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a) does not require explicit consideration of this species as it is not identified as a threatened species in the biodiversity credit calculator. Similarly, there are no biodiversity corridors in the study area as designated under the Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a) process. Hence, the presence of wallabies does not change the findings of the biodiversity assessment report.

Issue 24

Effects of battering on the adjacent vegetation in Croom Reserve for the on-ground carriageway have also not been considered at this stage of the environmental impact statement. Additionally, management of the edge effects (increased run-off, access for maintenance, rubbish, etc) will need to be considered and managed accordingly in perpetuity.

Response 24

Technical Paper 4 – Biodiversity Assessment Report and Chapter 9 of the environmental impact statement provide a comprehensive assessment of the potential direct and indirect impacts of the project on biodiversity. The assessment was undertaken in accordance with the requirements of the Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a).

Section 5.2.3 of Technical Paper 4 - Biodiversity Assessment Report lists a range of potential indirect impacts during the operational phase, including:

- Light spill from motorway lighting

- Weed encroachment
- Increase in pest animals specialising in edge habitats
- Road traffic noise
- Road pollutants entrained in stormwater runoff.

It is noted that the edge effects resulting from clearing of 0.15 hectares of Croom Reserve would not result in substantially different edge effects than those that occur at present.

No State significant biodiversity links occur in the development footprint of the project.

Management measures to address these impacts are presented in Section 9.5 of the environmental impact statement. Key mitigation measures include BD01 (which requires implementation of the Biodiversity Offset Strategy) and BD03 (which requires implementation of management measures as part of the construction environmental management plan to meet the requirements of Roads and Maritime's Biodiversity Guidelines) (Roads and Traffic Authority, 2011).

3.6.6 NON-ABORIGINAL HERITAGE

Issue 25

An area that is included in the deferred land and is currently under Shellharbour Rural Local Environmental Plan 2004 is the proposed Illawarra Business Park. This land contains both the original location of Marks Villa (which is referred to on page 84 as having archaeological potential) and the relocated Marks Villa (58 Tongarra Road, Albion Park) which is adjacent to Ravensthorpe. The possible impacts of the proposed bypass on this significant farm complex appear to have not been addressed in this report. Although this site was removed from the heritage schedule as part of the Illawarra Business Park Part 3A approval it currently retains its local heritage significance and should be considered in the assessment as it is located closer to the proposed bypass than Ravensthorpe.

Response 25

A comprehensive assessment of the potential impacts of the project on heritage is presented in Technical Paper 7 – Non-Aboriginal Heritage and Chapter 11 of the environmental impact statement. As noted in Shellharbour City Council's response, the archaeological potential of Mark's Villa is referred to in Technical Paper 7. The assessment noted that an area likely to contain the potential archaeological remains of Marks Villa has been removed from the proposed works boundary during the concept design process to avoid direct impacts. The assessment also identifies the connection of Marks Villa to Illawarra Regional Airport.

The project would not result in a direct impact on the Marks Villa site. Visual impacts were not assessed as part of the non-Aboriginal heritage assessment due to the substantial alterations to Marks Villa following its relocation behind Ravensthorpe. This included changes to the exterior of the homestead (including new roofing and removal of original chimneys), as well as changes to the room layout and its division into two separate dwellings.

Issue 26

With regards to Swansea homestead (which is owned by Council and currently located on the same lot as Croom Sporting Complex) Council would like to advise that there must be no impact from proposed road widening in front of Swansea homestead which could affect the curtilage or structures of the heritage item.

Response 26

Impacts on Swansea Farm House (LEP no. 198) are assessed in Section 11.3 of the environmental impact statement and as part of the assessment of proposed design refinements (Section 2). It is not proposed to carry out road widening that would affect the curtilage or structures of this heritage item. However, proposed changes to the layout at Croom Regional Sporting Complex would result in a moderate impact on the curtilage of this item (see Section 5.5.5 for further information).

Issue 27

The proposed removal of the Boles Meadow Homestead and associated structures is regrettable. However, Council supports the proposed archival and archaeological measures that are proposed. This will at least enable the historic story of this significant item to continue to be told.

Response 27

Roads and Maritime acknowledges Shellharbour City Council's support for the archival and archaeological measures proposed for the Boles Meadow Homestead. Roads and Maritime's commitment to managing the impact on Boles Meadow Homestead is identified in environment management measure HH02:

- Archival recording of the Boles Meadows Homestead, vegetation and outbuildings would be undertaken prior to any impact on these items. This recording would include a photographic record of the homestead, significant outbuildings, their original context, layout, building materials and methods used during their construction. The recording would be undertaken in accordance with the guidelines in How to Prepare Archival Records of Heritage Items (NSW Heritage Office, 1998).

Issue 28

The mitigation measures proposed for the unlisted remains of Tongarra Road Homestead and Stapletons Bridge are supported. It is worth noting that Stapletons Bridge is also in the proximity of what was known as Missinghams Tannery site. Details of this unlisted area can be obtained from the Tongarra Heritage Museum.

Response 28

Roads and Maritime acknowledges Shellharbour City Council's support for the management measures proposed. Roads and Maritime's commitment to managing the impact on Tongarra Road homestead is identified in environment management measure HH03:

- An archaeological investigation will be undertaken for the heritage listed sites at:
- Terry's Meadows (including Boles Meadows Homestead)

- Tongarra Road Homestead
- An excavation and salvage methodology will be prepared in consultation with the Department of Planning and Environment and the Heritage Council prior to commencement. A report will be prepared to outline the results of the investigation.

The location of Missinghams Tannery, while not precisely known, is not anticipated to be within the project boundary. The Roads and Maritime section 170 listing for Stapletons Bridge notes that the tannery was located on Stapletons Hill, west of the study area. Consequently, the site was not assessed within the non-Aboriginal heritage assessment. In the event that the former tannery was located within the project boundary, it is possible that some archaeological items may remain. If it was located within the project boundary, it is anticipated that there would be a low likelihood of archaeological remains, as the site would have been located within the floodplain (if it was located within the project boundary). In the event that remains are discovered during construction, Section 11.5 of the environmental impact statement provides measures to minimise impacts, including measure HH05:

- If unexpected archaeological finds are discovered during construction, the Unexpected Finds Procedure will be followed (Roads and Maritime, 2015a). The NSW Heritage Division will be notified of the discovery of a relic in accordance with Section 146 of the *Heritage Act 1977*. Construction personnel will be inducted in their responsibilities under the *Heritage Act 1977* and trained in the Procedure.

Issue 29

The mitigation measures proposed for Ravensthorpe are also supported. In this regard, Council has had early discussions with the current owners regarding suitable species for screen planting.

Response 29

Roads and Maritime acknowledges Shellharbour City Council's support for the mitigation measure proposed. Roads and Maritime's commitment to managing impact on Ravensthorpe is identified in environment management measure HH01:

- The landscape plan will be developed to minimise visual impacts on heritage items, including the Ravensthorpe Grounds and Workers Cottages, and the House on the Princes Highway, Yallah. In accordance with the landscape plan, planting on private land has taken place to screen the visual impact of the motorway on these items. Planting was undertaken in October 2016 in consultation with relevant property owners.

Issue 30

Council would like clarification on whether the bridge referred to on page 81 under the heading floodways is the Princes Motorway bridge crossing and whether this bridge is scheduled for removal.

Response 30

Roads and Maritime acknowledges the minor inaccuracy identified. The existing bridge across the Macquarie Rivulet is not proposed for removal as part of the project.

Issue 31

Council would also like to bring to your attention the following typographical errors that need to be acknowledged and or corrected:

- Page 19: The description of the image is incorrect. The dark blue line is the project area not Terry's Meadow Estate
- Page 30: Table 5 B should also reference association with the Youll Family. 4.3.1.2 should also reference association with the Youll family
- Page 33: Last paragraph. Swansea homestead is no longer used as a caretaker's residence and is currently vacant
- Page 41: 4.3.3.3 refers to figure 21, but should be figure 22
- Page 44: Spelling mistake 'cum' should read 'which became the ...Repeated on page 45
- Page 51: Last sentence should read 'old bails'
- Page 54: Figure does not show total area of LEP listed site – excludes Centenary Hall, Rural Fire Service building and other structure on the southern boundary
- Page 67: 6.1.1.3 should read Illawarra Light Railway Museum not Albion Park Museum. This occurs again on p68 under D Social significance, and G representativeness
- Page 84: 3rd line should be 'Rail' not 'Railway'
- Page 87: Last item – House – last column should refer to Wollongong Council not Shellharbour.

Response 31

Roads and Maritime acknowledges the minor typographical errors within Technical Paper 7 – Non-Aboriginal Heritage, as noted in Shellharbour City Council's submission. However, the conclusions regarding the nature of impacts on non-Aboriginal heritage are still valid.

3.6.7 SOCIO-ECONOMIC

Issue 32

The environmental impact statement recognises that the project may impact on retail and commercial businesses relying on highway dependent trade. The closing or reduced viability of businesses will potentially lead to loss of income, which is concerning since the median individual, family and household incomes in Shellharbour local government area are all below that of NSW and unemployment rates are already higher. It would be beneficial if Roads and Maritime put in place measures to mitigate potential negative impacts.

Similarly, mitigation plans should also be provided to address possible detrimental impacts on community cohesion and identity for residents who currently access Woollybutt Drive and Durgadin Drive.

Response 32

Detailed socio-economic and business impact assessments have been carried out for the project; provided in Technical Paper 9 – Socio-economic and summarised in Chapter 13 of the environmental impact statement. The assessment identified potential impact to highway dependent trade noting that reductions in turnover would be likely to result in reduced levels of employment within the businesses. It would be likely to result in lower employment due to reduced trading hours, as it would be unlikely they would continue to operate 24 hours a day once the highway is bypassed.

Businesses along the highway that are not highway dependent may on the other hand find that their trade increases due to faster travel times, and local trade is stimulated by an easier and less congested shopping environment.

Sections 4.4 and 4.5 of Technical Paper 9 - Socio-economic provide commentary on the likely impacts of the project on the identity and character of the area, and on community cohesion. It states that, functionally, the existing connections between urban and rural areas would not be changed. The two east-west connections which have been identified as critical to the functioning of the community, would continue to function in much the same way they currently do.

It was concluded that the landscape backdrop which constitutes an important community value would be retained; however, there would be an increased demarcation of the urban edge of the area. The other types of characteristics which were valued, including 'the people', the 'sense of community', 'community values' and 'community spirit'; and the 'unique culture', 'laid back lifestyle', 'progressive attitudes' and peaceful lifestyle, are not expected to be altered as a result of the project. A major improvement in the character of highway communities could be anticipated to occur with the reduction in traffic volumes on the Princes Highway through the centre of urban areas. Overall it is considered the effect on local identity and character from the Princes Highway corridor would be beneficial (refer Section 4.4 of Technical Paper 9).

Section 4.5 of Technical Paper 9 describes the relatively limited opportunities for community interaction in Albion Park Rail in particular, and relatively few community organisations, events and cultural, community or recreation facilities. It is possible that the project would therefore result in an improvement in personal safety, peaceful lifestyle, quality of life and quality of the residential and retail environment would occur with the bypassing of Albion Park Rail. The amenity of the area would improve due to the reduction in traffic volumes and traffic noise in these suburbs. These qualities would be much more conducive to the development of a sense of community in the suburb.

It is important to also note that the communities of Albion Park Rail and Albion Park would not be severed. This is important for the retail trade of Albion Park, given the distance from Albion Park Rail to Shellharbour City Centre is similar to that to Albion Rail. Tongarra Road would pass under the motorway, and the appearance and function should remain unchanged. The perception of severance would be reduced by the high level of the motorway at this point and the ability to pass under it. Any improvements to cycle and pedestrian links along this route would improve cohesion.

With specific regard to access along Woollybutt Drive and Durgadin Drive, Roads and Maritime would consult with the community to address relevant concerns prior to road closures in this area. Notification signage would also be installed at the road locations prior to closure.

The socio-economic impact assessment concluded that, overall, community cohesion in highway communities may be improved by the bypassing of Albion Park Rail.

Issue 33

There is an opportunity for public art to be incorporated into the design and infrastructure and Shellharbour City Council would welcome the opportunity to be involved in the preparation and implementation of a public art strategy for the project.

Response 33

Roads and Maritime have not proposed any public art as part of this project. Roads and Maritime are supportive of Shellharbour City Council undertaking public art on Council owned land such as the Croom Regional Sporting Complex.

Issue 34

It is recommended that further community consultation in Albion Park Rail is conducted in the future with established community groups and committees. Shellharbour City Council would be willing to link you with specific committees and networks such as Shellharbour City Business Network and Shellharbour's Crime Prevention Partnership to seek further community comment or relay information about the plans.

Response 34

Section 1.3 of this report provides a summary of consultation carried out to date, as well as proposed future consultation. Road and Maritime will continue to provide opportunities for the community to participate during the ongoing development and delivery of the project.

3.6.8 LANDSCAPE CHARACTER AND VISUAL AMENITY

Issue 35

Adverse visual and landscape impacts are usually associated with the development of major new motorway works such as those proposed. The proponent's attempts to manage these are acknowledged as are the limitations in doing so given the inherent financial / spatial / functional design constraints and the project stated objectives.

Response 35

Roads and Maritime acknowledges Shellharbour City Council's support of the environmental management measures and design elements proposed to minimise visual impacts from the project. Roads and Maritime's commitment to managing visual impacts is identified in Section 14.5 of the environmental impact statement and Appendix I of this report.

Issue 36

The determining authority in its assessing the environmental impact statement needs to ensure that visual and landscape impacts are minimised and managed as far as practicable. In addition the following also needs to be considered:

- Potential human / animal access to steep, accidental drops
- Isolated and or vegetated spaces which are conducive to anti – social behaviour (including dumping, graffiti or loitering) contrary to the principles of Crime Prevention Through Environmental Design.

The final detailed design including landscape design needs to account for the above.

Response 36

Section 5.19 of the environmental impact statement and Technical Paper 10 – Landscape Character and Visual Amenity outline the urban design and landscape objectives and features of the project.

These urban design objectives and principles would be reviewed and, if required, refined during detailed design. The project design would also be influenced by the Crime prevention by design guidelines and the assessment of development applications guidelines under section 79C of the

Environmental Planning and Assessment Act 1979 (Department of Urban Affairs and Planning, 2001).

As discussed in Section 3.4.3, the motorway would have controlled access fencing to prevent pedestrians from accessing the road corridor preventing access to slopes or drops within the road corridor.

3.6.9 LAND USE

Issue 37

Future greenfield area yields are mentioned on page 471. These figures should be vetted with the Department of Planning and Environment's regional team who are currently working on the latest Illawarra Urban Development Update Report and Illawarra Regional Growth Plan.

Response 37

The future development areas (i.e. greenfield areas) identified in Section 15.2.3 of the environmental impact statement have been sourced from planning documents and development application approvals granted by the Department of Planning and Environment and / or Wollongong City Council and Shellharbour City Council. Further consultation was also undertaken with these agencies including the Department of Planning and Environment's regional team during environmental impact statement exhibition and design refinement processes to further refine the development forecasts in the modelling undertaken as part of the assessments included in this report. The future development areas and their potential yields adopted in the assessment are consistent with strategic land use planning for the region. The timing of development of these areas would be dependent upon a range of factors, including market demand.

Issue 38

The determining authority in its assessment / determination should ensure impacts described in this chapter and other parts of the environmental impact statement are minimised as far as practical. In doing so, the determining authority should ensure relevant land owners are consulted.

These impacts include:

- Property acquisition (including partial and total acquisitions) resulting in a permanent change in land use
- Property severance impacts and reduced viability of land
- Changes to property access, which would be beneficial for some properties and adverse for others
- Improved access for future growth areas, and separation of through and local traffic
- Conversion of land currently used for agriculture as a result of the reconfiguration of Croom Regional Sporting Complex, which would result in new and upgraded facilities, better parking and improved access.

Response 38

A detailed assessment of land use impacts resulting from the project is provided in Chapter 15 of the environmental impact assessment, including identification of the impacts listed above. Section 15.5 provides environmental management measures proposed to minimise land use impacts. Roads and Maritime will continue to consult directly with impacted land owners.

3.6.10 CUMULATIVE IMPACTS

Issue 40

The Department of Planning and Environment should clarify on page 569 whether or not their concept plan approval for the Illawarra Regional Business Park has lapsed.

Response 40

Under Section 95 of the *Environmental Planning and Assessment Act 1979* a development consent lapses after five years from which it operates. Approval was granted to the Illawarra Business Park development in 2009 however, no works have subsequently commenced and as such this approval has lapsed.

It is understood that this site currently forms part of the dairy enterprise located adjacent to the Illawarra Highway.

3.7 WOLLONGONG CITY COUNCIL

3.7.1 TRAFFIC AND TRANSPORT

Issue 1

The proposal necessitates a deviation of Yallah Road whereby the location of Yallah Road is shifted south and will go over the bypass, and then intersect with the Princes Highway. Given the causative effect of the deviation is the bypass, it is considered the Roads and Maritime be accountable for costs of the deviation works.

Response 1

A comprehensive assessment of the traffic impacts of the project is provided in Technical Paper 1 – Traffic and Transport and Chapter 7 of the environmental impact statement. The traffic assessment has since been revised to include the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix A of this report.

Upgrades to Yallah Road will be driven by Marshall Mount and Calderwood population growth, as stated in Section 6.5.1.5 of Technical Paper 1 – Traffic and Transport. The need for the Yallah Road upgrade is not due to the impact of the Albion Park Rail bypass, and Yallah Road does not have direct access to the Albion Park Rail bypass. The alignment of Yallah Road has been considered with the Albion Park Rail bypass based on consultation with Wollongong City Council that indicated Yallah Road would be a major link to the new development areas to the west and that the current alignment of Yallah Road would not meet the requirements of this future capacity.

The Yallah Road upgrade will be developed by Wollongong City Council, however to ensure appropriate integration with the Albion Park Rail bypass, an upgrade to Yallah Road between Larkins Lane and the Princes Highway at Yallah would be undertaken as part of this project.

The design of Yallah Road allows for the future upgrade of the road to four lanes (two lanes in each direction), including a potential upgrade to the intersection with the existing Princes Highway. However, this upgraded intersection with the existing Princes Highway is not part of the Albion Park Rail bypass project. Roads and Maritime will monitor traffic performance at the Yallah Road / Princes Highway intersection, and the timing of the upgrade will be assessed based on the in level of development in Marshall Mount / West Dapto and future funding priorities.

Funding of the upgrade of Yallah Road as detailed in the environmental impact statement will be the subject of future negotiation between Roads and Maritime and Wollongong City Council.

Issue 2

Calderwood and impacts

Council previously stated it was concerned with the significant forecast future traffic volumes using Marshall Mount Road following both the implementation of the bypass and the expected development of Calderwood. Further, Council recommended that further infrastructure upgrades to improve the level of service for access for Calderwood traffic to / from the new bypass and to alleviate the above local road impacts of through traffic should be considered.

It appears that the environmental impact statement has not considered any such additional infrastructure, and instead is reliant upon the implementation of the Tripoli Way extension to cater for the traffic demands of the new development area.

The Technical Paper 1 - Traffic and Transport (Section 6.5.2.4) notes that the intersection of Tongarra Road and Terry Street will have unacceptable operation by 2020 unless the Tripoli Way upgrade is completed. The uncertain timing of the Tripoli Way extension is of concern to Council, because any increase in congestion and delays at Tongarra Road / Terry Street will further redistribute and encourage northbound traffic to short cut along Marshall Mount Road / Yallah Road. Any potential adverse impacts in this regard have not been identified in the environmental impact statement.

Response 2

Section 5.1.1 of Technical Paper 1 and Section 5.4 of the environmental impact statement identify that the traffic modelling considered future traffic volumes taking into account the nearby future growth areas, including both Marshall Mount and Calderwood. Any increases in traffic volumes on Yallah Road or Marshall Mount Road would be the result of future development in these areas.

Shellharbour City Council will be developing and delivering the Albion Park bypass (Tripoli Way). Roads and Maritime has committed to continuing ongoing consultation with Shellharbour City Council during the development of Tripoli Way and the Albion Park Rail bypass. At their meeting of 27 October 2015 Council resolved to adopt an accelerated development program to enable commencement of construction of Tripoli Way coincident with the ramps for the Albion Park interchange of the Albion Park Rail bypass. One of the issues that will be monitored and further investigated is the performance of the Terry Street / Tongarra Road intersection. It is noted that this intersection in its current form would continue to be a key constraint in the local road network with or without the Albion Park Rail bypass or Tripoli Way.

Issue 3

The Technical Paper tables results of intersection analysis of Tongarra Road / Terry Street intersection (with Tripoli Way extension in place), however doesn't include any analysis or commentary on the operation or proposed layout of the Tripoli Way / Terry Street intersection, which is hoped to cater for the majority of traffic to / from Calderwood. Whilst Council supports the provision of the Tripoli Way connection, there are some obvious challenges with providing this intersection, for example southbound weave manoeuvres from the M1 northbound off-ramp to Tripoli Way, and possible queuing of southbound traffic due to the opposing northbound on-load traffic demand at the Tripoli Way intersection. If Roads and Maritime is relying on Tripoli Way to address the substantial performance issues at Tongarra Street / Terry Street, then it is very important that the environmental impact statement confirms the acceptable design and operation of the new Tripoli Way / Terry Street intersection. This also has ramifications for the future traffic demands on Marshall Mount Road which is a serious concern for Council, as detailed above.

Response 3

A comprehensive assessment of the traffic impacts of the project is provided in Technical Paper 1 – Traffic and Transport and Chapter 7 of the environmental impact statement. The traffic assessment has since been revised to include the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix A of this report. The analysis adopted a signalised intersection for the Terry Street intersection with Tongarra Road (refer Table 5-7 and Table 5-8 of Appendix A of this report). As described in the response above, as part of the proposed design refinements, the northbound exit-ramp has been relocated to connect with Tongarra Road. This eliminates potential issues in the previously proposed (environmental impact statement) northbound exit-ramp layout related to weaving and queuing on approach to Tripoli Way.

As stated in Sections 5.3 of Technical Paper 1 – Traffic and Transport, the Albion Park bypass (Tripoli Way) and the connection to Terry Street is driven by the proposed development at Calderwood. Traffic capacity at the Terry Street / Tongarra Road signalised intersection will be driven by both background traffic growth and additional traffic from the future growth areas (refer Section 6.5.2.4 of Technical Paper 1 - Traffic and Transport). This intersection would fail by 2020 without Tripoli Way as a result of the increase in traffic volumes. The Albion Park Rail bypass project is not expected to have any implications for Terry Street / Tongarra Road.

Shellharbour City Council will be developing and delivering the Albion Park bypass (Tripoli Way), and at their meeting of 27 October 2015 Council resolved to adopt an accelerated development program to enable commencement of construction of Tripoli Way coincident with the ramps for the Albion Park interchange of the Albion Park Rail bypass. The potential impacts of Tripoli Way on the Terry Street / Tongarra Road intersection would need to be assessed as part of the environmental impact assessment undertaken for the Albion Park bypass (Tripoli Way).

Should the Albion Park bypass (Tripoli Way) project not be implemented by the opening of the Albion Park Rail bypass project Roads and Maritime will review the capacity of the intersection of Terry Street / Tongarra Road and investigate future upgrade needs.

Issue 4

Council previously questioned whether cycling would be permitted on the new bypass and connectivity across the bypass at Illawarra Highway. It appears from Section 6.7.3 and Figure 6-21 of Technical Paper 1 - Traffic and Transport, that cycling will be permitted on the Albion Park Rail bypass, and a cycle connection from Tripoli Way to the cul-de-sac in Illawarra Highway has been included.

Referring to Figure 6-21 specifically, it would appear that access from the major east-west cycleway crossing points to / from the M1 shoulder cycleway could be improved. For example, access from Yallah Road bridge shared user path to the M1 southbound is not provided. It would also appear that there is no southbound access to the M1 from the northern cul-de-sac section of Illawarra Highway. Providing infrastructure to allow improved cyclist access to / from the Albion Park Rail bypass would allow greater convenience and flexibility in route choice for more competent cyclists.

Response 4

The existing cycleway and those proposed for construction by the relevant Council are shown on Figure 3-6 and Figure 3-7 of the addendum traffic and transport assessment (Appendix A of this report). As discussed in Section 5 of this report, the project would provide improved connectivity for pedestrians and cyclists via the provision of both on and off road shared paths.

As shown in Figure 3-7 of the addendum traffic and transport assessment (Appendix A of this report), there is a shared path proposed as part of the project that connects with Yallah Road, travelling over the bridge and up to the limit of the project (i.e. the project boundary).

The environmental impact statement proposed an off-road shared cycle and pedestrian path along the existing Illawarra Highway. The proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities. Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings.

Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project).

The shared path to be constructed as part of the project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement.

Issue 5

Yallah Road connection to A1

Since the previous concept plan was presented to Council for feedback in November 2014, RMS has developed concept plans for an interim and ultimate Yallah Road connection to the A1 (Princes Highway), which Council supports.

Response 5

Wollongong City Council's support of the proposed design is noted although it is acknowledged that the ultimate plan for the Yallah Road does not form part of the Albion Park Rail bypass project.

Issue 6

Council has undertaken further Tracks, Sidra and Paramics modelling of the Yallah-Princes Highway Haywards Bay proposed interim and final upgrades and forwarded a copy of the report to Roads and Maritime's (refer "Princes Highway-Yallah Road Connection - Tracks Modelling Summary Sept 2015"). The report concludes that the interim connection scenario has at least a 10 year life given the development forecasts, and that beyond 10 years, the ultimate four-way signalised intersection would operate acceptably.

The environmental impact statement report includes the 'interim' upgrade at Yallah Road / Princes Highway, however the Traffic and Transport technical note states that the upgrade will cater for 2041 (ultimate) demands, but only includes an analysis of the existing 'Give Way' intersection with the service road. It does not consider the two closely spaced intersections either side of Haywards Bay bridge, which Paramics Modelling shows to be the critical factor in safe and satisfactory operation of the interchange. Bitzios Consulting undertook a Paramics microsimulation analysis of the Haywards Bay bridge under 2031 forecast traffic demands, concluding that it could operate effectively, however would fail under further 15-45 per cent traffic demand increases. It is noted that the 2036+ (ultimate development) demands in this area are some 59 per cent – 138 per cent higher than the 2031 demands, meaning the Haywards Bay interchange will not operate acceptably with the interim upgrade (existing Give Way intersection) soon after 2031.

The Traffic and Transport technical paper states that Roads and Maritime will monitor traffic performance of the Yallah Princes intersection to determine when the ultimate signalised intersection should be provided. However, given the above traffic operational and resultant safety concerns with Haywards Bay bridge, it is likely that the signalised upgrade would be required much earlier than the 2041 stated in the environmental impact statement.

Apart from the impacts of traffic congestion on Haywards Bay bridge and adjacent intersections, cycle and pedestrian access and safety is also a significant concern for Council. The bypass design proposes a shared user path on Yallah Road over the M1 - cyclists and pedestrians heading between the development area of Yallah-Marshall Mount and Albion Park, Tallawarra or Haywards Bay will be required to use the Haywards Bay bridge and adjacent intersections. Haywards Bay bridge is only approximately seven metres wide and given the significant volume increases expected up to and beyond 2031 under the environmental impact statement 'interim' upgrade arrangement, this will present safety issues for cyclists and pedestrians due to the need to cross busy intersections and the lack of appropriate width paths. The proposed ultimate four-way signalised intersection would address this issue by providing safe crossing of the A1 Princes Highway.

Consequently, Council urges Roads and Maritime to consider progressing the concept for the ultimate four-way signalised intersection of Yallah Road and the A1, including confirmation of property acquisition for the important fourth (eastern) leg of the intersection. This will ensure that an appropriate level of future access can be provided for the Yallah-Marshall Mount and West Dapto land release to the M1, via the A1 Princes Hwy.

Response 6

A comprehensive assessment of the traffic impacts of the project is provided in the addendum traffic and transport report which is included as Appendix A of this report.

In late 2016, the project team undertook detailed consultation with Wollongong City Council to establish the 'most likely' network geometry for the respective future year modelling horizons

In agreement with Council, the assumptions used in the Aimsun modelling are that the existing priority controlled intersection at Yallah Road / Princes Highway would be replaced by the offset traffic light arrangement, as developed by Wollongong City Council, by 2041. Ongoing traffic monitoring would be undertaken to determine the requirements for future upgrades.

Issue 7

Tallawarra (Yallah) interchange

Council remains supportive of the proposed Tallawarra (Yallah) interchange, including the interim left-in / left-out at Cormack Avenue. The following comments are provided based on Council's previous feedback:

- Weave issues on Princes Hwy (southbound) south of Yallah Bay Road - the technical paper considers merging sections (ie M1 southbound entry ramp merge), however the weave of traffic across two lanes to enter the M1 southbound off ramp appears not to have been considered. It is essential that Roads and Maritime address these issues as part of the detailed design process
- Given the unopposed eastbound traffic movement at the eastern roundabout, Council has concerns with queues / delays to the M1 southbound offload traffic at the roundabout. Whilst the technical paper Sidra analyses shows an average Level of Service (LOS) B at 2041 PM peak, the delay at the off ramp leg is not shown. Council has also undertaken Sidra modelling of the proposed roundabout under 2036+ (ultimate) traffic demands (refer 'Princes Highway-Yallah Road Connection – Tracks Modelling Summary Sept 2015'). The results show poor LOS and lengthy queues in the PM peak on the southbound off-ramp. Again, it is essential that Roads and Maritime address these issues as part of the detailed design process.

Response 7

Wollongong City Council's support for the Yallah interchange is noted.

An assessment of the traffic impacts of the project is provided in Technical Paper 1 – Traffic and Transport and Chapter 7 of the environmental impact statement. The traffic assessment has since been revised to include the potential impacts associated with the proposed design refinements described in Section 5 and is included as Appendix A of this report. The modelling approach used in this Appendix was developed through an ongoing consultation process with Council following the environmental impact statement exhibition period. The model used now includes data inputs and network geometry agreed to by Council.

Since the submission of the environmental impact statement, adjustments have been made to the eastern roundabout at the Yallah interchange with connectivity remaining the same (refer Section 5.3.1 Appendix A of this report).

A comprehensive assessment of operational performance in 2041 for the Yallah interchange is provided in Section 5.3.1 of the addendum traffic and transport assessment (Appendix A of this report). All entry and exit ramps at the Yallah interchange are expected to operate at an acceptable level of service in both AM and PM peak hour periods (Figure 5-11 of this report). Entry ramp merges are generally expected to operate at level of service C or better in both peak periods. This indicates that the interchange will function well, ensuring safe merging of traffic, there is not expected to be any delays that would result in queuing on the southbound exit ramp.

Issue 8

Illawarra Highway (Albion Park) interchange

Refer to previous comments above under "Calderwood and Impacts", regarding possible southbound weaving and queuing issues on approach to the future Tripoli Way intersection.

Response 8

As part of the proposed design refinements, the northbound off-ramp has been relocated to connect with Tongarra Road. This would eliminate potential issues in the previously proposed northbound exit-ramp layout related to weaving and queuing on approach to the Tripoli Way bypass. With the new interchange configuration and adequate advanced line marking and signage for vehicles exiting the bypass southbound, there are unlikely to be issues with weaving or merging on the approach to Tripoli Way / Terry Street intersection.

The optimum design of Tripoli Way and the local road network in Albion Park would need to be determined as part of the concept design and review of environmental factors prepared for the Albion Park bypass (Tripoli Way). This falls outside the scope of this assessment.

Issue 9

Realignment of bypass near Croom Sporting Complex

Council has no further comments to add regarding the bypass alignment in the vicinity of Croom Sporting Complex.

Response 9

Wollongong City Council's response is noted.

Issue 10

General comments on environmental impact statement traffic modelling

Council has reviewed the modelled future (2041) network volumes presented in the environmental impact statement Traffic and Transport Technical Paper. It has become apparent that in parts there are some very significant differences when compared to Council's modelling outputs. Council requests Roads and Maritime liaise further to clarify the apparent modelled traffic volume output differences.

Response 10

Since the exhibition of the environmental impact statement, Roads and Maritime has undertaken ongoing consultation with Wollongong City Council in regards to the modelling approach and input data. In particular:

- Consultation with Wollongong City Council was undertaken between September 2016 and November 2016 to address the traffic modelling comments raised in their submission (issues as identified above). The Southern Region, Department of Planning and Environment were present at some of these meetings.
- Agreement was established with Wollongong City Council on the spatial residential and employment forecasts, network geometry and the interim design year which was utilised in Appendix A

This new modelling methodology has been used in the updated traffic modelling and is shown in Appendix A.

3.7.2 HYDROLOGY AND FLOODING

Issue 11

The adopted performance criteria for the proposed bypass relating to flood immunity, being the 20 year Average Recurrence Interval (ARI) event is considered inappropriate for a major section of road infrastructure. This performance criterion should be increased to a minimum 100 year ARI event, to be consistent with major urban release areas such as West Dapto, such that accessibility is available to manage emergency response in existing / future residential areas for major flood events.

Response 11

The flood objectives for the project are presented in Section 8.1.2 of the environmental impact statement along with a brief justification of the adopted criteria.

Section 8.3.2 of the environmental impact statement and Section 3 of the additional hydrology and flooding assessment (Appendix C of this report) identify the operational phase impacts of the project. The level of flood immunity of the bypass is discussed with reference to each of the four catchments intersected by the project. The majority of the main carriageways would be above the current 100 year ARI flood level. This is a significant improvement on the existing condition, in which the existing road network is subject to short-term closures due to flooding every year, as described in Section 3.2.2 of the environmental impact statement.

There is one section of the main carriageway, around 160 metres long near the Duck Creek bridge (BR01 in Figure 5-1 of this report), at which two of three northbound lanes would be inundated to a depth of up to 0.25 metres in the 100 year ARI flood event (refer Table 6-1 of Technical Paper 3 – Hydrology and Flooding). This section would be flood free in the 50 year ARI flood. The road level of the main carriageway could not be raised higher in this location due to the need to tie into the level of the existing bridge, which is currently inundated in the 100 year ARI flood event. In the event of a flood of this magnitude, this section of the bypass would be classified as being low hazard under the Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005) and would remain passable for emergency vehicles.

Roads and Maritime appreciates that a desirable level of flood immunity for the project would be to the 100 year ARI flood level, and has largely achieved this desirable level.

There are several constraints that limit the ability of the project to achieve this level of immunity. As described above, the need to tie into the existing bridge at BR01 (Figure 5-1 of this report) means the bypass cannot be raised above the 100 year ARI flood level. There is also the need to achieve a balance between avoiding negative impacts on surrounding infrastructure and maximising the flood immunity of the project. These may be incompatible objectives; for example, further maximising the flood immunity of the project would require incursions into the airspace requirements for the Illawarra Regional Airport therefore affecting the flightpath of aircraft take-off and landing. This would have an overall impact on future aircraft operations, compared to the existing situation. There are also a range of other environmental aspects that need to be considered, and the design has been optimised in terms of the feasible level of flood immunity that could reasonably be achieved.

It is noted that the flood immunity criteria adopted for the project is based on comparing the flood levels and the motorway levels and does not account for freeboard. However, the Addendum Hydrology and Flood Assessment Report (Appendix C) describes the freeboard achieved at critical points along the motorway. The revised design generally achieves 0.5 metres freeboard to the 20 year ARI flood levels. The flood levels and freeboard achieved at the critical points along the motorway are summarised in Table 5-1 of the Addendum Hydrology and Flood Assessment Report (Appendix C).

Issue 12

The predicted flood impacts to adjoining lands as a result of the proposed bypass are considered to have a detrimental effect and therefore should be further mitigated.

Response 12

The anticipated flood impacts on land adjoining the project are presented in Technical Paper 3 – Hydrology and Flooding, Section 8.3 of the environmental impact statement and the additional hydrology and flooding assessment (Appendix C of this report). It is acknowledged that there are some minor, localised negative flood impacts on adjacent land resulting from the project. There are also some locations that would experience positive impacts in the form of reduced flood extents and/or depths (refer Figure 8-9, 8-12 and 8-15 of the environmental impact statement) with 23 properties in the Horsley Creek catchment becoming no longer flood impacted as a result of the project.

Where negative flood impacts are predicted, these would have implications for the ongoing and future use of the subject land. Section 8.1.3 of the environmental impact statement describes the iterative process of developing the concept design in a way that minimises flood impacts. This process would be repeated during the detailed design of the project, and any design changes would seek to either maintain or minimise any adverse flood impacts of the project on surrounding land.

Management measure HF06 (refer to Section 6.2 of the additional hydrology and flooding assessment in Appendix C of this report) provides a commitment by Roads and Maritime to re-assess potential negative impacts on property 1 and dwellings 1 and 2 during detailed design, specifically to minimise or avoid negative impacts. If this is not possible, Roads and Maritime would consult with the landowner to develop site-specific flood management measures for each property.

Issue 13

In particular, the predicted 2.5 metre flood level increase in the Duck Creek catchment in the 100 year event is likely to reduce the future development potential for existing agricultural land which is earmarked for future residential/industrial zoning as part of the Yallah Marshall Mount Precinct.

Response 13

The flood impacts on the subject property (property 1) are presented in Table 8-7 of the environmental impact statement. The flood levels at this location would increase by 2.5 metres in the 100 year ARI event and the flood extent would increase by 0.55 hectares. This would negatively impact the property and the future development potential of the land, and the flood hazard would remain high. The existing dwelling on the site would remain flood free (refer Section 8.3.2 of the environmental impact statement).

Roads and Maritime has committed to working with the owner of property 1 to provide site-specific flood management measures in management measure HF06 as required.

Issue 14

The predicted impacts of up to 400 millimetres in the Horsley Creek catchment in the 100 year event on existing recreational / agricultural land may also reduce the future development potential of this land.

Response 14

A comprehensive assessment of the potential impacts of the project on flood behaviour is provided in Chapter 8 of the environmental impact statement and Technical Paper 3 – Hydrology and Flooding.

The impacts of the project on flooding of agricultural and recreational land in the Horsley Creek catchment in the 100 year ARI event are shown in Figure 6-6 of Technical Paper 3 – Hydrology and Flooding. It is noted that this figure is incorrect due to an error in the legend that failed to identify areas that would become flood free in the 100 year ARI (shown in yellow). The figure has been updated and is provided in Section 4.5 of this report. A total of 23 properties in Albion Park Rail would become flood free in the 100 year ARI event as a result of the project due to the provision of a new detention basin near Croome Road.

Minor increases in flood levels would be mainly associated with drainage structures. The design of these structures would be reviewed in detailed design with a view to minimising these impacts.

There would be an increase in flood levels of greater than 400 millimetres near Croome Road associated with the proposed detention basin. This includes existing agricultural land that would be converted to a basin to store water and so would not be viable for future development. To the north of the bypass is an area that would be affected by an increase in flood levels in the 100 year ARI event of greater than 400 millimetres. This is associated with the outlet structure for the basin; this structure would be reviewed and the impact further mitigated (where feasible) during detailed design, as discussed in Table 6-7 of Section 6.3.1 of Technical Paper 3 – Hydrology and Flooding.

Issue 15

The predicted 54-83 millimetre flood level increase for dwellings identified in the Macquarie Rivulet catchment in the 100 year event will potentially increase the economic and social costs to the residents and overall community in the event of such a flood, being contrary to the requirements of the NSW Floodplain Development Manual.

Response 15

The additional hydrology and flooding assessment (Appendix C of this report) reports that property 2 (dwelling 1) would be subject to a 35 millimetre increase in flood levels in the 100 year ARI event, increasing the depth of over-floor flooding from 14 millimetres to 49 millimetres (a reduction from the impact proposed in the environmental impact statement). For property 3 (dwelling 2), there would be a flood level increase of 20 millimetres in the 100 year ARI event, with no over-floor flooding (also a reduction from the impact proposed in the environmental impact statement). These flood impacts would be mitigated at detailed design as required. However, if this is not possible, the flood impacts of the project on these two properties would be managed via management measure HF06, which requires Roads and Maritime to work with the property owner to provide site-specific flood management (refer Section 6.2 of the additional hydrology and flooding assessment). In this way, any increased economic and social cost associated with the flood impacts of the project would be minimised or avoided.

The NSW Flood Prone Land Policy, which forms Appendix A of the Floodplain Development Manual (Department of Infrastructure, Planning and Natural Resources, 2005), states that “a merit based approach shall be adopted for all development decisions, which takes into account social, economic and ecological factors, as well as flooding considerations.”

The development of the Albion Park Rail bypass project has sought to provide a balanced approach to managing the full range of social, economic and ecological impacts, as articulated in the environmental impact statement. While the project would have some negative impacts in relation to flooding, it would also deliver substantial flooding benefits (refer Section 8.2 and 8.3 of the environmental impact statement):

- There would be a significant improvement in access during flood conditions over the existing condition, with the majority of the new motorway being flood free in the 100 year ARI event, except for a small section at Duck Creek, which would be flood free in the 50 year ARI event. Currently, sections of the road network are closed due to flooding as much as seven times each year
- Access for local and through traffic would be improved during a flood event
- There would be improved access for emergency services and evacuation for both regular and rare flood events because the new motorway would be higher than the existing road network, which is regularly inundated by flood waters; currently the project area does not have designated flood evacuation routes (State Emergency Service, 2008 and 2010)
- There would be an improved level of flood immunity at Tongarra Road, increasing flood immunity from the two year average recurrence interval in the existing condition to the five year average recurrence interval
- Existing flood risk would be mitigated by constructing a new detention basin upstream of the bypass near Croome Road, resulting in 23 properties in the Horsley Creek catchment becoming no longer flood impacted. This would bring significant social and economic benefit to the community
- The project also incorporates emergency crossovers to enable traffic to continue should one of the carriageways be closed during a traffic incident.

A comparison with the 2016 draft Macquarie Rivulet Flood Study found that flow rates and flood levels for a range of design storm events are lower in the July 2016 draft flood model compared to the model used in the environmental impact statement (refer Section 2.3 of Appendix C). This assessment is considered to be the more conservative approach. Additional work would be undertaken during detailed design to avoid or further minimise the identified negative flood impacts through a process of iterative flood modelling and design refinement. Section 8.5 of the environmental impact statement and Table 6-1 of this report details a comprehensive range of mitigation measures to manage any residual flood impacts should the detailed design fail to improve these flood impacts.

Issue 16

Consideration should be given to the incorporation of multiple stormwater detention facilities within the proposed bypass project for each affected catchment (i.e. Duck Creek, Macquarie Rivulet, Horsley Creek) to assist in mitigating stormwater impacts to downslope catchments due to the proposed increase in paved area associated with the bypass.

Response 16

Within the Duck Creek and Macquarie Rivulet catchments, local runoff from the project would peak prior to the peak of flow within Duck Creek and Macquarie Rivulet watercourses. If onsite detention was implemented this would slow down the local runoff and bring the peak flow from local runoff and the peak flow within the major watercourses closer together. This would increase the flow rate within Duck Creek and Macquarie Rivulet resulting in a greater flooding impact.

As well as reconfiguring the Green Meadows detention basin to ensure that its function is maintained, the project incorporates a new detention basin upstream of the bypass near Croome Road. This would result in 23 properties in the Horsley Creek catchment that are currently in the floodplain becoming flood free (refer Section 8.3 of the environmental impact statement).

Issue 17

The potential for cross-catchment stormwater flows to occur for any storm event due to the proposed bypass does not appear to have been considered in the environmental impact statement. This item needs to be further investigated to ensure that flooding impacts due to any cross-catchment flows as a result of the proposed bypass alignment does not occur for any storm event.

Response 17

A comprehensive assessment of the impacts of the project on flood behaviour was undertaken for all three catchments within the project area, namely, the Duck Creek, Macquarie Rivulet and Horsley Creek floodplains. The results are presented in Chapter 8 of the environmental impact statement and Technical Paper 3 – Hydrology and Flooding. The three catchments were further assessed in the additional hydrology and flooding assessment (Appendix C of this report) in the context of the proposed design refinements, with the addition of Brooks Creek catchment at the northern extent of the project.

The assessment was undertaken in accordance with the Secretary's Environmental Assessment Requirements, which included modelling of a range of design events, expressed as annual exceedance probabilities:

- 10 per cent (equivalent to the 10 year ARI event)

- 2 per cent (equivalent to the 50 year ARI event)
- 1 per cent (equivalent to the 100 year ARI event)
- 0.5 per cent (equivalent to the 200 year ARI event)
- 0.2 per cent (equivalent to the 500 year ARI event)
- Probable maximum flood.

The Secretary's Environmental Assessment Requirements also required modelling of the 200 year and 500 year ARI events as proxies for assessing sensitivity to an increase in rainfall intensity due to climate change and, where applicable, the identification of land use changes.

The approach adopted for the flood modelling used catchment-wide flood models, and therefore incorporated any cross-catchment flows between sub-catchments (such as the Frazers Creek and Macquarie Rivulet sub-catchments within the larger Macquarie Rivulet catchment). There are no cross-catchment flows between the three main catchments (the Duck Creek, Macquarie Rivulet and Horsley Creek catchments).

3.7.3 BIODIVERSITY

Issue 18

Vegetation survey – Forest Red Gum – Thin-leaved Stringybark Grassy Woodland

In review of the vegetation survey, description and mapping of Derived Forest Red Gum - Thin-leaved Stringybark Grassy Woodland by NGH Environmental (2015), the following comments are provided:

- The VIS Classification 2.1 equates Forest Red Gum - Thin-leaved Stringybark Grassy Woodland on Coastal Lowlands, southern Sydney Basin Bioregion to the threatened ecological community Illawarra lowlands grassy woodland in the Sydney Basin Bioregion. While it is clear that the majority of the Derived Forest Red Gum - Thin-leaved Stringybark Grassy Woodland described and mapped by NGH Environmental (2015) would likely be considered planted or recruited from seed broadcast in areas of previous major earthworks for the Princes Highway and associated roads, this will not be the case for all mapped polygons. For example, the two mapped polygons in the Old Golf Course site have been inspected by Council officers and are not considered to be planted and this also accords with a review of historic aerial images
- The Plant Community Type Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion equates to the Biometric Vegetation Type SR 545 which the Biometric Veg Types Database equates to Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion
- The Biometric Veg Type SR 545 equates to GW page 34: South Coast Grassy Woodland by Tozer et al 2010 which identifies Illawarra Lowlands Grassy Woodland endangered ecological community as a 'Related threatened ecological community'.

Based on Council's site inspections and aerial photo interpretation, some areas described and mapped as Derived Forest Red Gum - Thin-leaved Stringybark Grassy Woodland by NGH Environmental (2015) within the Wollongong local government area are considered to be consistent with the NSW Scientific Committee (1999) Final Determination for Illawarra lowlands grassy woodland in the Sydney Basin Bioregion, particularly with reference to Clauses 2 and 9. As such, it is recommended that further vegetation surveys be carried out in the Wollongong local government area to establish more clearly what is likely to be two separate vegetation zones of the plant community type Forest Red Gum - Thin-leaved Stringybark Grassy Woodland, one of which is representative of Illawarra lowlands grassy woodland in the Sydney Basin Bioregion and one of which is not.

Response 18

Chapter 9 of the environmental impact statement and Technical Paper 4 – Biodiversity Assessment Report provide a detailed assessment of the potential impacts of the project on biodiversity, undertaken in accordance with the requirements of the Framework for Biodiversity Assessment (NSW Office of Environment and Heritage, 2014a).

The methodology in the Framework for Biodiversity Assessment (Office of Environment and Heritage, 2014a) requires use of a biodiversity credit calculator, and the vegetation identified via field survey must be selected within the calculator from a list of plant community types. Where the observed community type is not listed in the calculator, the closest plant community type must be selected from the list. The calculator does not contain a category for 'planted native vegetation', and so all patches of this type of vegetation surveyed in the field were defined as Derived Forest Red Gum - Thin-leaved Stringybark Grassy Woodland for the purposes of undertaking the calculations. At the time of the environmental impact statement exhibition, this vegetation type did not require offsetting under the biodiversity credit calculator, and hence offsets were not proposed in Technical Paper 5 - Biodiversity Offset Strategy.

It is understood that Issue 18 is suggesting the that the two patches of Derived Forest Red Gum - Thin-leaved Stringybark Grassy Woodland located within the Old Golf Course (near Yallah Road crossing of the motorway) should not be considered 'planted native vegetation', and in fact meet the requirements of the description of Illawarra Lowlands Grassy Woodland, endangered ecological community. As a listed community under the *Threatened Species Conservation Act 1995*, this would trigger requirement for offsetting as per the biodiversity credit calculator.

The vegetation survey data for the two patches of vegetation within the Old Golf Course has been reviewed, and they have been re-classified in the calculator accordingly as Illawarra Lowlands Grassy Woodland, and identified as requiring offsetting.

Since the environmental impact assessment, Illawarra and South Coast Lowland Forest and Woodland was listed as a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act, 1999* on 16 September 2016. This critically endangered ecological community corresponds closely to the NSW *Threatened Species Conservation Act, 1995* listed Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion endangered ecological community. Areas of Illawarra and South Coast Lowland Forest and Woodland within and adjacent to the project were determined during field assessment in June 2016. The assessment found that all patches of Woollybutt – White Stringybark – Forest Red Gum grassy woodland that met the Illawarra Lowlands Grassy Woodland *Threatened Species Conservation Act, 1995* listing criteria also meet the criteria for Illawarra and South Coast Lowland Forest and Woodland. Roads and Maritime have now prepared and submitted a referral under the *Environment Protection and Biodiversity Conservation Act, 1999*.

The revised biodiversity assessment report and biodiversity offset strategy have now been updated to reflect these changes. The revised reports form Appendices D and E of this report.

Issue 19

In relation to the survey effort for assessing vegetation communities, particularly replication of the plot data as opposed to actual sampling, it is understood from the Office of Environment and Heritage that additional vegetation survey work will be required.

Response 19

This comment is correct. Reference is made to the response provided to Issue 9 in Section 3.5.2 of this report.

Issue 20

Woollybutt - White Stringybark - Forest Red Gum and Eastern Flame Pea (*Chorizema parviflorum*)

It is understood the TransGrid site on Yallah Road is being considered as an offset site for Woollybutt - White Stringybark- Forest Red Gum and Eastern Flame Pea (*Chorizema parviflorum*). Collecting seed from representative individuals of *Chorizema parviflorum* whose removal cannot be avoided is suggested as an additional mitigation measure. Seed could be provided to the Wollongong Botanic Garden and the Australian PlantBank.

Response 20

Road and Maritime are committed to undertaking offsetting in accordance with the biodiversity offset strategy developed for the report and included in Appendix E. The collection of seeds is not proposed to be undertaken as part of this strategy. Should Wollongong City Council wish to collect seed prior to construction occurring for the Wollongong Botanic Garden, Roads and Maritime would consider providing access to the site.

Issue 21

Biodiversity offset strategy

Page 25 of the Biodiversity Offset Strategy prepared by NGH Environmental dated 9 October 2015 states Site 18 (park at the end of Wollingurry Street) is Council owned land. At present this parcel of RE1 zoned land (Lot 65 DP 1058949) is in private ownership, with the future intention for it to be handed over to Council, the date for which is yet to be confirmed.

Response 21

Wollongong City Council's advice on the land tenure of the subject lot is noted. Roads and Maritime would consult with Wollongong City Council on the transfer of ownership of the lot to Wollongong City Council and its potential use as an offset site in the biodiversity offset strategy.

3.7.4 ABORIGINAL HERITAGE

Issue 22

The proposed major project is supported by an Aboriginal Archaeological and Cultural Heritage Assessment by Artefact Heritage and Waters Consultancy. The report appears to provide a reasonable assessment of the Aboriginal archaeological and cultural heritage values and impacts. The recommendations of the report should be implemented through relevant conditions of consent and throughout the course of the project.

Council would encourage the careful consideration of any forthcoming comments from the Office of Environment and Heritage archaeologists and Aboriginal heritage specialists in finalising the assessment

Council would also encourage the notification of the local Aboriginal community groups of the proposal and the provision of adequate opportunities for comment. Council would also encourage the involvement of local Aboriginal groups in the process of pursuing works, where there are relevant Aboriginal cultural heritage matters identified in the report.

The recommendations of the report should be implemented through relevant conditions of consent and throughout the course of the project.

Response 22

Technical Paper 6 – Aboriginal Heritage, and Chapter 10 of the environmental impact statement outline the potential impacts of the project on Aboriginal cultural heritage, and detail the consultation undertaken to date with the Aboriginal community. Measures to manage Aboriginal cultural heritage impacts are listed in Section 10.5. They include measure AH01, which commits to the preparation of an Aboriginal heritage management plan, to include all measures outlined in the Aboriginal cultural heritage assessment report (Technical Paper 6 of the environmental impact statement) which was prepared as part of Technical Paper 6 – Aboriginal Heritage, and the relevant statutory requirements.

Ongoing consultation with the Aboriginal community would be undertaken by Roads and Maritime in accordance with the requirements of the:

- Procedure for Aboriginal Cultural Heritage Consultation and Investigation (Roads and Maritime, 2011)
- Aboriginal Heritage Consultation Requirements for Applicants (Department of Environment, Climate Change and Water, 2010).

Reference is made to Section 3.5 of this report for responses to submissions made by the Office of Environment and Heritage in relation to Aboriginal cultural heritage.

3.7.5 NON-ABORIGINAL HERITAGE

Issue 23

The proposed development has been determined to be in the vicinity of one listed heritage item on the Wollongong local environmental plan 2009 - 6437 House Princes Highway Yallah. This is acknowledged in the report by Artefact Heritage and discussed in the table on page 58 of Technical Paper 7 – Non-Aboriginal heritage.

It is noted that the report refers to discussions to be held with Wollongong City Council to determine the most appropriate location of any tree planting and the responsibility for planting and maintenance. These discussions are yet to commence. Council would welcome opportunities for input in relation to the mitigation of potential heritage impacts on views to and from this significant building as part of the project.

Careful consideration should be given to the location, placement, etc of sound barrier walls and other such potentially avoidable impacts as part of the finalisation of the plans.

The recommendations of the non-Aboriginal heritage assessment should be implemented through relevant conditions on any future consent for the proposed works.

Response 23

The statement in Table 17 of Technical Paper 7 – Non-Aboriginal Heritage represents Roads and Maritime's commitment to consult with Wollongong City Council regarding the management of potential heritage impacts on the 6437 House, Princes Highway, Yallah. Consultation would also be undertaken with the property owners, as outlined in management measure HH01.

Section 11.5 of the environmental impact statement contains the management measures for non-Aboriginal heritage that would be incorporated into the project construction environmental management plan and implemented during the project.

3.7.6 LAND USE

Issue 24

Within the Wollongong local government area the route is located in a road reservation zoned SP2 - Infrastructure - Road, zoned for purpose of the bypass. It is noted that some of the land affected by the proposal is currently identified by Wollongong Local Environmental Plan 1990 and Wollongong Local Environmental Plan No 38 as being "deferred matter". The Yallah-Marshall Mount Planning Proposal involves the rezoning of some of that land to E2 - Environmental Conservation. Roads are not a permissible use in the E2 zoning.

Response 24

The project is State significant infrastructure under part 5.1 of the *Environmental Planning and Assessment Act 1979*. Although local environmental plans do not specifically apply to State significant infrastructure, an assessment of the project against the provisions of the relevant local environmental plans is outlined in Section 2.1.2 of the environmental impact statement.

Section 2.1.2 notes that the project would traverse an area within the Yallah-Marshall Mount Draft Structure Plan and draft Planning Proposal proposed for rezoning to E2. Roads are not permitted within this zone. An objective of this zone is to prevent development that could destroy, damage or otherwise have an adverse effect on areas of high ecological, scientific,

cultural or aesthetic values. An assessment of the impacts of the project on ecological, cultural and aesthetic values is provided in Chapters 9, 10, 11 and 14 of the environmental impact statement. Management measures to minimise impacts from the project are summarised in Chapter 23. Revised impact assessments in the context of the proposed design refinement (refer Section 5 of this report) are also provided at Appendix D, Appendix E, Appendix F, Appendix G and Appendix H of this report. The project seeks to achieve the intention of this objective as the motorway and associated structures are designed to ensure minimal adverse impacts on ecological, cultural and aesthetic values.

Issue 25

The Roads and Maritime have advised verbally that portions of three parcels of Council land will be affected by the proposal and will need to be acquired by the Roads and Maritime via future negotiations. The parcels affected are: Lot 134 DP 1015310 Semillon Place, Dapto, Lot 100 DP 216769 Princes Highway, Yallah and Lot 20 DP 1075828 Larkins Lane, Yallah.

Response 25

Chapter 15 of the environmental impact statement assesses the land use impacts of the project. Direct impacts on properties (identified as land parcels 49, 17 and 16 respectively), including to land owned by Wollongong City Council, are identified and assessed in Section 15.3.2 of the environmental impact statement. Property acquisitions will be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* in consultation with the affected landowner.

3.8 SHOALHAVEN CITY COUNCIL

3.8.1 PROJECT BACKGROUND

Issue 1

Roads and Maritime Services is planning for a future extension of the M1 Princes Motorway between Yallah and Oak Flats to provide a bypass of Albion Park Rail.

A bypass of Albion Park Rail would be consistent with the NSW Long Term Transport Master Plan.

A commitment to construct a bypass has yet to be made.

Response 1

The NSW Government has allocated \$15 million in the 2016-17 budget to continue planning for the Albion Park Rail bypass. The project is targeting planning approval in 2017. The NSW Government has committed funding through Rebuilding NSW to allow construction to start by early 2019.

Issue 2

The Princes Motorway / Princes Highway (M1/A1) route is a major commuter, tourist, and freight road connecting Sydney and Wollongong to the Illawarra-Shoalhaven, the South Coast and Victoria.

Roads and Maritime Services has undertaken substantial upgrades in the last 10 years to improve the route between Wollongong and Nowra.

In the mid-1990s, the then Roads and Traffic Authority (now incorporated in Roads and Maritime) undertook a study to identify a preferred route for an upgrade of the route between Yallah and Oak Flats, about 20 kilometres south of Wollongong. The study identified a preferred road corridor that would involve an extension of the M1, which would bypass the Princes Highway and the township of Albion Park Rail.

To reserve the land for the future bypass, the proposed road corridor was included in the Wollongong City and Shellharbour City Council local environmental plans, as it is located within both local government areas. At the time, Roads and Maritime advised the local community that construction of the preferred route would be unlikely to take place within 15 years as traffic volumes were not sufficient to justify investment in the project.

There are however two alternatives to the project. One being longer term and a full bypass the other being a resolution of the intersection issues at the convergence of the Princes Hwy (M1/A1) and the Illawarra Hwy (A48) which is currently served by a signalised roundabout. This roundabout is the cause of congestion and traffic delays in morning and evening peak periods.

Response 2

The proposed project will result in the bypass of traffic around the Illawarra Highway signalised roundabout by directing traffic along a continuation of the M1 Princes Motorway. The project does not however propose to remove the existing roundabout at the intersection of the Illawarra Highway and the Princes Highway. This roundabout will instead facilitate local traffic flows with the Illawarra Highway terminating at the connection to Croome Lane. This will alleviate the existing traffic issues at the roundabout once the project is complete. As shown in Figure 5-11 of this report, in 2041 the roundabout is expected to operate at an overall level of service B and A in the AM and PM peak respectively. This is due to the anticipated high volumes of northbound traffic on Princes Highway which creates insufficient gaps for the western approach traffic. The overall delay experienced by motorists is expected to be substantially less at the roundabout due to the lower volumes of traffic turning in and out of Illawarra Highway when compared to the overall delay experienced by motorist should the project not be constructed.

3.8.2 TRAFFIC

Issue 3

Traffic on the Princes Motorway / Princes Highway in the study area is characterised by:

- Varying traffic volumes throughout the study area. The annual average daily traffic volumes vary markedly at different locations in the study area
- Steadily increasing traffic volumes, with linear growth rates of between about one and two per cent per annum
- Significant variations in daily traffic flows. Weekdays tend to follow a similar pattern, the northbound movement is the peak direction in the morning and the southbound movement is the peak direction in the evening. The Friday afternoon southbound peak movement tends to be higher than the other days, due to tourist traffic combining with the commuter peak
- Weekend days show a different traffic pattern to the weekdays with the dominant northbound peak occurring on Sunday afternoons and the southbound peak on Saturday mornings. These weekend peaks are similar to or greater than the weekday peaks
- A high proportion of regional freight trips. The highway is classified as a B-double route between Wollongong and Nowra. Heavy vehicles comprise about nine per cent of vehicles on the route
- A high proportion of tourist trips in particular during weekends and holiday periods. This is likely to be contributing to the Friday southbound and Sunday northbound peaks being so high
- Traffic congestion during the morning and afternoon peak. Travel time surveys conducted in 2013 show that the level of service in the northbound direction reaches E (the second worst level of service) in the morning peak northbound approaching the intersection with the Illawarra Highway. The extent of delays during the morning and afternoon peaks has been gradually increasing, with average travel speeds reducing and travel times generally increasing. Currently it takes 9.5 minutes in the northbound morning peak and 7.5 minutes in the southbound afternoon peak to travel the 7.6 kilometre section of the existing route
- Seasonal variation in traffic volumes. The weekly volumes can vary by about 25 per cent throughout the year largely due to holiday traffic associated with the peak holiday periods
- Varying travel speeds during the morning and afternoon peak. The slowest section is between Creamery Road and the Illawarra Highway, where speeds are at least 30 kilometres per hour slower than the speed limit for the dominant traffic flow in both directions
- Substantially reduced traffic speeds during peak holiday periods, when large queues of traffic are being experienced due to increased traffic volumes and local traffic constraints
- A high proportion of through traffic (71 per cent in the morning peak, and 47 per cent in the afternoon peak).

Response 3

A detailed traffic and transport assessment has been carried out for the project; provided in Technical Paper 1 - Traffic and Transport, and summarised in Chapter 7 of the environmental impact statement. The assessment included details of the existing traffic conditions, as summarised above.

These conditions were also addressed in the revised addendum traffic and transport assessment (Appendix A of this report) to include the potential impacts associated with the proposed design refinements as described in Section 5.

Issue 4

Social issues include considerations of impacts on residents, businesses, visitors and / or the travelling public. The elimination of the queuing for kilometres through Albion Park Rail would be eliminated or at least significantly reduced with a bypass of Albion Park Rail.

The bypass would have several major social benefits:

- It would remove the substantial delays experienced by the motorists during peak periods, which are exacerbated during peak travel times such as holiday periods. These delays impact commuters daily as they travel to and from work. Anecdotal evidence suggests that congestion levels are such that people's travel patterns are modified, for example commuters may change their start and end times or avoid congested areas altogether
- It would be of benefit to tourists, and the tourism industry. During holiday peak periods, the Princes Highway / Princes Motorway takes a substantial amount of holiday traffic. This traffic often experiences extended delays. The bypass would increase the reliability of tourism related trips
- It would reduce highway traffic through Albion Park Rail and reduce the physical barrier of the highway traffic from the centre of town. The improved amenity along the existing Princes Highway would improve the quality of the Albion Park Rail urban environment for businesses and the local community, create a more pedestrian-friendly environment and reinforce a sense of community identity and community wellbeing.

Response 4

Roads and Maritime acknowledges the support of Shoalhaven City Council for the project. The benefits of the project, including those identified above, are summarised in the executive summary of the environmental impact statement.

Issue 5

With the bypass in place for the future the travel times on the existing route show that the travel times are between 9 and 9.5 minutes with a considerable saving in time for bypass traffic, this journey taking about 6.5 minutes. However under a 'do nothing' scenario travel times on the route would substantially increase to 44 minutes in the northbound peak and 24 minutes in the southbound peak direction by 2046.

Response 5

Roads and Maritime acknowledges the support of Shoalhaven City Council for the project.

Issue 6

With a benefit versus cost ratio of at least two, this means that the economic benefits produced by constructing the bypass are more than twice the cost of the infrastructure over the 30 year life of the analysis period. For a large road infrastructure project, this is considered to be a very positive result and reflects the economic merits of the project. On this basis, the benefits of the project are sufficient to justify its cost, and the bypass would represent a good economic investment.

Response 6

Roads and Maritime acknowledges the support of Shoalhaven City Council for the project.

Issue 7

General benefits:

- Improve travel times in both directions on this important route
- Improve the reliability of travel times. This would be particularly important for trips during peak travel periods
- Divert substantial through traffic away from the Princes Highway in Albion Park Rail. The bypass would cater mainly for through trips, while the existing Princes Highway would cater mainly for local trips
- Increase road capacity in the study area, which would cater for the anticipated future population growth in West Dapto, Calderwood and Tallawarra
- Maximise the benefits of upgrading the M1 / A1 route between Sydney and Nowra by bypassing the only traffic lights on the route between Heathcote and Bomaderry
- Maximise the benefits of upgrading the M1 / A1 route between Sydney and Bomaderry by bypassing the only town not bypassed (following completion of the Berry Bypass by 2018)
- Remove the section of the Illawarra Highway near the Illawarra Regional Airport that is highly susceptible to flooding
- Substantially improve road safety by separating through and local traffic and removing traffic conflicts
- Provide economic benefits more than twice the costs.

Response 7

Roads and Maritime acknowledges the support of Shoalhaven City Council for the project. The benefits of the project, including those identified above, are summarised in the executive summary of the environmental impact statement.

3.8.3 INTERCHANGE AT YALLAH

Issue 8

It is proposed that the project be staged to allow the grade separation of the traffic interchange at Yallah and eliminate the signalised roundabout at the intersection of the Princes Highway and the Illawarra Highway. This roundabout contributes substantially to the congestion and traffic delays in morning and evening peak periods.

This interchange can provide immediate benefits to relieve the peak traffic congestion and is part of the bypass solution. Already, four lanes, with parking / breakdown lanes exist through the Albion Park Rail shopping centre and while there are four sets of traffic signals they are spaced quite a distance apart.

The early staging of these works at Yallah can deliver much of the benefit to daily commuters and through traffic while the longer bypass is being constructed.

Response 8

The timing, duration and staging of construction of the interchange at Yallah are such that construction could not feasibly be completed early, nor could it be constructed substantially faster than identified in the environmental impact statement. However, extended work hours would be implemented to reduce overall project construction time.

It is not proposed to remove the existing roundabout at the intersection of the Illawarra Highway and the Princes Highway. The project would, however, provide separation of local and through traffic, and terminate the Illawarra Highway in a cul-de-sac. This would alleviate the existing traffic issues at the roundabout once the project is complete.

Issue 9

The benefits of an Albion Park Rail bypass will be felt far outside the immediate study area.

Benefits will accrue to commuters, hauliers and tourists and improve the quality of life in Albion Park Rail and the commercial precinct of Albion Park Rail.

The project as presented is supported.

Response 9

Roads and Maritime acknowledges the support from Shoalhaven City Council for the project.

4 CLARIFICATIONS

This section describes clarifications as well as minor errors and discrepancies that have been identified in the environmental impact statement and appendices. Where relevant, the text provided can be considered to replace the text from the environmental impact statement and appendices. None of these minor errors and discrepancies would result in any significant change to the impacts described in the environmental impact statement.

It is noted that some technical papers from the environmental impact statement that were provided on the Department of Planning and Environment website included translation errors which made some text and figures difficult to read. Corrected versions of these documents will be uploaded to the mapping portal as part of the public exhibition period of this document.

4.1 PLANNING APPROVAL FRAMEWORK

Section 2.1.1 of the environmental impact statement describes the planning approval framework within the *Environmental Planning and Assessment Act 1979*. The section suggested that the project would be declared as State significant infrastructure under Section 115U(4) of the Act (that is, it would be declared under *State Environment Planning Policy (State and Regional Development) 2011*).

At the time of the development of the environmental impact statement, it was proposed that declaration of the project as State significant infrastructure would be sought under Section 115U(4) of the Act. This declaration has been requested but has not yet been gazetted. Once gazetted this project will be included in Schedule 4 of *State Environmental Planning Policy (State and Regional Development) 2011*.

It is noted that the *Threatened Species Conservation Act 1995* was repealed on 26 August 2017 and replaced with the *Biodiversity Conservation Act 2016*. As the Secretary's Environmental Assessment Requirements for the project require the assessment to be undertaken in accordance with the *Threatened Species Conservation Act 1995*, the project is captured by savings and transitional provisions and is subject to the *Threatened Species Conservation Act 1995*.

4.2 VEGETATION CLASSIFICATION

Chapter 9 of the environmental impact statement summarises the field surveys undertaken in 2013 and 2014, and the vegetation communities that were identified as part of these surveys. In early 2017, as part of investigations into the proposed design refinements, a further nine vegetation plots were surveyed in areas where the project boundary was to be potentially modified. These additional plots triggered a review of the classification of the vegetation within the project footprint. As a result, some vegetation (0.55 hectares) that was classified as disturbed riparian vegetation in the environmental impact statement was reclassified following the review, as Swamp Oak Floodplain Forest, which is listed as an endangered ecological community under the *Threatened Species Conservation Act 1995*. While the updated project footprint has not resulted in additional clearing of these vegetation stands, this vegetation is now identified as an endangered ecological community and is therefore subject to offsetting.

As described in Section 5.5.3 of this report, this endangered ecological community has now been included within the revised biodiversity assessment report for this project (Appendix D of this report).

4.3 ALBION PARK SHOWGROUND CURTILAGE

The extent of the heritage curtilage for the Albion Park Showground was incorrectly described in Chapter 11 and Technical Paper 7. The addendum statement of heritage impact (Appendix G of this report) corrects this error and provides an assessment that considers the additional area of curtilage which was not assessed in the environmental impact statement. This addendum report is included in Appendix G of this report.

4.4 WATER QUALITY CONTROL TARGETS

Section 5.11, Table 5-4 of the environmental impact statement stated the Wollongong Development Control Plan 2009 performance targets for pollutant load reduction. However, the total phosphorus and total nitrogen targets in Table 5-4 were incorrectly labelled. Table 4-1 below corrects Table 5-4 from the environmental impact statement.

Table 4-1 Correction of Wollongong Development Control Plan 2009 water quality control targets from Section 5.11 of the environmental impact statement

	Total phosphorus	Total nitrogen	Total suspended solids	Gross pollutants
Performance targets of pollutant loads as listed in Table 5-4 of the environmental impact statement	40-45%	55-60%	80-85%	90%
Actual Wollongong Development Control Plan 2009 performance targets	55-60% (corrected from EIS)	40-45% (corrected from EIS)	80-85% (no change from EIS)	90% (no change from EIS)

Table 5-5 (Drainage and Water Quality Principles) in the environmental impact statement referenced the incorrect Table 5-4. The inclusion of the Wollongong Development Control Plan 2009 performance targets was intended to provide context only. Project specific water quality targets are instead proposed based on an analysis of feasible and reasonable water quality treatment measures as outlined in Table 16-3 of the environmental impact statement.

The environmental impact statement Table 5-5 is updated by Table 4-2 below, which is supported by Table 4-3 below (revision of Table 16-3 in the environmental impact statement).

Table 4-2 Correction to drainage and water quality principles

Category	Principle as defined in the environmental impact statement	Corrected principle
Runoff from ramps, service, access and local roads	Does not require treatment prior to discharge, as long as overall targets in Table 5-4 are achieved.	Does not require treatment prior to discharge, as long as overall targets in Table 4-3 are achieved.
Runoff from main carriageways	Does not require treatment prior to discharge, as long as overall targets in Table 5-4 are achieved.	Does not require treatment prior to discharge, as long as overall targets in Table 4-3 are achieved.
Stormwater pollutant removal rates	Provide improved pollutant reduction rates compared to the project without water quality treatment strategy. Where possible, meet performance targets shown in Table 5-4	Provide improved pollutant reduction rates compared to the project without water quality treatment strategy. Where possible, meet performance targets shown in Table 4-3
Spill containment for main carriageways	A minimum of 20 kilolitres spill containment volume to be provided	A minimum of 20 kilolitres spill containment volume to be provided
Spill containment for ramps, service, access and local roads.	Spill containment to be provided for ramps, service, access and local roads where feasible.	Spill containment to be provided for ramps, service, access and local roads where feasible.

Changes to principles identified in **bold**.

Based on the use of the feasible and reasonable water quality treatment measures listed in Table 5-6 of the environmental impact statement, Roads and Maritime has determined operational water quality targets for this project (Table 4-3 below). Operational water quality control targets are identified by catchment rather than as a project overall to consider local conditions and ensure the most appropriate outcomes are achieved for that particular catchment see Table 4-3 below.

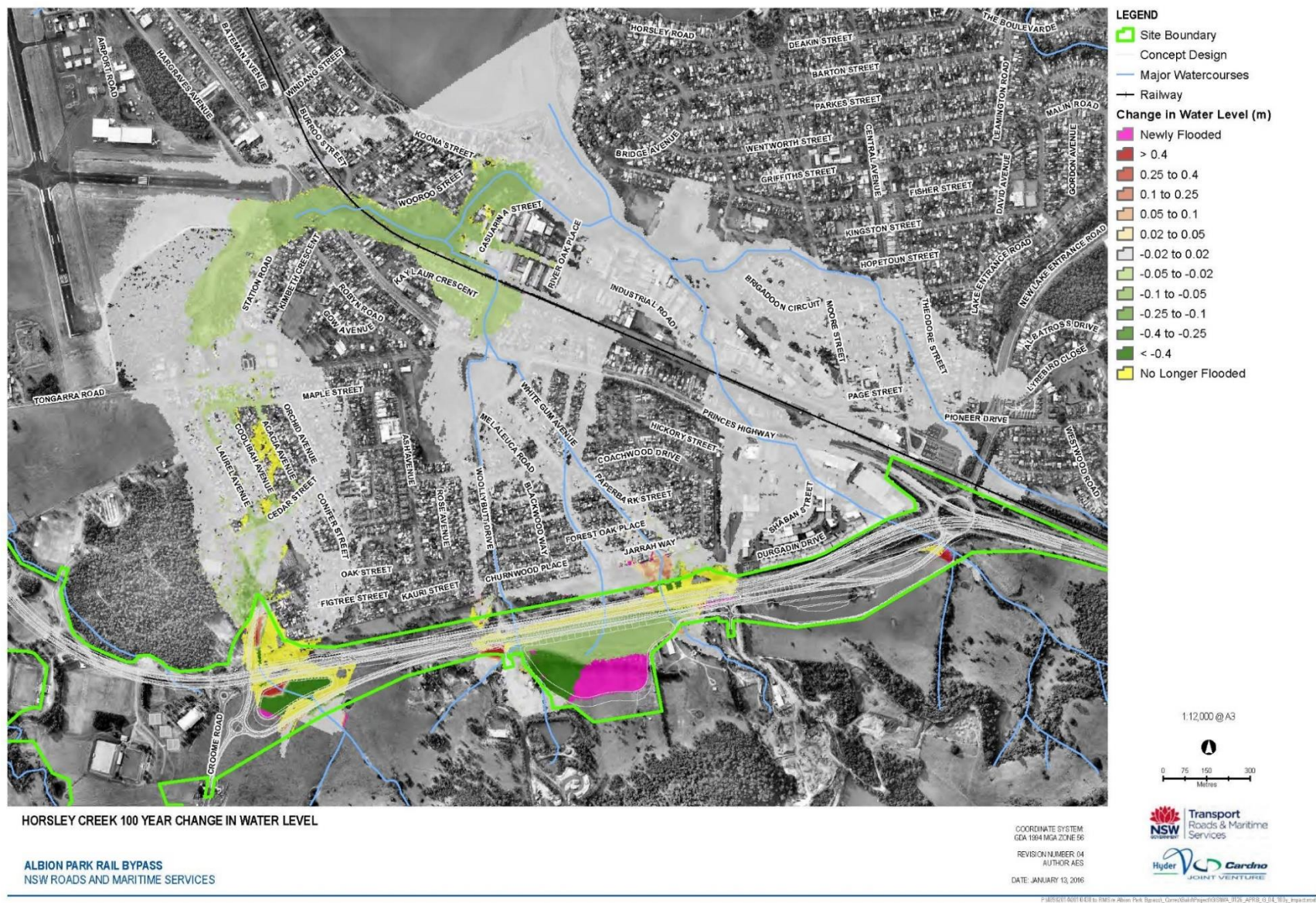
Table 4-3 Operational water quality control treatment targets

Catchment	Pollutant (kg/yr)	Existing conditions (without this project)		Future conditions (with this project) with reasonable and feasible mitigation measures as per Table 5-6 of the environmental impact statement		Adopted annual average load reduction target for this project (highlighted green when as per Wollongong development control plan)
		Residual pollutant load	Annual average load reduction	Residual pollutant load	Annual average load reduction	
Duck Creek	Total suspended solids	20,600	30.6%	29,700	67.3%	67%
	Total phosphorus	56.4	17.2%	70.2	53.8%	54%
	Total nitrogen	282	4.1%	506	18.6%	19%
	Gross pollutants	984	39.3%	846	85.9%	86%
Macquarie Rivulet	Total suspended solids	3,770	0%	2,640	85.6%	80%
	Total phosphorus	10.9	0%	9.1	70.1%	55%
	Total nitrogen	60.5	0%	87	30.4%	30%
	Gross pollutants	270	0%	12.6	99.0%	90%
Frazers Creek	Total suspended solids	21,600	9.6%	12,100	77.5%	77%
	Total phosphorus	79.8	3.3%	33.1	63.2%	55%
	Total nitrogen	382	1.3%	278	24.9%	25%
	Gross pollutants	548	11.2%	254	93.3%	90%
Horsley Creek	Total suspended solids	34,400	29.7%	6,910	82.9%	80%
	Total phosphorus	84.5	16.3%	22.8	66.3%	55%
	Total nitrogen	396	8.1%	218	21.3%	21%
	Gross pollutants	2,940	2%	49.8	98.2%	90%

4.5 HORSELY CREEK FLOOD MAPPING

Figure 6-6 of Technical Paper 3 – Hydrology and Flooding identified the impacts of the project on flooding of agricultural and recreational land in the Horsley Creek catchment in the 100 year ARI event (Figure 4-1). It is noted that this figure is incorrect due to an error in the legend that failed to identify areas that would become flood free in the 100 year ARI (shown in yellow).

The figure has been updated and is provided below in Figure 4-2. A total of 23 properties in Albion Park Rail would become flood free in the 100 year ARI event as a result of the project due to the provision of a new detention basin near Croome Road.



4.6 LANDSCAPE CONCEPT DESIGN

The landscape concept design included within Section 4.8 of Technical Paper 10 – Landscape Character and Visual Impact, utilised symbology of faded green shapes to identify existing vegetation to be retained (example shown in Figure 4-3).

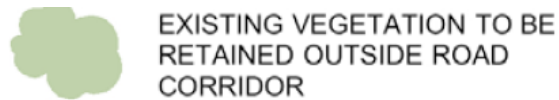


Figure 4-3 Existing vegetation symbology from the landscape concept design

The proposed tree plantings were identified in the legend of these plans as darker green shapes as demonstrated in Figure 4-4.



Figure 4-4 New tree planting symbology from the landscape concept design

Within the drawings some of the proposed tree plantings were faded as part of the design process which resulted in difficulty in differentiating between existing and proposed vegetation. An example of proposed trees appearing to look like existing vegetation is included in Figure 4-5.

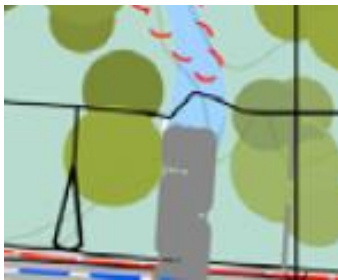


Figure 4-5 An example of vegetation incorrectly faded in the landscape concept plans

The latest landscape concept designs, included in Appendix I of this report, has rectified this issue allowing for a clear differentiation between proposed and existing vegetation.

4.7 LAND PARCEL CLASSIFICATION

Table 15-2 of the environmental impact statement defined the directly impacted land parcels in the project. Land parcel 49 was defined as owned by a private land holder. This land parcel, which corresponds with Lot 134 DP 1015310, is in the ownership of Wollongong City Council and is not a privately owned land parcel.

Table 15-2 of the environmental impact statement also defined the total land area of land parcel 2 as being 12.5 hectares in area. Based on the most recent survey data this land parcel is measured at 2.7 hectares in area. In both the environmental impact statement and current project designs 100 per cent of this land parcel is to be impacted by the project.

4.8 APPROACH TO TRAFFIC MODELLING

The traffic assessment carried out for the environmental impact statement used a combination of strategic traffic modelling software TRACKS and SIDRA intersection modelling as the basis of the traffic analysis.

A revised traffic modelling approach was adopted to assess the proposed design refinements. This revised approach used Aimsun traffic modelling software to supplement the TRACKS network modelling and is discussed in detail in Section 5.51 of this report. The revised traffic modelling approach has produced different results from the assessment carried out in the environmental impact statement primarily due to modelling changes rather than as a result of the design refinements.

Where design refinements have led to changes in traffic impacts, the Addendum Traffic and Transport Assessment Report (Appendix A) provides updated traffic forecasts for the environmental impact statement design, based on the revised modelling approach, to allow for an accurate assessment of the impacts associated with design changes.

4.9 OBSTACLE LIMITATION SURFACES

Technical Paper 2 – Aviation assessed the impact of the project on the airspace requirements for the Illawarra Regional Airport. The assessment considered the current operational (Code 2) obstacle limitation surface and the aspirational (Code 3) obstacle limitation surface, the latter being the airspace requirements in the event the airport is upgraded in future to accommodate bigger aircraft. Shellharbour City Council has since confirmed that scheduled passenger services will commence in October 2017, and the aspirational (Code 3) obstacle limitation surface will become the operational obstacle limitation surface for the Illawarra Regional Airport.

The environmental impact statement and submissions and preferred infrastructure report assess the project against the aspirational (Code 3) obstacle limitation surface.

4.10 NOISE CATCHMENT AREA MAPPING

Figure 12-1 of the environmental impact statement identified the noise catchment areas and noise monitoring locations for the purpose of the noise and vibration assessment. It is noted that NCA 14, NCA 15 and NCA 16 were incorrectly labelled in this figure, although they were correctly referenced in Technical Paper 8 – Noise and Vibration of the environmental impact statement.

4.11 PRE-CONSTRUCTION ACTIVITIES

Chapter 5 of the environmental impact statement describes the scope of the Albion Park Rail Bypass project. The following activities are identified as pre-construction activities:

- Placement of clean bridging layer material on top of geotextile (without topsoil stripping) for working platforms and haulage routes within the project footprint
- Installation of wick drains
- Installation of traffic control signals on existing roads
- All work associated with Croom Regional Sporting Complex
- Installation of temporary traffic barriers and localised adjustment of traffic layouts within the existing road area
- Establishment and use of ancillary sites
- Permanent closure of infrastructure assets as part of the project including:
 - Woollybutt Drive connection to the existing East West Link (following implementation of traffic control signals at the intersection of Woollybutt Drive and the Princes Highway)
 - Durgadin Drive connection to the existing East West Link.

5 DESIGN REFINEMENTS

Roads and Maritime has refined aspects of the project as presented in the environmental impact statement in order to minimise impacts, where possible. The design refinements are a direct response to:

- Consultation with the community during the environmental impact statement exhibition period (28 October to 27 November 2015)
- Submissions received during the environmental impact statement exhibition period
- Landowner discussions during property acquisition and adjustment since exhibition of the environmental impact statement
- Continued development of the concept design.

This section presents:

- A description of the design refinements
- Details of consultation undertaken
- A comparison of each design refinement with the design presented in the environmental impact statement
- The justification for each design refinement
- An environmental assessment of the design refinements.

5.1 PROJECT DEFINITIONS

5.1.1 PROJECT FOOTPRINT

The environmental impact statement defines the project boundary to include the operational area and the construction area. The operational area includes the road reserve and other permanent work areas (mainly Croom Regional Sporting Complex and adjustments to the Green Meadows detention basin). The construction area includes temporary work areas outside the operational area.

The term 'project boundary' is referred to in the project related documentation to mean the operational boundary only, not the area defined in the environmental impact statement. To avoid confusion, and to allow comparison between the design assessed in the environmental impact statement and the proposed design refinements, the following terms are used in this report:

- The 'project footprint' – this refers to the operational area plus the construction area for the current project design. This includes the design refinements identified and assessed in this report.
- The current 'site boundary' – this refers to the operational area for the current project design
- The 'project boundary' – this refers to the operational area plus the construction area for the project, as defined in the environmental impact statement.

5.1.2 ANCILLARY SITES

As part of the design refinement process the number of proposed ancillary sites has been reduced. Due to this, the identification numbers have been revised. Table 5-1 below details the site identification numbers currently used in Figure 5-1 to Figure 5-7 of the environmental impact statement and the corresponding identification used in the environmental impact statement.

Table 5-1 Ancillary site identification numbers

Current ancillary site identification number	Environmental impact statement identification number	Description
AS01	AS01	West of the interchange at Yallah
Not included in current design	AS02	East of the interchange at Yallah
AS03	AS03	Near Yallah Bay Road
AS04	AS04	Near the existing Princes Highway and South Coast Rail Line
Not included in current design	AS05	West of Illawarra Highway intersection
AS06	AS06	East of Illawarra Highway intersection
Not included in current design	AS07	Near interchange at Albion Park
AS08	AS08	Near Tongarra Road bridge
AS09	AS09	At Croom Regional Sporting Complex
AS10	AS10	Near Croom Regional Sporting Complex
AS11	AS11	Near East West Link
Not included in current design	AS12	Near East West Link
AS13	AS13	Near East West Link

5.2 DESIGN REFINEMENTS

A series of design refinements have been developed to minimise impacts described in the environmental impact statement and in response to:

- Consultation with the community during the environmental impact statement exhibition period
- Submissions received during and following the environmental impact statement exhibition period
- Landowner discussions during property acquisition and adjustment since exhibition of the environmental impact statement
- Continued development of the concept design.

The proposed project including the design refinements is displayed in Figure 5-1 to Figure 5-7. The proposed design refinements are also described in Table 5-2. Further information for three of the more detailed design refinements (ID2, ID3 and ID10) is provided in Sections 5.2.1, 5.2.2 and 5.2.3 respectively.

Table 5-2 Design refinements

ID no	Refinement	Environmental impact statement design	Proposed design	Justification
1	Reduction in project footprint on agricultural land	As defined in the environmental impact statement, the project would have an impact on 27 hectares of dairy farm land and would require partial acquisition of the dairying enterprise. This would result in a change of land use for some land parcels from dairy farming to road corridor.	The revised layout includes an adjustment to the project boundary so that there is a reduction of 10.3 hectares in the direct (operational) impact to dairy land.	Changes to the project boundary are proposed to reduce the impact on agricultural land through a modified alignment. Due to the impact of the proposed route on dairy lands located to the north of Albion Park and in response to submissions received, the design was reviewed to determine whether the layout could be improved to minimise the impacts of the route on these lands. This design refinement is one of several design refinements that facilitate a reduction in the impact on dairy land.
2	Changed layout of interchange Albion Park	Refer Section 5.2.1	Refer Section 5.2.1	Refer Section 5.2.1
3	Revised layout of Croom Regional Sporting complex	Refer Section 5.2.2	Refer Section 5.2.2	Refer Section 5.2.2
4	Removal of ancillary site AS02	The environmental impact statement proposed an ancillary site on the eastern side of the Princes Highway, north of Yallah Bay Road.	This ancillary site is no longer proposed.	This ancillary site was identified for use during construction of the project north of Albion Park Rail but has since been removed based on discussions held with the landowner in this location.
5	Removal of ancillary site AS05	The environmental impact statement proposed an ancillary site on the western side of the connection to the Illawarra Highway.	This ancillary site is no longer proposed.	This ancillary site was identified for use during construction of the project north of Albion Park Rail but has since been removed based on discussions held with the landowner in this location. The removal of this site would also reduce impacts on agricultural lands.
6	Modifications to	The environmental impact statement included details on the number and	Modification to the flood modelling , along with the realignment of the interchange at Albion Park, has	Culverts are required along the alignment to mitigate flood impacts as a result of construction of

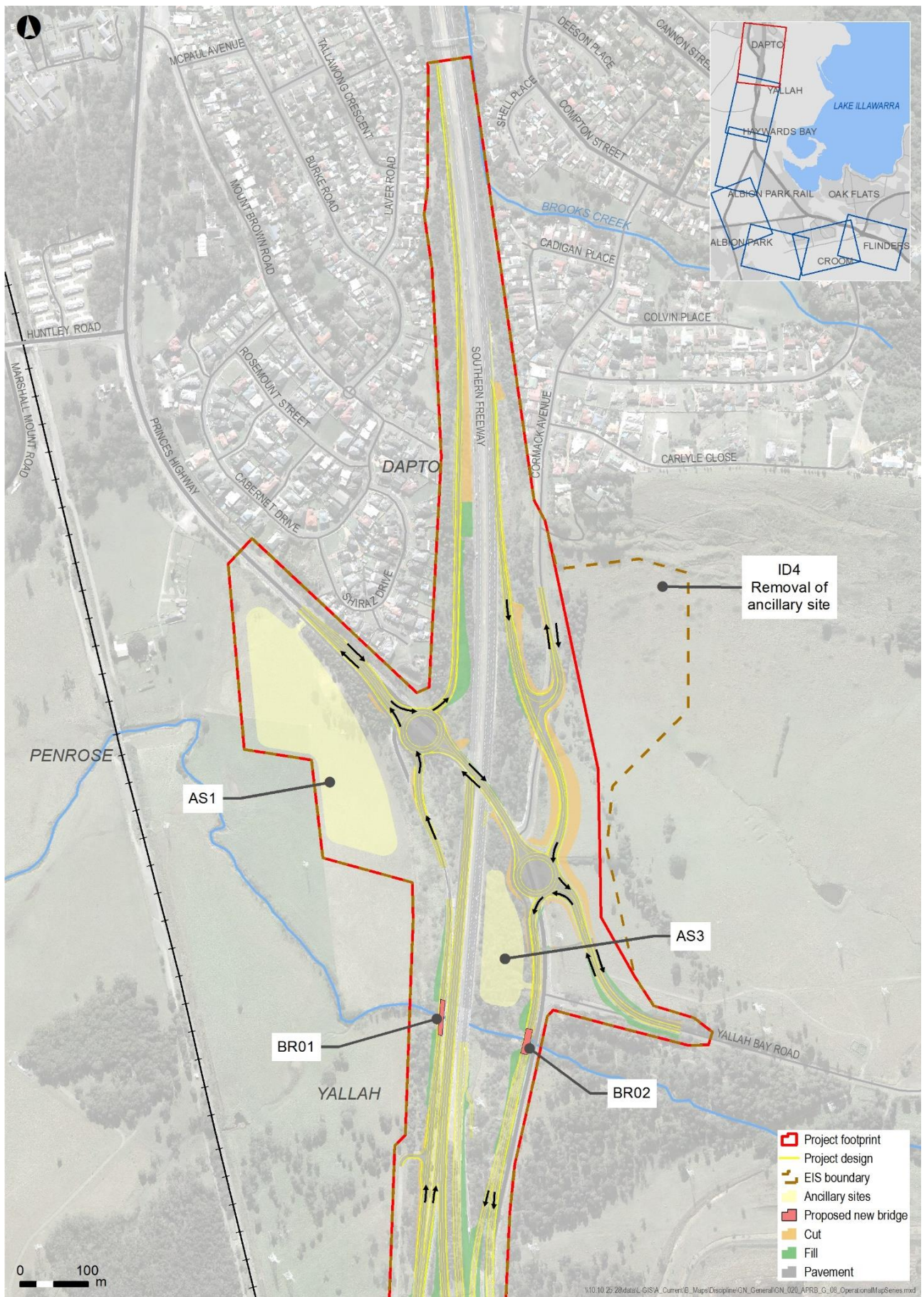
ID no	Refinement	Environmental impact statement design	Proposed design	Justification
	culverts	locations of culverts proposed required along the motorway as flood management structures.	resulted in changes to the number and location of culverts required along the motorway to mitigate impacts to surface water flows.	the motorway. Changes to the design require modifications to the proposed culverts to ensure the required flooding targets are achieved.
7	Relocation of shared cycle and pedestrian path between Albion Park and the north of Albion Park Rail	The environmental impact statement proposed a shared cycle and pedestrian path along the existing Illawarra Highway.	The shared cycle and pedestrian path has been relocated to the eastern side of the motorway.	Submissions received from adjacent property owners and other dairy industry representatives raised concerns regarding the safety of the interaction between pedestrians, cyclists and cattle crossing the alignment along this section of the existing Illawarra Highway. The movement of cattle across the proposed location of the share user path adds an additional potential clash point between pedestrians, cyclists and cattle. Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise. The proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities. Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings. Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project). The shared path to be constructed as part of the

ID no	Refinement	Environmental impact statement design	Proposed design	Justification
				project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement.
8	Removal of ancillary site AS07	The environmental impact statement proposed an ancillary site between the southbound exit ramp and northbound entry ramp of the interchange at Albion Park near Terry Street.	This ancillary site is no longer proposed.	The site was reviewed and, due to its small size and lack of access, was determined to be unsuitable for use as an ancillary site.
9	Adjusted project footprint for dedicated haul routes along the north-west corner of Croom Reserve (east of Princes Highway)	The environmental impact statement project boundary at this location was located closer to the road alignment limiting construction access.	The project footprint has been widened to the edge of the vegetation in Croom Reserve. The additional area is required for temporary works to ensure enough space for dedicated haul routes for trucks and equipment during construction of the project.	The environmental impact statement project boundary was not sufficient to allow for dedicated haulage routes. Dedicated haul routes would improve road safety during construction of the project as trucks and equipment would not need to use public roads to access construction sites. The widened project footprint would allow truck and equipment movements within the approved project area and off public roads at this location, reducing traffic impacts.
10	Expanded ancillary site AS13	The environmental impact statement proposed an ancillary site east of Croome Road (and Swansea Farmhouse).	A large parcel of land immediately next to AS13 would be included in the project footprint to expand this ancillary site.	Additional land has become available at this location following the exhibition of the environmental impact statement. This would allow a larger area for construction activities with minimal additional environmental impacts.
11	Adjusted project footprint along the southern side of Woollybutt Drive	The environmental impact statement identified work required to remove redundant pavement from the southern section of Woollybutt Drive. This work was not included in the environmental impact statement project boundary.	The project footprint would be expanded to include the required work.	The inclusion of this area within the project footprint would ensure it is clearly identified as required for the project, and would form part of the project approval.
12	Addition of traffic lights	The environmental impact statement	Traffic lights would be provided on the new East	Traffic lights are proposed at this location in

ID no	Refinement	Environmental impact statement design	Proposed design	Justification
	at the access to Holcim Quarry	proposed that access to the quarry would be via a 'T' intersection directly onto the new East West Link, to the south of the motorway.	West Link at the access point to the Holcim Quarry. This would enable safe movement of trucks into and out of the quarry.	response to submissions from the quarry operator who expressed concerns about traffic performance and safe access. Following design and traffic analysis, traffic lights were considered the most suitable safe option.
13	Adjusted project footprint at the intersection of Woollybutt Drive and the Princes Highway	The environmental impact statement identified work required to install traffic lights at the intersection of Woollybutt Drive and the Princes Highway. This work was not included in the environmental impact statement project boundary.	The project footprint would be expanded to include the required work.	The inclusion of this area within the project footprint would ensure it is clearly identified as required for the project, and would form part of the project approval.
14	Addition of traffic lights at the access to Cleary Brothers Quarry	The environmental impact statement proposed that access to the quarry would be via a 'T' intersection directly onto the new East West Link, to the south of the motorway.	Traffic lights would be provided on the new East West Link at the access point to the Cleary Brothers Quarry. This would enable safe movement of trucks into and out of the quarry.	Traffic lights are proposed at this location in response to submissions from the quarry operator who expressed concerns about traffic performance and safe access. Following design and traffic analysis, traffic lights were considered the most suitable safe option.
15	Adjusted project footprint at Durgadin Drive	The environmental impact statement proposed that Durgadin Drive would be terminated with a cul-de-sac. Alternative access to the industrial area would be available via the Princes Highway. This work was not included in the environmental impact statement project boundary.	The project footprint would be extended to include the required work.	The inclusion of this area within the project footprint would ensure it is clearly identified as required for the project, and would form part of the project approval.
16	Adjusted project footprint along the western side of the project alignment near the end of the project	An additional buffer was allowed within the environmental impact statement project boundary for construction of the new East West Link, along the western boundary of a local access road, south of the proposed new East West Link.	The project footprint would be reduced along the western side of the project alignment, between the Cleary Brothers Quarry access and just north of Horsley Creek.	Upon review, it was found that this area is not required for construction of the project. The project footprint has been adjusted to minimise impacts on private property and agricultural land.

ID no	Refinement	Environmental impact statement design	Proposed design	Justification
17	Changes to functionality of roundabout at Oak Flats interchange	The environmental impact statement proposed a reconfiguration of the existing interchange at Oak Flats to incorporate the motorway, ramp adjustments and a new East West Link.	Changes are proposed to ramp and local road connections at the roundabout at Oak Flats to improve traffic operation of the roundabout. Two new slip lanes have been added for traffic travelling southbound on the Princes Highway to exit onto New Lake Entrance Road and for traffic travelling southbound from New Lake Entrance Road onto the Motorway southbound. These may be combined with partial or full signalisation of the roundabout as traffic demand increases. The project footprint has been adjusted to include the area required for new slip lanes.	Further detailed traffic assessment has identified additional changes to the interchange configuration are required to achieve good performance in the future as traffic demand increases.
18	Extended work hours	The environmental impact statement proposed extended work hours for certain construction activities in some locations. The proposed extended construction hours were: - Monday to Friday, between 6am and 7pm - Saturdays, between 8am and 5pm - Outside of known likely major traffic peaks (such as avoiding holiday periods).	Extended work hours would be implemented across the whole of the project as standard construction hours, including in areas identified in the environmental impact statement as being located near sensitive receivers. Activities to be undertaken in the first and last hour of each day would be managed in accordance with the construction environmental management plan to minimise impacts. The project standard construction hours would be: - Monday to Friday, between 6am and 7pm - Saturdays, between 8am and 5pm - No work on Sundays and public holidays. Any work required outside of the standard construction hours (out of hours work) would be carried out in accordance with relevant conditions of the project approval and any Environment Protection Licence for construction of the project.	Additional consultation with affected residents identified that a significant majority (84%) prefer extended work hours in order to reduce the overall project construction timeframe. Extended work hours across the project would reduce the overall construction timeframe and reduce the duration of construction impacts such as noise, visual, air quality (dust), soil erosion and traffic.

ID no	Refinement	Environmental impact statement design	Proposed design	Justification
19	Minor project footprint adjustments off Yallah Road and Princes Highway, Yallah	The environmental impact statement proposed an upgrade to Yallah Road between Larkins Lane and the Princes Highway at Yallah to incorporate a two lane configuration of Yallah Road (which could be upgraded to four lanes in the future) with a bridge for Yallah Road crossing the motorway.	The project footprint would be expanded in two small areas either side of the proposed motorway and reduced in one area further north.	Upon review, it was found that the project boundary was too small to allow for construction of the motorway just north of Yallah Road so the project footprint was increased here in two small areas and there was one area to the north that was found to be not required, thus ensuring that there was no net increase impact on the Endangered Ecological Community.
20	Removal of ancillary site AS12	The environmental impact statement proposed an ancillary site between the motorway, Croome Road and the East West Link.	This ancillary site is no longer proposed.	The site was reviewed and the site has been chosen for a temporary on site detention basin.
21	Expanded ancillary site AS10	The environmental impact statement proposed an ancillary site to the west of Croome Road in the Croom Regional Sporting Complex.	A parcel of land within the project footprint next to AS10 would be included in this ancillary site.	Additional land is required for the construction of Croom Regional Sporting Complex and this additional area has been identified for this purpose.



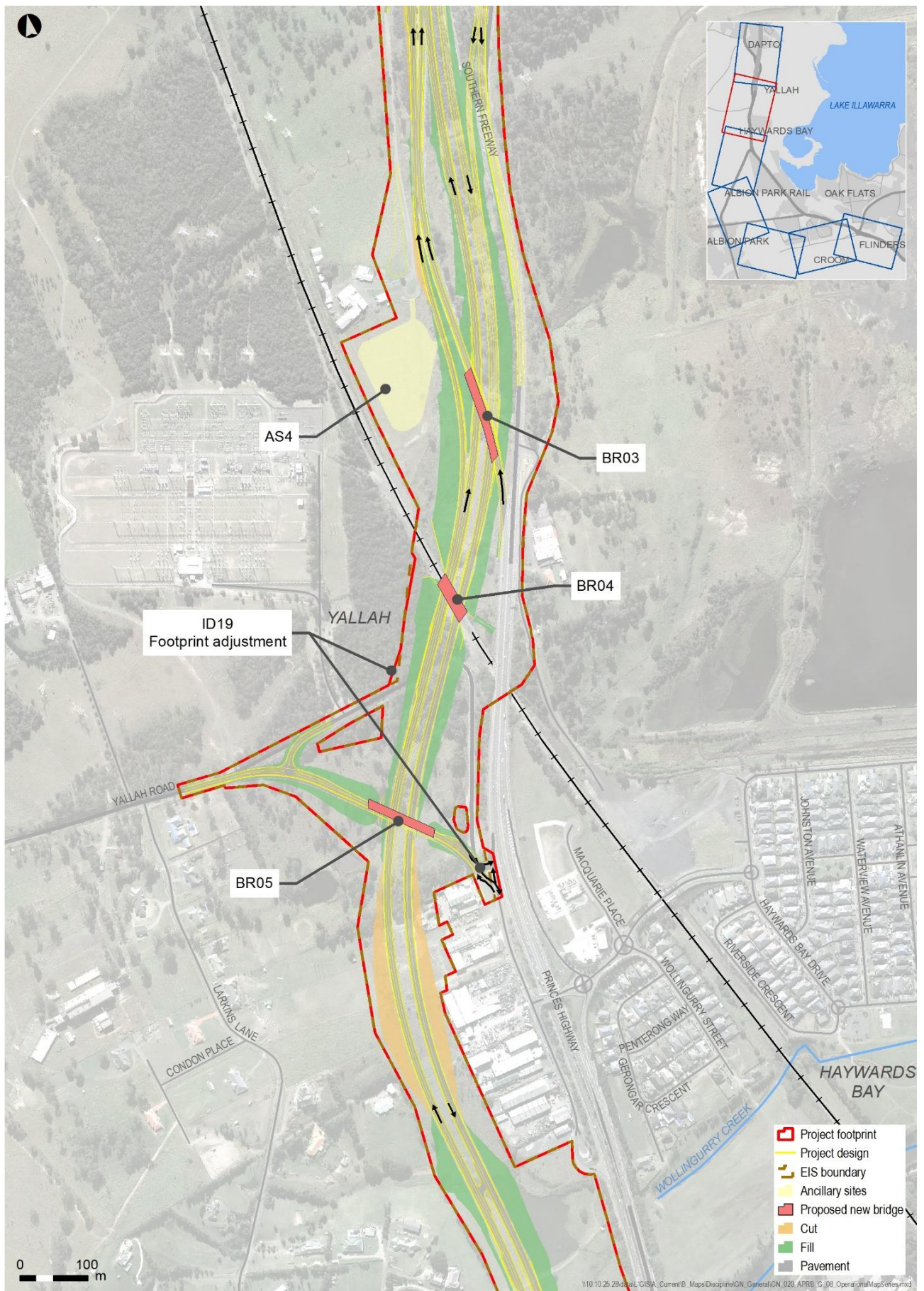


Figure 5-2 Design refinements figure b

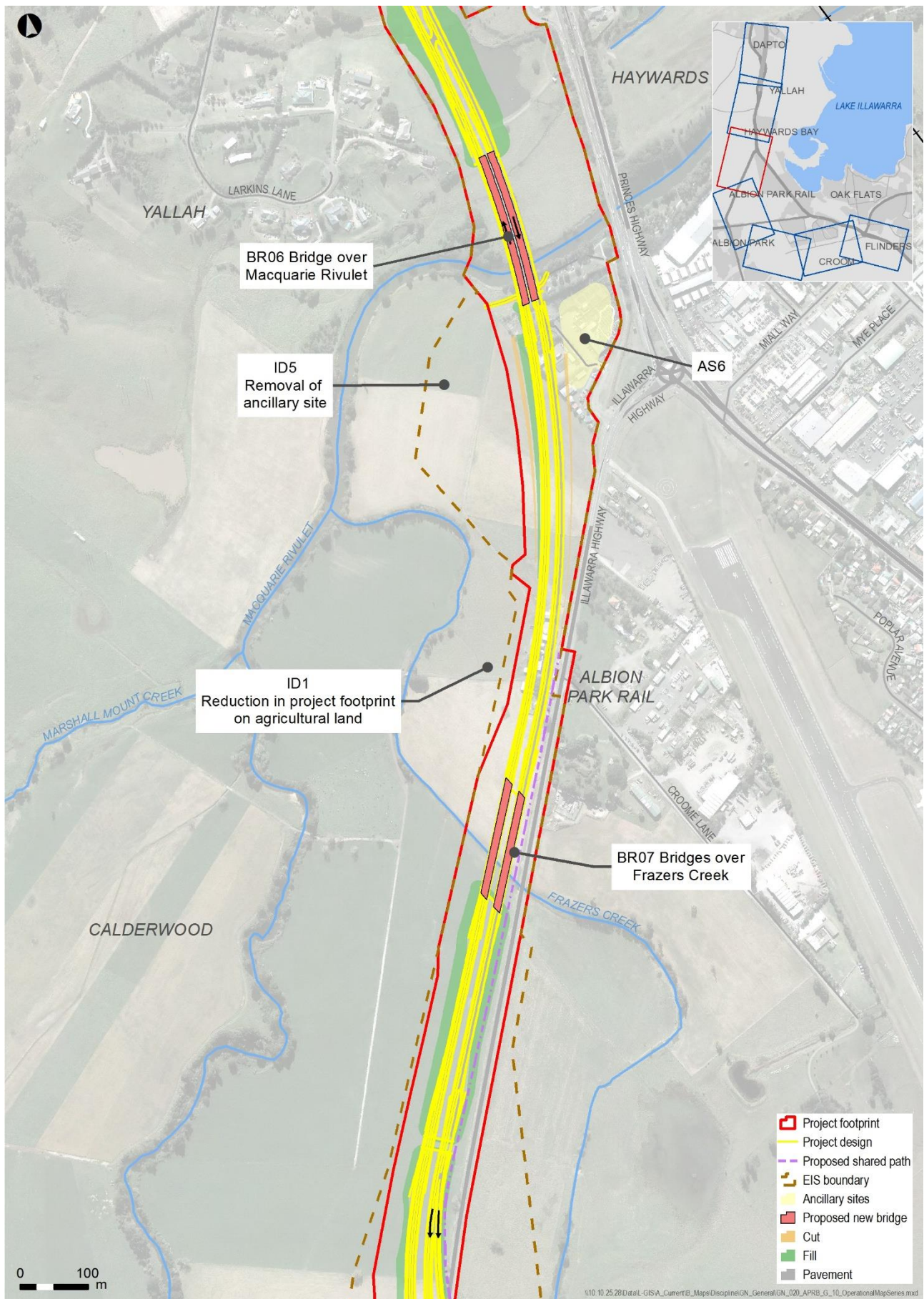


Figure 5-3 Design refinements figure c

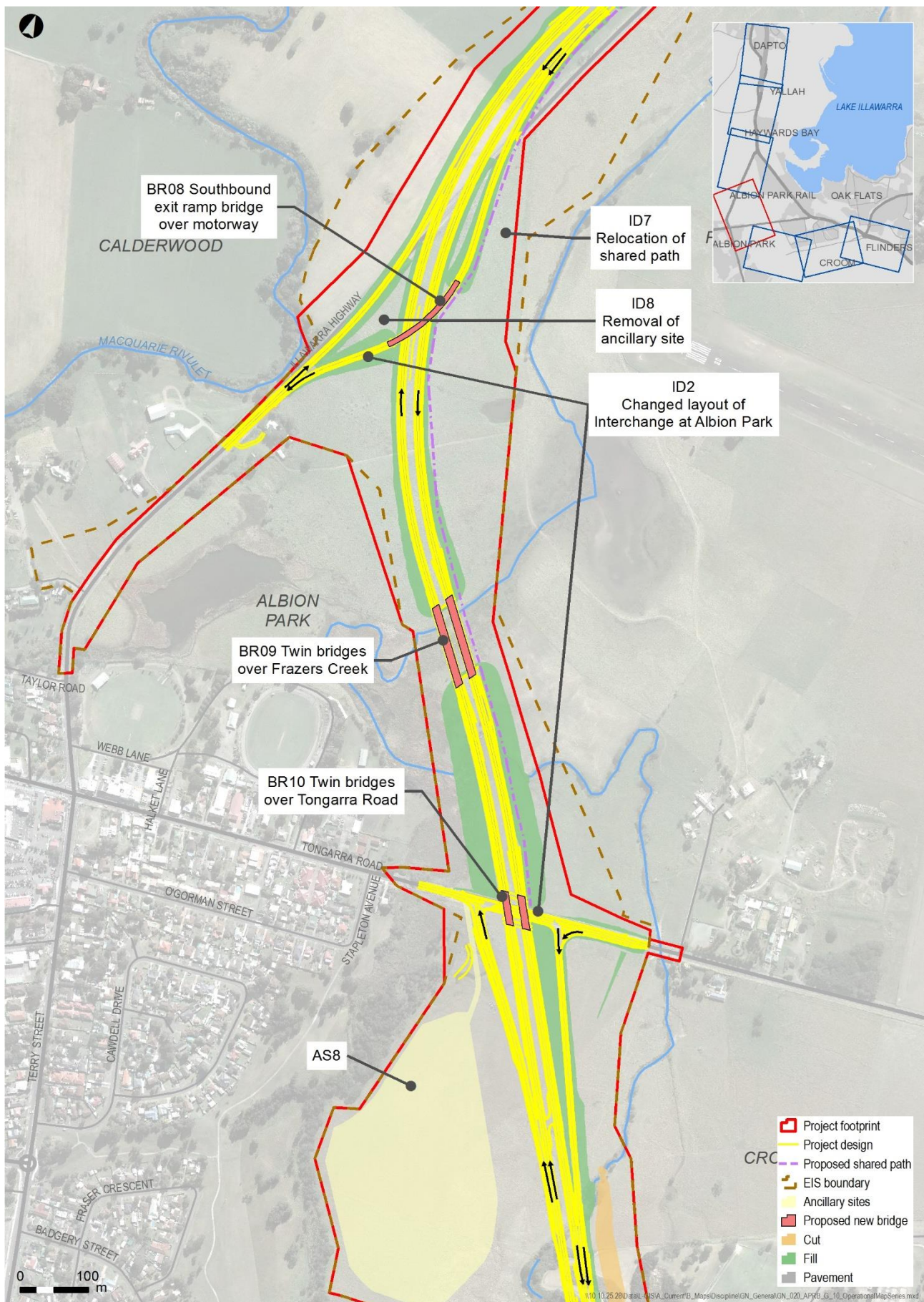


Figure 5-4 Design refinements figure d

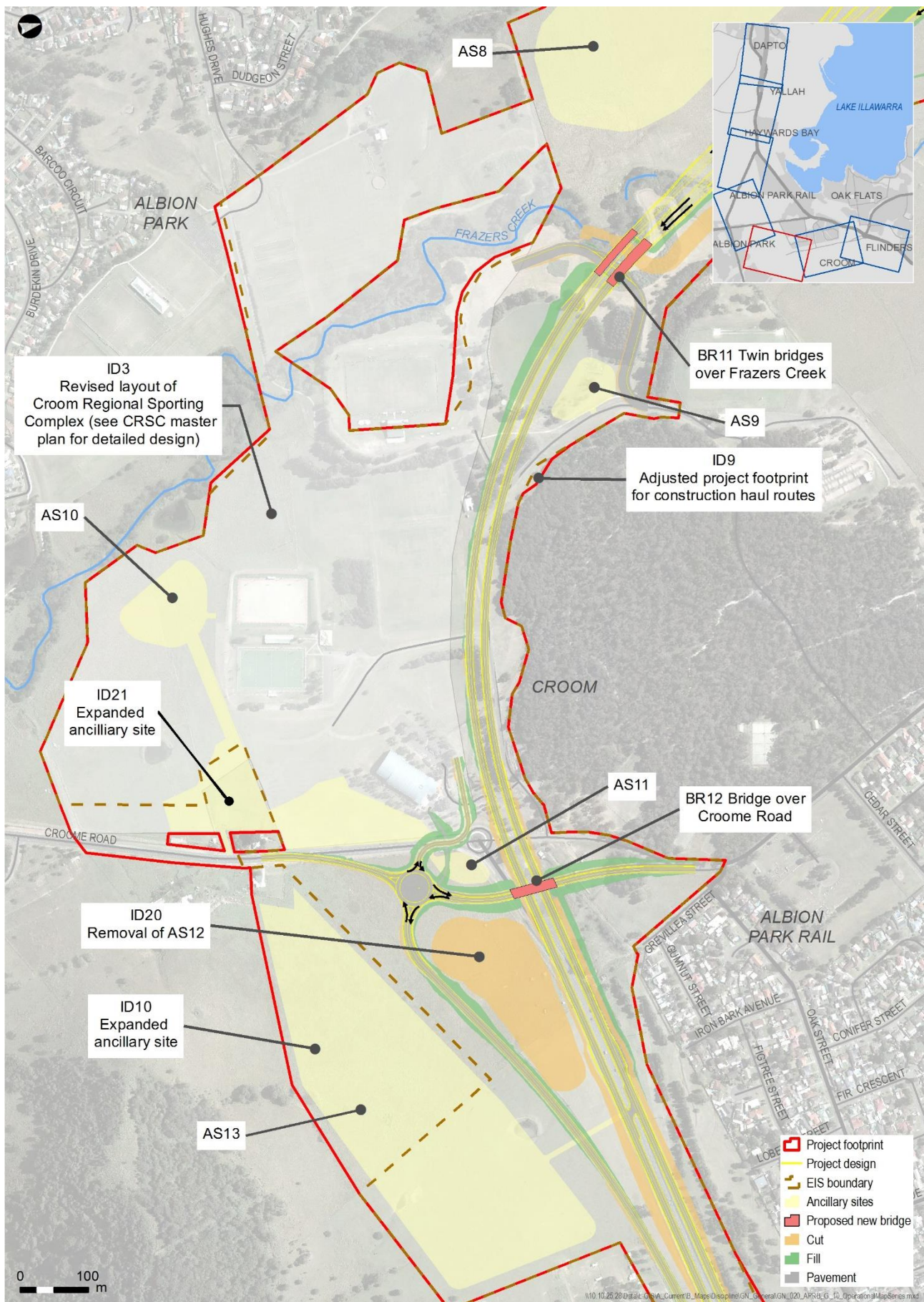


Figure 5-5 Design refinements figure e

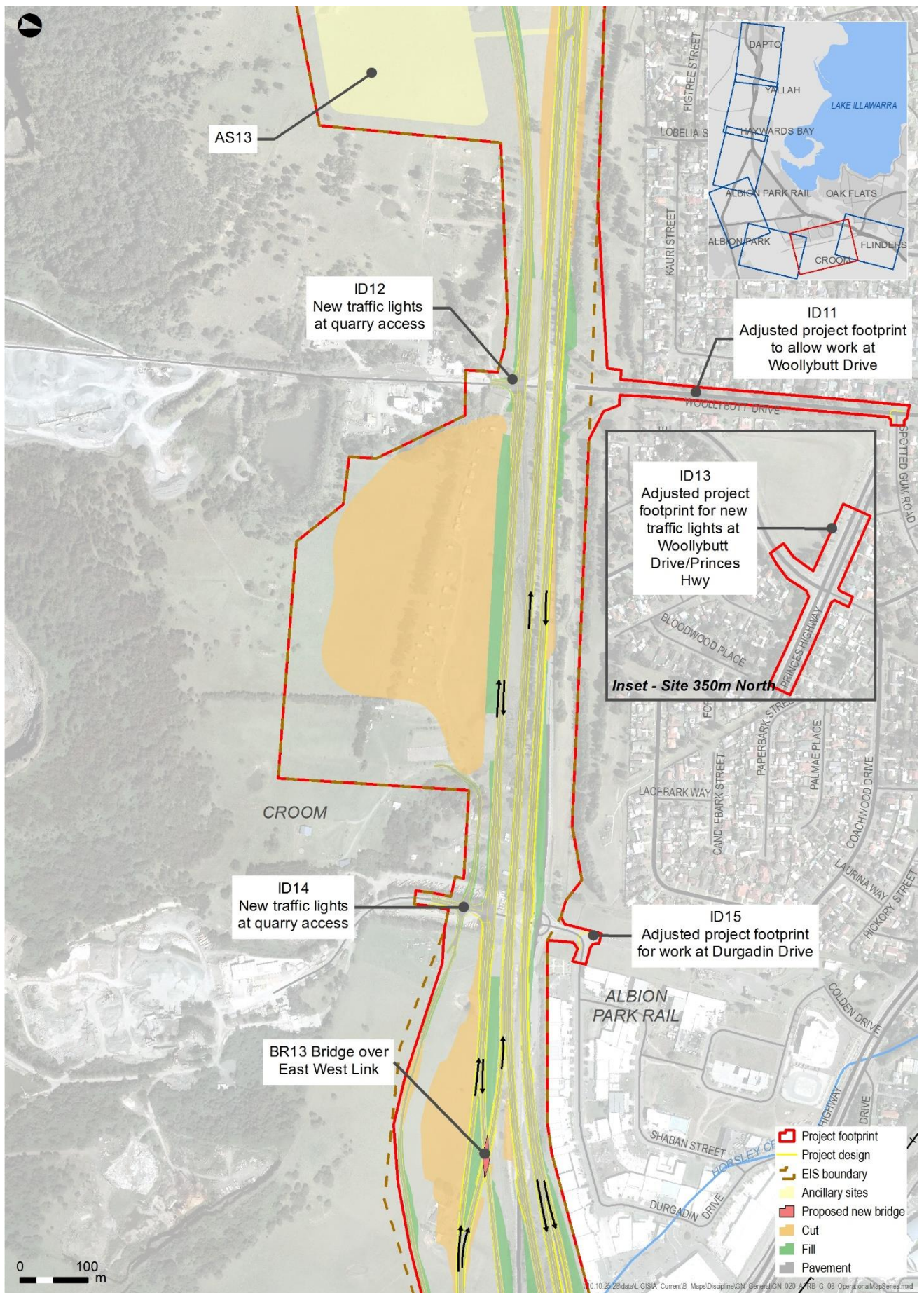


Figure 5-6 Design refinements figure f

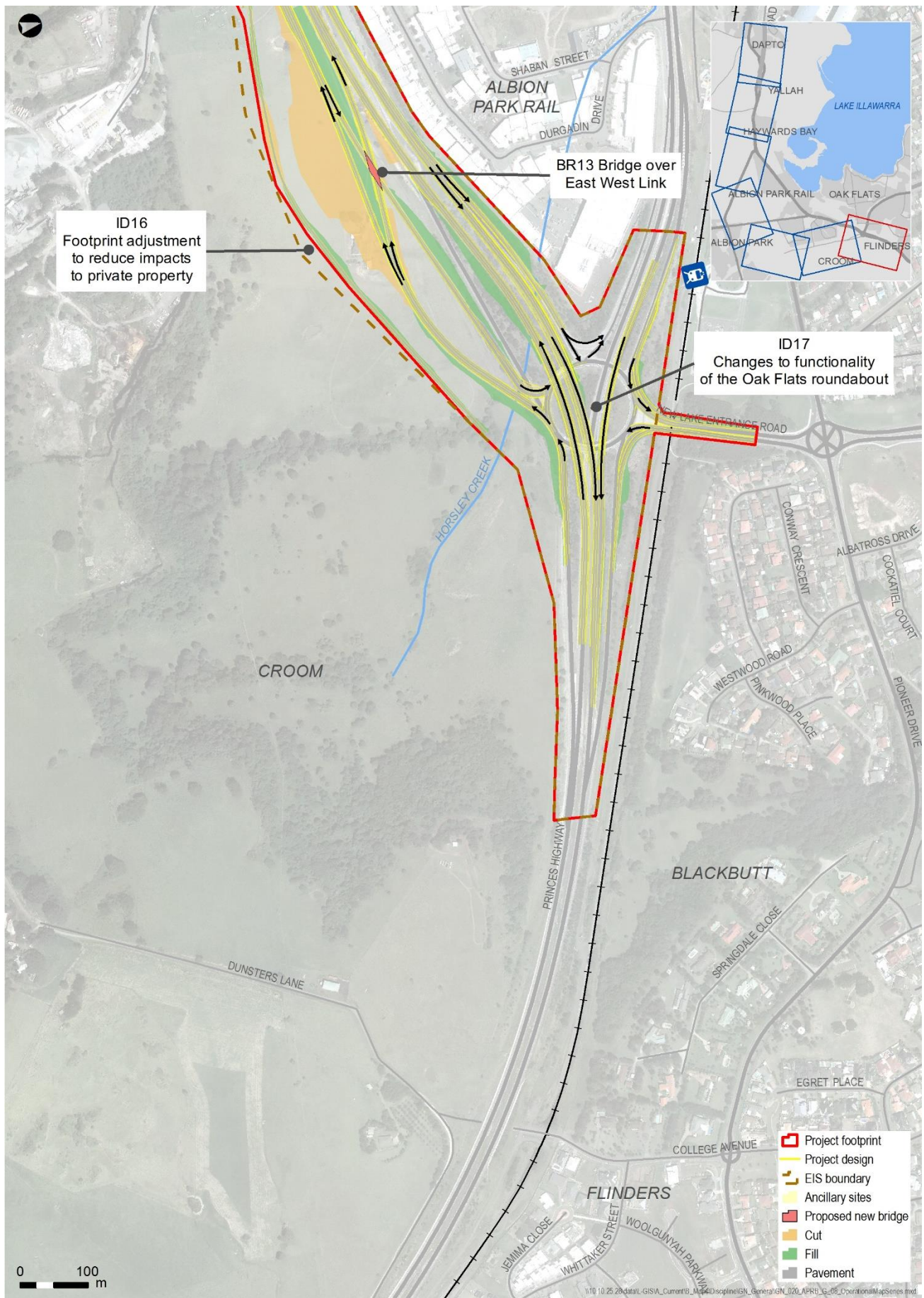


Figure 5-7 Design refinements figure g

5.2.1 INTERCHANGE AT ALBION PARK (ID2)

Due to concerns raised in submissions regarding the impact on agricultural lands, Roads and Maritime identified the need to review the design in order to reduce these impacts. Additional design development was undertaken for the interchange at Albion Park and a change to the preferred interchange arrangement was identified and is described below and shown in Figure 5-8. The proposed changes to the interchange are designed to allow connection to a future bypass of Albion Park (Tripoli Way).

Environmental impact statement design

The interchange at Albion Park described in the environmental impact statement proposed entry and exit ramps as follows:

- A northbound entry ramp connecting the Illawarra Highway (Terry Street) to the motorway
- A northbound exit ramp connecting traffic leaving the motorway to the Illawarra Highway (Terry Street)
- A southbound entry ramp connecting Tongarra Road to the motorway
- A southbound exit ramp crossing over the motorway to connect to the Illawarra Highway (Terry Street).

The environmental impact statement proposed the following structures associated with the interchange at Albion Park:

- A bridge over the motorway for the southbound exit ramp at Albion Park
- Twin bridges on the motorway over Frazers Creek
- Twin bridges on the motorway over Tongarra Road.

The environmental impact statement also proposed the following changes to the local road network associated with the interchange at Albion Park:

- Illawarra Highway north - The connection between Albion Park and Albion Park Rail would be closed permanently. The northern section of the highway would be retained, but would terminate in a cul-de-sac at Croome Lane
- Illawarra Highway (Terry Street) - The southern section of the Illawarra Highway (Terry Street) would be altered to connect to the new interchange at Albion Park
- Tongarra Road would be upgraded to provide a right-turn lane to the southbound entry ramp, and a shared path. An intersection would be provided to allow access to the southbound entry ramp.

The proposed interchange at Albion Park was designed to connect with a future bypass of Albion Park (Tripoli Way). This bypass is being investigated by Shellharbour City Council.

Description of design refinement

The proposed design refinement at the interchange at Albion Park would include the following changes to entry and exit ramps:

- The northbound entry ramp connecting the Illawarra Highway (Terry Street) to the motorway has been realigned to reduce its footprint on agricultural land
- The northbound exit ramp connecting traffic leaving the motorway to the Illawarra Highway (Terry Street) has been removed. A northbound exit ramp has been added to connect to Tongarra Road

- The southbound exit ramp to the Illawarra Highway (Terry Street) has been realigned. The ramp would pass over the motorway on a bridge about 200 metres further to the south. The ramp would connect traffic leaving the motorway to the Illawarra Highway (Terry Street).
- The southbound entry ramp connecting Tongarra Road to the motorway would remain as described in the environmental impact statement.
- The southbound exit ramp bridge over the motorway has been realigned to carry the realigned southbound exit ramp.

All other bridges would be constructed as described in the environmental impact statement.

The proposed design refinement at the interchange at Albion Park would include the following changes to the local road network:

- An additional signalised intersection would be provided to allow connection of the northbound exit ramp to Tongarra Road. Entry onto the southbound on ramp would also be signalised.

Tongarra Road would be upgraded as described in the environmental impact statement, and the Illawarra Highway (north of Croome Lane) and Terry Street would be changed as described in the environmental impact statement (see Figure 5-8).

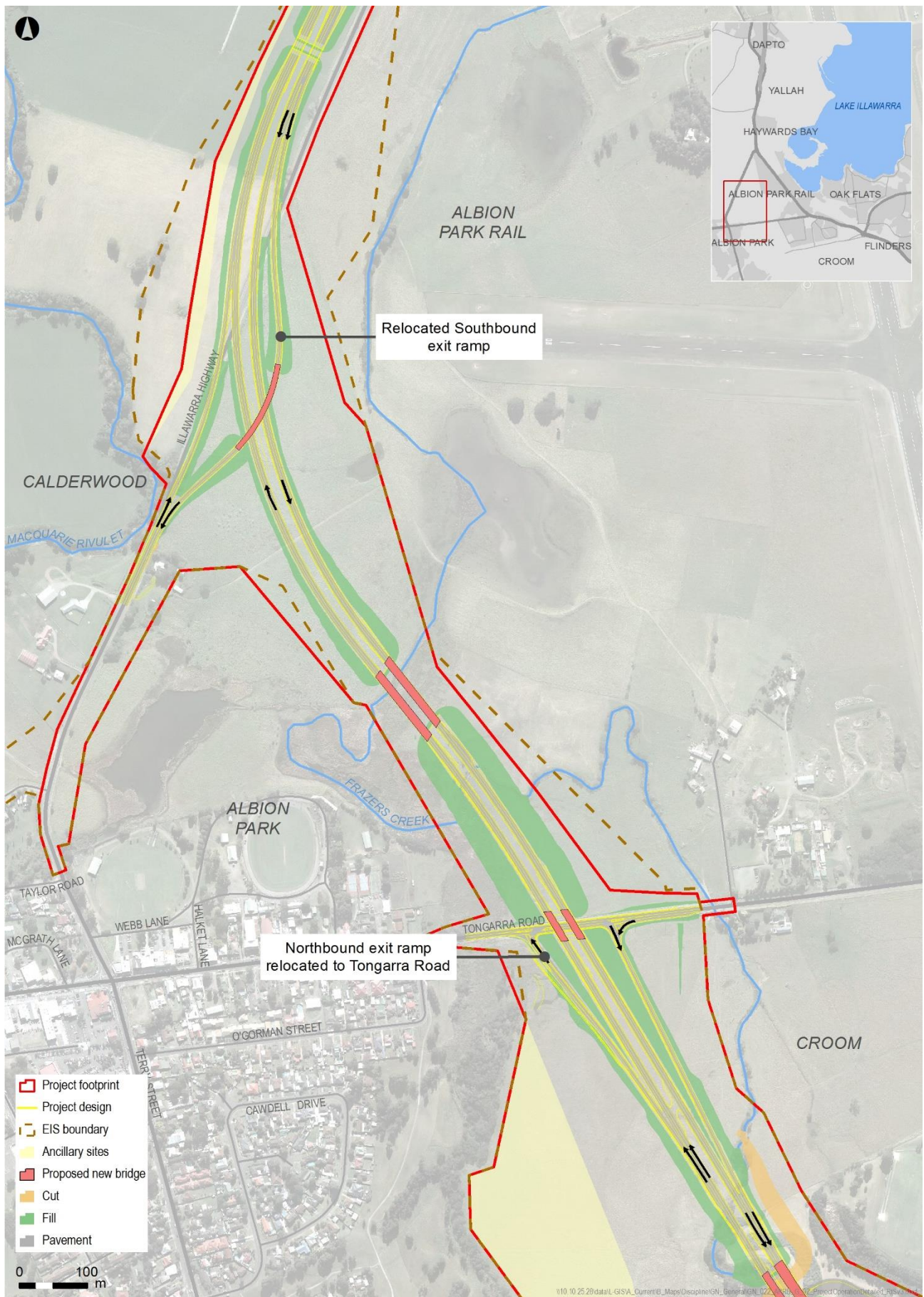


Figure 5-8 Interchange alignment at Albion Park

Justification for design refinement

Changes to the interchange at Albion Park are proposed to reduce the impact on agricultural land, and to eliminate a potential traffic weaving issue that could occur under the environmental impact statement design arrangement.

The configuration of the northbound exit ramp has changed since the environmental impact statement, having been previously designed as a free flow ramp which connected into Terry Street. Detailed modelling and assessment of the free flow option was undertaken and the following issues were identified in the microsimulation model during the AM and PM peaks:

- Extensive queuing and delay on Terry Street on the approach to Tongarra Road
- Extensive queuing and delay on Tripoli Way west of Terry Street
- Weaving behaviour on the approach to the Tripoli Way / Terry Street intersection, with long queues.

The relocation of the northbound exit ramp would eliminate a potential safety issue of weaving traffic, which may occur if the entry ramp was to be located closer to the Terry Road exit. The relocation is supported by the revised traffic modelling, as discussed in Section 5.5.1 and Appendix A of this report.

Due to the impact of the proposed route on dairy lands located to the north of Albion Park, the design was reviewed to determine whether the layout could be improved to minimise the impacts of the route on these lands. The proposed design refinement would result in a reduced impact on agricultural (dairy) land by about 10.3 hectares for the operational boundary and a further reduction of 3.8 hectares for the construction footprint as a result of the removal of the ancillary site AS05. The functionality of the interchange would be maintained with no additional impacts on traffic or flooding. This is discussed further in Section 5.5.1 and Section 5.5.2 of this report.

5.2.2 CROOM REGIONAL SPORTING COMPLEX (ID3)

The motorway route would pass through the Croom Regional Sporting Complex. Sporting fields and facilities would be directly impacted by the project, including the cricket / AFL oval and the northern extents of the junior rugby league playing fields and netball courts. To ensure its ongoing use, the project would reconfigure the Croom Regional Sporting Complex.

Environmental impact statement design

The reconfiguration of the Croom Regional Sporting Complex described in the environmental impact statement included the following:

- Six new (grassed) junior netball courts
- New junior AFL/cricket field relocated in the southern area with a 'drop-in' cricket pitch
- Relocation of the existing recreational horse arenas to the horse recreational area west of Frazers Creek, with fenced access for riders
- Four new formalised parking areas and two existing parking areas formalised, providing 500 formal car spaces
- New and/or relocated amenities buildings
- Improved internal roads.

Description of design refinement

Since the exhibition of the environmental impact statement, the proposed design for the sporting complex has been refined in an updated master plan for the site (Figure 5-9). The proposed changes include:

- The location and level of the junior AFL / cricket oval and netball courts would be adjusted to reduce the amount of excavation required in hard rock. The new AFL / cricket field would be at about the same level as the existing hockey fields
- A drop-in cricket pitch is no longer proposed – it would be grown in place
- The road between the netball and hockey facilities would now consist of two lanes rather than a one-way loop. There would be no road between the hockey and cricket facilities to the west of the hockey fields
- A one lane service road is proposed to be constructed alongside the existing footpath that goes between the main complex and the horse recreational area over Frazers Creek. This road would come off the cricket car park area and is subject to negotiations between Shellharbour City Council and Jemena
- The roundabout shown to the north of the hockey fields (east of the junior rugby league fields) in the environmental impact statement has been removed
- The two parking areas adjacent to the hockey and junior rugby league facilities have been consolidated into one car park to the north of the hockey fields
- There has been further consolidation and formalisation of car parking spaces to provide 557 formal parking spaces (57 more than proposed in the environmental impact statement).
- The new fenced off area to replace the area at Croome Road has been reconfigured including changes to parking and access, and the five existing arenas are to be retained.

The Croom Regional Sporting Complex master plan has been updated and is included in Figure 5-9.

Justification for design refinement

Detailed design of the Croom Regional Sporting Complex has progressed since the display of the environmental impact statement in consultation with Shellharbour City Council and local user groups, resulting in improved functionality.

The cricket field and netball courts were proposed to be located on areas of hard rock, which would have required an excavation of up to nine metres. By relocating these facilities, there would no longer be a need for large-scale excavation, which would be a cost saving.

Further consolidation of car spaces would result in 57 more formal parking spaces than proposed in the environmental impact statement.

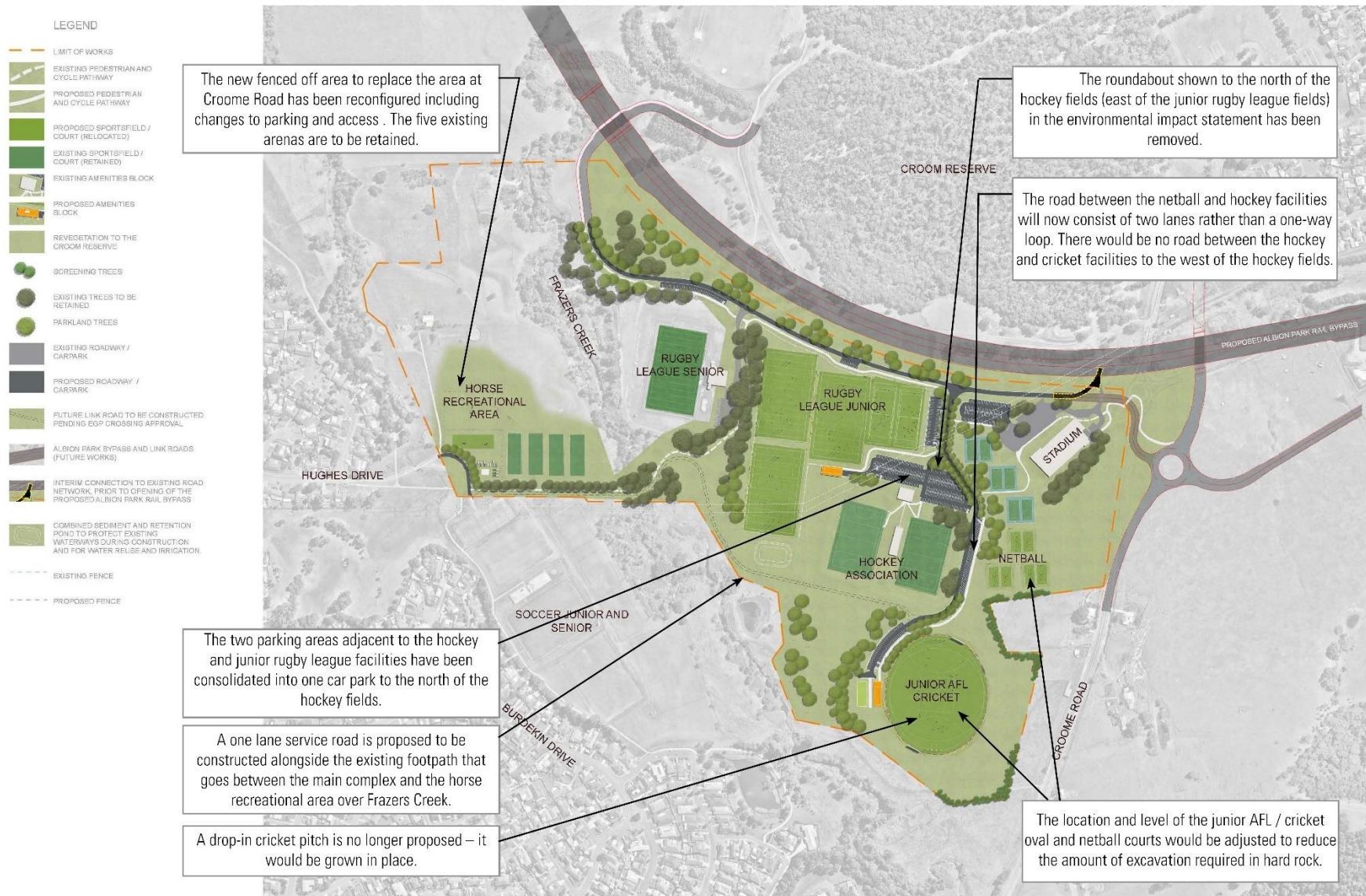


Figure 5-9 Croom Regional Sporting Complex master plan

5.2.3 ANCILLARY SITE ASSESSMENT

The former Department of Planning and Infrastructure (now Department of Planning and Environment) published draft conditions for State significant infrastructure (linear infrastructure) approvals in March 2012. These conditions, as documented in the environmental impact statement, outline the expected criteria that would be applied to the project with respect to site selection for ancillary facilities.

An assessment of the expanded ancillary site to the east of Croome Road (AS13) is presented in Table 5-3. The ancillary site is identified as ID10 on Figure 5-5.

An assessment of the expanded ancillary site to the west of Croome Road (AS10) is presented in Table 5-4. The ancillary site is identified as ID21 on Figure 5-5.

The extended ancillary site meets the relevant assessment criteria. Impacts associated with the expanded ancillary site are assessed in Section 5.5.

Table 5-3 Assessment of expanded ancillary site AS13 (ID10) against the Department of Planning and Environment criteria

Expected criteria	Meets criteria (yes/no)	Relevant environmental management measure to manage potential environmental impacts
a) Be located more than 50 metres from a waterway	Yes	The site is located more than 50 metres from a waterway. No additional mitigation measures are required.
b) Be located within or next to land where the State significant infrastructure is being carried out	Yes	The site is located within or next to land where the State significant infrastructure is being carried out. No additional mitigation measures are required.
c) Have ready access to the road network	Yes	The site would have ready access to the road network. No additional mitigation measures are required.
d) Be located to minimise the need for heavy vehicles to travel through residential areas	Yes	The site is located in an area that would minimise the need for heavy vehicles to travel through residential areas. No additional mitigation measures are required.
e) Be sited on relatively level land	Yes	The site is located on relatively level land. No additional mitigation measures are required.
f) Be separated from nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant)	Yes	There are two vacant dwellings within 200 metres of the site. One is owned by Roads and Maritime and is proposed to be demolished. The other is the vacant Swansea Farmhouse. No additional mitigation measures are required.
g) Not require vegetation clearing beyond that already required by the State significant infrastructure	Yes	The site is mostly clear of vegetation due to previous agricultural use. No additional mitigation measures are required.
h) Not impact on heritage items (including areas of archaeological sensitivity) beyond those already impacted by the State significant infrastructure	Yes	The site would not impact on any heritage items. No additional mitigation measures are required.
i) Not unreasonably affect the land use of nearby properties	Yes	The site would not unreasonably affect the land use of nearby properties. No additional mitigation measures are required.
j) Be above the 20 year ARI flood level unless a contingency plan to manage flooding is prepared and implemented	Yes	The site is located above the 20 year ARI flood level. No additional mitigation measures are required.
k) Provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours.	Yes	The site would provide sufficient area for the storage of raw materials. No additional mitigation measures are required.

Table 5-4 Assessment of expanded ancillary site AS10 (ID21) against the Department of Planning and Environment criteria

Expected criteria	Meets criteria (yes/no)	Relevant environmental management measure to manage potential environmental impacts
a) Be located more than 50 metres from a waterway	Yes	The site is located more than 50 metres from a waterway. No additional mitigation measures are required.
b) Be located within or next to land where the State significant infrastructure is being carried out	Yes	The site is located within or next to land where the State significant infrastructure is being carried out. No additional mitigation measures are required.
c) Have ready access to the road network	Yes	The site would have ready access to the road network. No additional mitigation measures are required.
d) Be located to minimise the need for heavy vehicles to travel through residential areas	Yes	The site is located in an area that would minimise the need for heavy vehicles to travel through residential areas. No additional mitigation measures are required.
e) Be sited on relatively level land	Yes	The site is located on relatively level land. No additional mitigation measures are required.
f) Be separated from nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant)	Yes	There are two vacant dwellings within 200 metres of the site. One is owned by Roads and Maritime and is proposed to be demolished. The other is the vacant Swansea Farmhouse. No additional mitigation measures are required.
g) Not require vegetation clearing beyond that already required by the State significant infrastructure	Yes	The site is clear of vegetation and forms part of the Croom Regional Sporting Complex land. No additional mitigation measures are required.
h) Not impact on heritage items (including areas of archaeological sensitivity) beyond those already impacted by the State significant infrastructure	Yes	The use of the area for temporary construction represents a moderate impact to the curtilage of the item and a moderate reversible impact to the views and vistas of the item. Following temporary use during construction works, this portion of the site would be remediated and returned to its preconstruction state. No additional mitigation measures are required.
i) Not unreasonably affect the land use of nearby properties	Yes	The site would not unreasonably affect the land use of nearby properties. No additional mitigation measures are required.
j) Be above the 20 year ARI flood level unless a contingency plan to manage flooding is prepared and implemented	Yes	The site is located above the 20 year ARI flood level. No additional mitigation measures are required.
k) Provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours.	Yes	The site would provide sufficient area for the storage of raw materials. No additional mitigation measures are required.

5.3 SCOPE OF DESIGN REFINEMENT ASSESSMENT

The proposed design refinements are detailed in Section 5.2.

Each design refinement was assessed against each of the key issues and other issues, as set out in the Secretary's Environmental Assessment Requirements issued for the project on 18 March 2015 by the Department of Planning and Environment. The assessment of each of the proposed design refinements is presented in Section 5.5.

The assessment identifies where additional or different impacts are expected from those identified in the environmental impact statement. Where the impacts would not differ, a statement is made on the consistency with impacts described in the environmental impact statement.

The assessment process involved desktop and field investigations (where required). Where additional impacts were identified, or extra mitigation would be required, these are detailed in the assessment. The main design refinements necessitated additional assessment of traffic and transport (including aviation); hydrology and flooding; biodiversity; Aboriginal heritage; non-Aboriginal heritage; and noise and vibration. Supporting technical reports were prepared and are included in Appendices A to I of this report.

5.4 CONSULTATION

As part of the design refinement process, consultation was undertaken with government agencies and stakeholders where required. Consultation undertaken is outlined below in Table 5-5.

Table 5-5 Issues raised during consultation

Agency	Consultation format
Environment Protection Authority	Project update meetings undertaken on the 27 February 2017 and 24 April 2017. Consultation regarding the implementation of extended work hours across the project including the outcomes of targeted community consultation, was undertaken on the 21 March 2017. The Environment Protection Authority were generally supportive of the approach to consultation and the proposed standard construction hours.
Shellharbour City Council	Meeting held every 2 months to discuss the development of the Croom Regional Sporting Complex and interactions with the Albion Park bypass (Tripoli Way). Collaborated during the design review of the interchange at Albion Park.
Wollongong City Council	Regular meetings undertaken to discuss the traffic modelling approach and cohesion between Council land use and traffic projections and those utilised by the project. Collaborated during the design review of the interchange at Albion Park.
Office of Environment and Heritage	Meetings held on the 27 February 2017 and 1 May 2017 (biodiversity personnel only) to present the proposed design refinements and discuss potential agency considerations and biodiversity offsets.
Illawarra Bicycle Users Group	Phone conversation with representative of the group to discuss changes to the proposed shared pathway adjacent to the Illawarra Highway and alternative shared pathway project Roads and Maritime will be supporting to ensure access is maintained, and other issues raised during the submissions period relating to cycling
Utility providers: • Transgrid • Jemena Networks • Jemena Eastern Gas Pipeline • Sydney Water • Endeavour Energy • Energy Australia • Telstra • Optus • TPG • NBN • Sydney Trains and Railcorp	Roads and Maritime have undertaken a substantial amount of consultation with affected utility providers. There has been numerous phone conversations, written correspondence, face to face meetings and draft designs with the impacted utility providers. All providers have given in principle agreement to the project and the potential impacts of the project on the local utilities.

In addition to this, on 5th May 2017 a project update was sent to staff from Southern Region Department of Planning and Environment, Office of Environment and Heritage and the Department of Primary Industries to present the refined project design for comment as detailed in this report.

5.5 ENVIRONMENTAL ASSESSMENT

The assessment identifies where additional or different impacts are expected from those identified in the environmental impact statement. A risk assessment was carried out to determine where additional assessment was required. Results of the risk assessment are documented in Table 5-6, which identifies where additional assessment was required and has been carried out. The issues reviewed correspond with those presented in the environmental impact statement.

Table 5-6 Additional assessment required

ID no	Refinement	Traffic and transport	Hydrology and flooding	Biodiversity	Aboriginal heritage	Non-Aboriginal	Noise and vibration	Socio economic	Landscape and visual	Land use	Other
1	Project boundary adjustment north of Frazers Creek	✓	✓	✓	✓	-	✓	✓	✓	✓	✓
2	Interchange at Albion Park	✓	✓	✓	-	✓	✓	✓	✓	✓	-
3	Croom Regional Sporting Complex	✓	-	✓	-	✓	✓	✓	-	✓	-
4	Removal of ancillary site AS02	-	-	-	-	-	✓	✓	-	✓	-
5	Removal of ancillary site AS05	-	-	-	-	-	✓	✓	-	✓	-
6	Modifications to culverts	-	✓	-	-	-	-	-	-	-	-
7	Relocation of shared cycle and pedestrian path	✓	-	-	-	-	-	✓	-	✓	-
8	Removal of ancillary site AS7	-	-	-	-	-	✓	✓	-	✓	-
9	Adjusted project footprint for dedicated haul routes	✓	-	✓	-	-	-	✓	-	✓	-
10	Expanded ancillary site AS13	-	✓	✓	-	-	✓	✓	✓	✓	-
11	Adjusted project footprint southern side of Woollybutt Drive	-	-	✓	-	✓	-	✓	-	✓	-
12	Addition of traffic lights at Holcim Quarry	✓	-	-	-	-	-	✓	✓	-	-
13	Adjusted project footprint Woollybutt Drive and the Princes Highway	-	-	✓	-	-	-	✓	-	✓	-
14	Addition of traffic lights at Cleary Brothers Quarry	✓	-	-	-	-	-	✓	✓	-	-
15	Adjusted project footprint at Durgadin Drive	-	-	✓	-	-	-	✓	-	✓	-
16	Adjusted project footprint to the southern end	-	-	✓	-	-	-	✓	-	✓	-
17	Roundabout at Oak Flats interchange	✓	-	-	-	-	-	✓	-	-	-
18	Extended work hours	-	-	-	-	-	✓	✓	-	-	✓
19	Adjusted project footprint off Yallah	-	-	-	-	-	-	✓	-	✓	-

ID no	Refinement	Traffic and transport	Hydrology and flooding	Biodiversity	Aboriginal heritage	Non-Aboriginal	Noise and vibration	Socio economic	Landscape and visual	Land use	Other
	Road										
20	Removal of ancillary site AS12	-	-	-	-	-	✓	✓	-	✓	-
21	Expanded ancillary site AS10	-	-	-	-	✓	✓	✓	✓	✓	-

5.5.1 TRAFFIC AND TRANSPORT

Traffic assessment methodology and approach

An addendum to Technical Paper 1 – Traffic and Transport of the environmental impact statement has been prepared to assess the potential changes in impacts on traffic and transport due to the proposed design refinements. The addendum forms Appendix A of this report.

The traffic assessment carried out for the environmental impact statement used a combination of strategic traffic modelling software TRACKS and SIDRA intersection modelling as the basis of the traffic analysis.

A revised traffic modelling approach was adopted to assess the proposed design refinements. This revised approach used Aimsun traffic modelling software to supplement the TRACKS network modelling. The revised traffic modelling approach has produced different results from the assessment carried out in the environmental impact statement primarily due to modelling changes rather than as a result of the design refinements.

TRACKS Modelling Refinement

The TRACKS model used in the environmental impact statement was based on the joint Wollongong Shellharbour Strategic Transport Model (WOLSH). During the display period of the environmental impact statement, Wollongong City Council carried out a comparison of the TRACKS and the WOLSH models and found the differences were predominantly attributed to the difference between the model methods used.

Following public exhibition of the environmental impact statement, the TRACKS model was updated which included refinements of the residential and employment forecasts and network geometry. These refinements were agreed with Wollongong City Council.

The TRACKS model was used to quantify the following operational performance indicators, including:

- Road network travel times
- Road network average speeds
- Traffic assignment through the network.

Aimsun model

The Aimsun traffic model was developed to supplement the TRACKS model. The Aimsun model provides additional outputs that are not available in the TRACKS model as well as improved accuracy for certain performance metrics.

The performance outputs from the Aimsun model were compared to the outputs from the TRACKS model developed during the environmental impact statement. It is noted that this

comparison was expected to produce different results based on the different modelling software and methodology employed, and a refinement in model inputs.

The main inputs into the Aimsun model are the refined TRACKS model and supplementary data provided by additional traffic surveys (see below). The Aimsun model was used for:

- Peak hour volumes for average annual daily traffic estimation
- Assessment of capacity and level of service at key ramp, merge and intersection locations.

Additional traffic surveys

Additional traffic surveys were undertaken in October 2016 to improve the calibration and validation of the Aimsun model. The majority of data used for the Aimsun calibration was from 2014, and so 2014 is the base case. Where 2016 data was used, the data was adjusted to account for growth in traffic volumes that occurred between 2014 and 2016.

Aviation assessment methodology and approach

An addendum of Technical Paper 2 – Aviation was also undertaken to examine the impacts of the proposed design refinements and document any changes to the impacts identified in the environmental impact statement. The addendum report is located in Appendix B of this report. This process included:

- The revised project design, including the proposed design refinements, was compared to the project design as shown in the environmental impact statement
- Protection surfaces associated with Illawarra Airport's existing and aspirational obstacle limitation surface and other relevant airspace protection surfaces were compared to the proposed design refinements
- An analysis of the revised project design was carried out to identify the impacts of the proposed design refinements on relevant aviation considerations.

Existing environment

The existing environment was described in Section 7.2 of the environmental impact statement and is still applicable to this assessment.

Potential construction impacts on traffic and transport associated with proposed design changes

Potential construction impacts on traffic and transport due to the proposed design refinements are generally consistent with the impacts detailed in the environmental impact statement.

The northbound exit ramp within the Albion Park interchange has been relocated to Tongarra Road. This shift of the ramp has minimal impacts to the construction methodology and as such no changes to the number of trucks and the routes taken by trucks is required.

Potential construction impacts on aviation associated with proposed design changes

Construction related activities associated with the proposed design refinements are consistent with the activities listed in the environmental impact statement. The potential construction impacts on aviation are considered consistent with some improvement to those stated in the environmental impact statement.

Potential operational impacts on traffic and transport associated with proposed design changes

Operational impacts 2041 environmental impact statement versus revised design

Network performance

In 2041, the project is forecast to carry between 60,000 and 77,000 vehicles on a typical weekday (Table 5-7 and Figure 5-10). This is different to the forecast presented in the environmental impact statement because of the changes to assessment modelling as outlined above.

Table 5-7 Forecast traffic volumes on the project

Location	2041 environmental impacts statement forecast average daily traffic (vehicles)	2041 revised design forecast average daily traffic (vehicles)
New motorway, at Macquarie Rivulet Bridge	53,100	76,700
New motorway, south of Tongarra Road	45,100	61,300

The project would deliver the following benefits to network performance:

- An average increase in road network travel speeds of 47 per cent within the study area compared to the 'do nothing' scenario as summarised in Table 5-8 (this is a marginal change from the 44 per cent presented in the environmental impact statement)
- A reduction in vehicle hours travelled of 24 per cent in the study due to traffic using the bypass (this is a minor reduction when compared to the environmental impact statement reduction of 28 per cent)
- A reduction in travel time of more than 11 minutes northbound in the AM peak and more than 10 minutes southbound in the PM peak which is consistent with the environmental impact statement.

Table 5-8 Vehicle kilometres travel (VKT) and vehicle hours travelled (VHT) with and without project

Model Years	Annual		
	VKT	VHT	Average Travel Speed (km/h)
2041 without EIS (baseline)	476,194,104	13,380,301	36
2041 with EIS	494,333,651	9,571,655	52
Difference	18,139,547	3,808,647	+16
% difference with EIS	+4%	-28%	+44%
2041 without project (baseline)	512,596,923	14,150,516	36
2041 with project	568,872,954	10,809,563	53
Difference	56,276,031	3,340,953	+17
% difference with project	+11%	-24%	+47%

*Source: TRACKS windowed model (2016),

**Albion Park Rail Bypass - Predicted Traffic Increase between 2014 and 2041 at Key Locations
(Based on TRACKS Do Nothing Model (2016))**

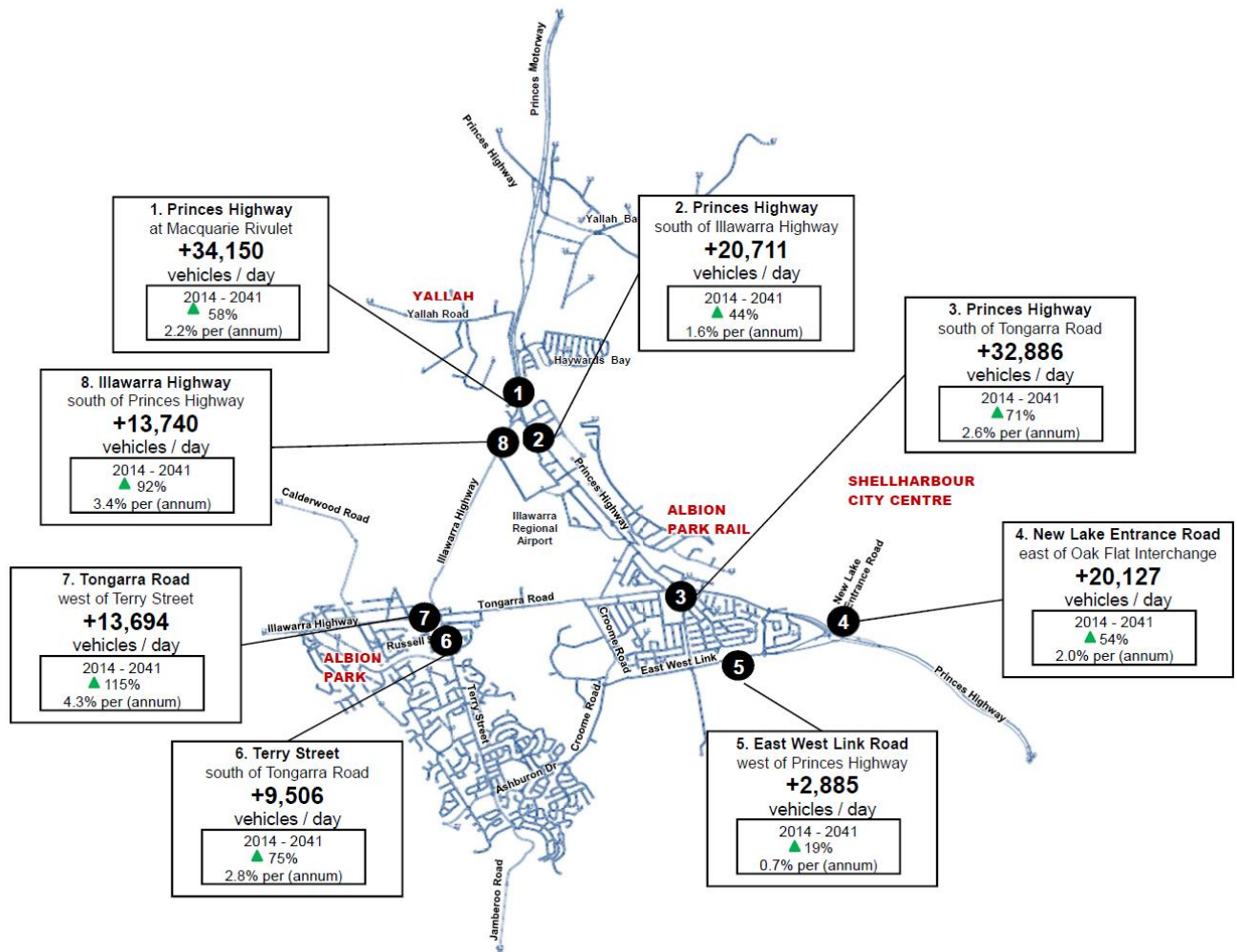


Figure 5-10 Existing average daily traffic growth, 2014-2041

Level of service main carriageway

Largely as a result of the revised traffic modelling approach, the level of service to be achieved along the main carriage way in the design year 2041 has changed in the current design in some peak periods from the environmental impact statement. These changes are identified in Table 5-9 below.

Table 5-9 Main carriageway midblock modelled levels of service for 2041 design year.

Location on the main alignment	Environmental impact statement level of service	Current design level of service	Environmental impact statement level of service	Current design level of service
	AM		PM	
North – north of interchange at Yallah	Northbound: C Southbound: C	Northbound: C Southbound: B	Northbound: B Southbound: D	Northbound: C Southbound: C
Central – between the interchange at Albion Park and interchange at Yallah	Northbound: C Southbound: B	Northbound: D Southbound: C	Northbound: B Southbound: D	Northbound: C Southbound: D
South – between the interchange at Albion Park and Oak Flats Interchange	Southbound: C Northbound: B	Southbound: C Northbound: B	Southbound: B Northbound: C	Southbound: C Northbound: C

Level of service at interchanges

Interchange at Yallah

Since the exhibition of the environmental impact statement, there have been adjustments made to the footprint of the eastern roundabout at Yallah interchange, however the connectivity remains unchanged.

Results of the updated 2041 design year modelling for the interchange at Yallah are shown in Figure 5-11 and summarised as follows:

- The northbound entry and southbound entry ramps operate at level of service C or better in both AM and PM peak periods.
- The southbound exit ramp operates at level of service B in both the AM and PM peak periods.
- The northbound exit ramp operates at level of service C in the AM and B in the PM peak periods.
- The western roundabout of the Northern Interchange operates at level of service A in both the AM and PM Peak periods.
- The eastern roundabout of the Northern Interchange would operate at a level of service B in both AM and PM peak periods with an average delay of 25 and 26 seconds respectively.
- The Illawarra Highway / Princes Highway operates at a level of service B in the AM peak and level of service A in the PM peak period.

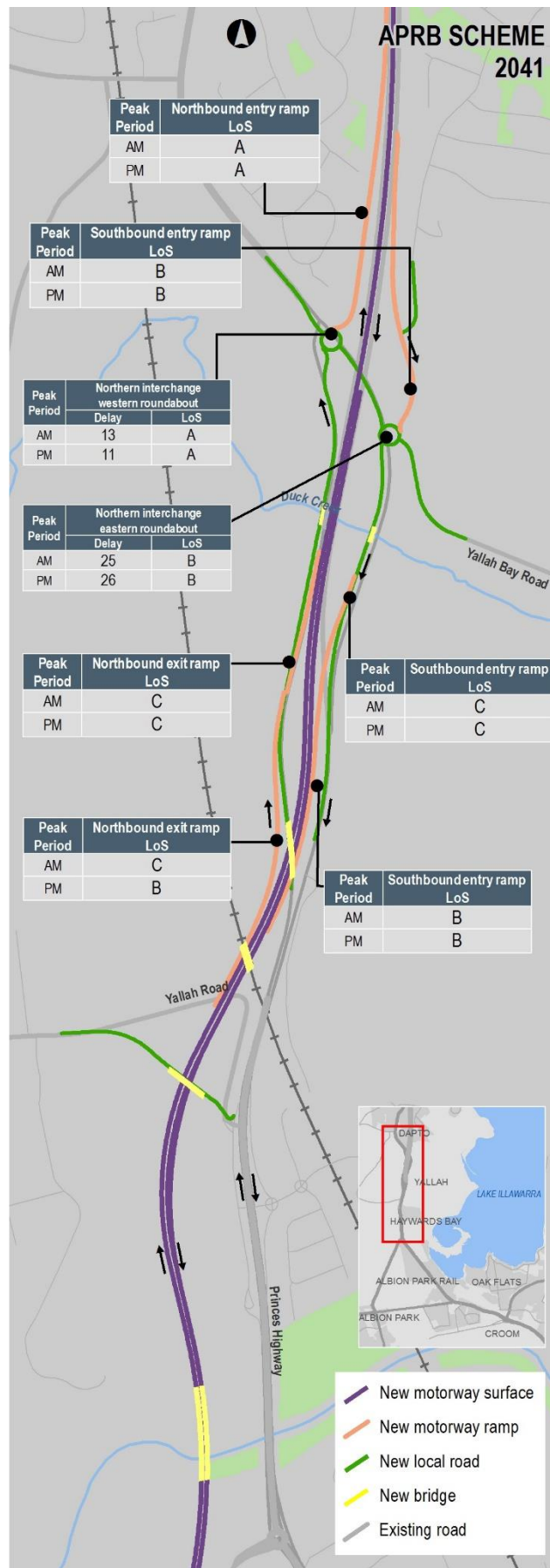


Figure 5-11 Level of service for the interchange at Yallah 2041

Interchange at Albion Park

Results of the updated modelling for the interchange at Albion Park are shown in Figure 5-12 and summarised as follows:

- The southbound exit, northbound exit and southbound entry ramps operate at level of service C or better during both the AM and PM peaks.
- The northbound entry ramp operates at level of service E in the AM peak and level of service D in the PM peak. Motorists can still expect to travel at acceptable speeds of 75 km/h in the AM peak and 79 km/h in the PM peak compared to a posted speed of 80km/hr at this ramp location.

The intersection of northbound exit ramp and Tongarra Road operate at level of service B or better during both AM and PM peak periods. The configuration of the northbound exit ramp has changed since the environmental impact statement, having been previously designed as a free flow ramp which connected into Terry Street. Detailed modelling and assessment of the free flow option was undertaken and the following issues were identified in the microsimulation model during the AM and PM peaks:

- Extensive queuing and delay on Terry Street on the approach to Tongarra Road
- Extensive queuing and delay on Tripoli Way west of Terry Street
- Weaving behaviour on the approach to the Tripoli Way / Terry Street intersection, with long queues.

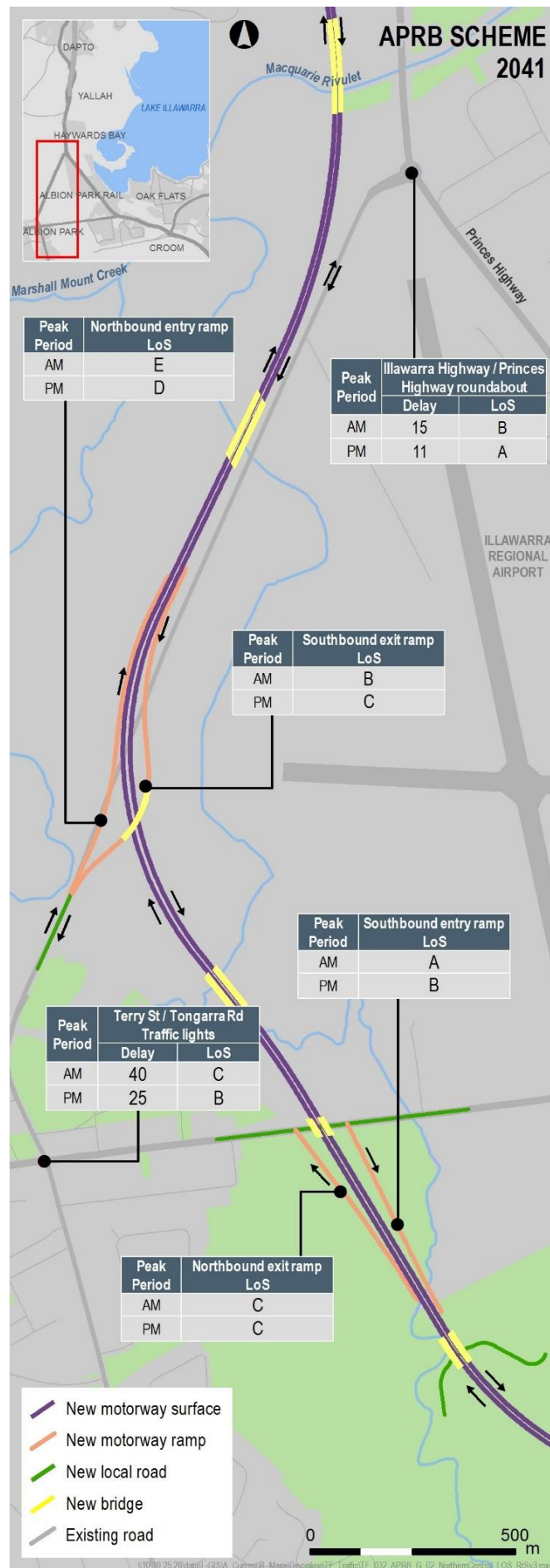


Figure 5-12 Level of service for interchange at Albion Park 2041

Oak Flats interchange

Results of the updated 2041 design year modelling for the Oaks Flat interchange are shown in Figure 5-13 and summarised as follows:

- The southbound entry ramps and northbound exit ramp operate at level of service B or better
- The northbound entry ramp operates at level of service C during the AM and PM peak period
- The Oak Flats Interchange's critical movement would operate at level of service C in the AM peak and level of service B in the PM peak period. None of the approaches experience average delay greater than 70 seconds, a threshold deemed to be appropriate for this case. The majority of road users are expected to experience average delays at this intersection of under 40 seconds during the AM peak and below 30 in the PM peak period. There are a number of ways that this intersection could be optimised to improve the performance. It is proposed that the interchange layout be further investigated during the project detailed design phase.
- The main line south of the interchange would operate at level of service C or better in both AM and PM peak periods.

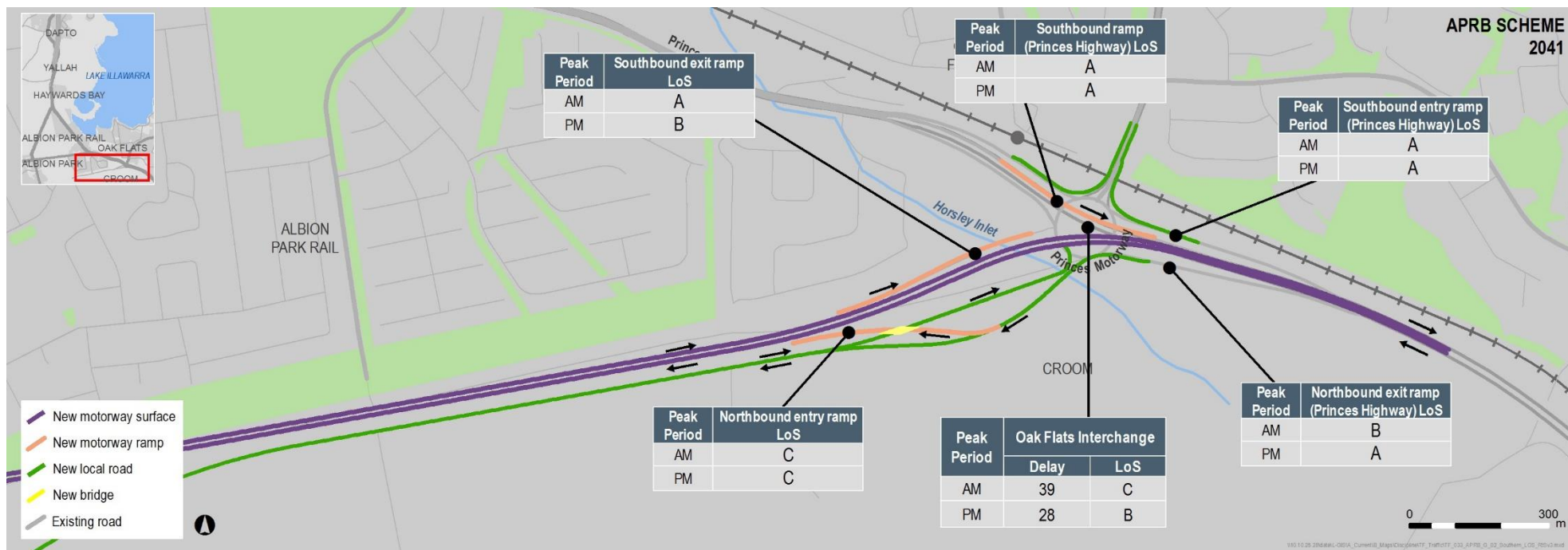


Figure 5-13 Level of service for Oak Flats interchange, 2041

Impacts on Albion Park town centre

The existing traffic network in Albion Park town centre will come under increasing pressure in the future as a result of large scale residential development such as Calderwood and Tullimbar. A pinch point for this congestion would be Terry and Tongarra Road intersection. Traffic growth is expected to increase substantially for this east west corridor movement as these residential developments are completed.

Travel patterns would largely stay the same with the proposed design for Albion Park. People travelling to or from the north would now take the Illawarra highway and would access the proposed motorway via the ramps on the Illawarra Highway. The traffic within Albion Park travelling to the south like Kiama or east to Shellharbour would use Tongarra Road as they would now but they would be able to get onto the proposed motorway via the on ramps. However, for the design presented within the environmental impact statement traffic heading from the south or east would have been redirected by the northbound exit ramp to the Illawarra Highway instead of the existing access along Tongarra Road. As such there is less impacts to traffic patterns from the proposed design than the design presented in the environmental impact assessment.

There are two main routes for east-west traffic in the 2041 traffic model including the existing Illawarra Highway (Tongarra Road) and the proposed Tripoli Way, a Shellharbour City Council project. Three of the ramps in the environmental impact statement design were located close to the Tripoli Way corridor and one was located at Tongarra Road. With the proposed design the northbound offload ramp was relocated to Tongarra Road, so two ramps are located close to Tripoli Way and two at Tongarra Road. Figure 5-14 shows that traffic volumes on Tongarra Road increase as a result of the relocation of the ramp, compared to the design presented in the environmental impact statement.

The proposed design spreads traffic between the two main east west links through Albion Park in the 2041 traffic model more evenly thus reducing likely congestion to either route. It is noted that the proposed location of the northbound offload and southbound onload ramps would allow flexibility for future upgrades to the road network in Albion Park.

When compared to the traffic volumes without the bypass in place (do nothing), the traffic volumes on Tongarra Road are similar to the proposed design. Figure 5.14 shows the forecast average daily traffic for 2041 around the Albion Park town centre. The average daily traffic volume differences varied between 5% and 15% along the town centre study area. This shows that the traffic impacts of the project are minor within the Albion Park town centre.

Roads and Maritime will continue to monitor the traffic performance through Albion Park and determine the suitability and timing of future road upgrades through Albion Park. This will require coordination with Shellharbour City Council on the proposed future distributor road (Tripoli Way) for the Albion Park urban area and future connection to Albion Park Rail Bypass project. Roads and Maritime is currently undertaking a corridor study for the Illawarra Highway and this will review the future need of the corridor through Albion Park.

The intersection of Terry Street / Tongarra Road is forecast to operate at level of service C in the AM and level of service B in the PM peak periods with an average delay of 40 seconds in the AM peak and 25 seconds in the PM peak. For the purposes of modelling the Albion Park Rail bypass, right turns on all legs of this intersection were assumed to be removed by 2041 (restricted right turns on the eastern and western legs are already in place during weekdays). It should be noted that the intersection of Terry Street / Tongarra Road currently experiences congestion within peak periods, it is acknowledged that this is an existing congestion problem for the Illawarra Highway. This intersection is outside of the project scope and banned right turns on the northern and southern legs were only applied for modelling purposes. Roads and Maritime will monitor congestion at the intersection and investigate ways of reducing congestion in the future.



Figure 5-14 2041 Forecast average daily traffic comparison (Albion Park town centre)

Croom Regional Sporting Complex

There would be no changes to potential traffic impacts at Croom Regional Sporting Complex compared to the environmental impact statement.

Regional and local access and connectivity

As a result of submissions received regarding concerns about traffic performance and safe access, traffic modelling for both the Holcim and Cleary Brothers quarry access points has been updated. The model was revised to include updated traffic data provided by Holcim based on traffic counts during the AM peak between 14 November 2016 and 18 November 2016. Traffic generation data remained the same for the Cleary Brothers access point.

The revised traffic model showed that by using the worst case scenario for the design presented in the environmental impact statement, the intersections would fail at level of service F. To achieve satisfactory intersection performance, the implementation of traffic lights at opening year is proposed at the quarry access intersections along the new East-West Link. With the implementation of traffic lights, both quarry access intersections are anticipated to operate at level of service A.

Heavy vehicles

The project arrangement in comparison to the environmental impact statement would result in minimal changes for heavy vehicles. Any vehicles from the south, heading west of Albion Park and exiting at Tongarra Road would now be routed along the Illawarra Highway, as they presently are. They would be able to bypass the Princes Highway and Tongarra Road between the Oak Flats interchange and Tongarra Road off-ramp.

Permanent road closures

Intersections of Colden Drive and Woollybutt Drive with the East West Link Road would be removed, however, this would not occur until the traffic lights at Woollybutt Drive and Princes Highway intersection are installed. The Illawarra Highway would be closed between Tongarra Road and the A1 Princes Highway, however, this would not occur until the opening of the new motorway. A number of driveway accesses would be closed after alternative access arrangements are provided.

Road safety

The majority of through traffic would be diverted onto the new motorway, significantly reducing traffic volumes on the existing Princes Highway route between Yallah and Oak Flats. This would result in significant crash reduction along the existing Princes Highway route and would improve road safety to local traffic.

The project would also reduce future traffic volumes along the Tongarra Road which would also have similar road safety benefits. A significant proportion of the future through traffic from the Calderwood area travelling south would be diverted onto the motorway once the south facing entry ramp from Tongarra Road opened, reducing the incidence of crashes on Tongarra Road and Princes Highway. The improved safety conditions on key roads that provide access to Albion Park Rail and Albion Park is an important benefit of the project.

Pedestrians and cyclists

The environmental impact statement proposed a shared path to connect the townships of Albion Park Rail and Albion Park along the old Illawarra highway alignment. The proposed network of pedestrian and cycle facilities described in the environmental impact statement has been reviewed in consideration of submissions received and the proposed design refinements.

Based on this review, the proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities.

Concerns were raised in submissions about the safety of the interaction between pedestrians and cyclists and cattle, which would be crossing the alignment at the proposed bridge over Frazers Creek. The proposed movements of cattle beneath the motorway in this area adds an additional potential clash point between/pedestrians and cattle. Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings.

Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project).

The shared path to be constructed as part of the project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement.

Potential operational impacts on aviation associated with proposed design changes

Protection of the airport's operational airspace

The height of the motorway and local access roads was heavily influenced by the obstacle limitation surface. The outcomes of this revised aviation assessment can be summarised as follows:

- Based on the current design sufficient clearance exists between the existing operational obstacle limitation surface and road surface to accommodate a 4.6m vehicle envelope
- Provided that street lighting poles are designed to accommodate the existing operational obstacle limitation surface height limits, the current design would otherwise pose no further impact on current operations at Illawarra Regional Airport other than those identified in the environmental impact statement
- There is no proposed change from the environmental impact statement design with respect to the Runway 16 Precision Approach Path Indicator (PAPI) Obstacle Assessment Surface (OAS).
- The Illawarra Highway at the northern roundabout, which is existing infrastructure, would not be compliant with the aspirational obstacle limitation surface in supporting a 4.6m vehicle envelope. This would not change as a result of the proposed bypass
- A number of existing and proposed facilities in the Croom Regional Sporting Complex would intrude on the aspirational obstacle limitation surface, however this would not produce a greater intrusion than already occurs.
- In all other respects the impacts of the revised design would be no greater than those presented in the environmental impact statement.

To minimise the risks presented to aircraft operations at Illawarra Regional Airport during operation of the project the detailed design of the project would comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport.

Clearance to light poles

Light poles (and other road furniture) in this area have been designed to remain below the existing operational and aspirational obstacle limitation surface height limits. As a result, some

light poles would require a lower pole than the standard 9.0 metre mounting height. This will be confirmed during detailed design following project approval.

Potential impacts on aviation associated with management measures

Section 5.5.6 of this report defines the potential use of noise barriers to reduce operational acoustic impacts on surrounding sensitive receivers. The potential noise barriers, whilst subject to review during detailed design, were considered in relation to the protection surfaces associated with Illawarra Regional Airport's existing and aspirational obstacle limitation surfaces.

The assessment indicated that a section of proposed noise barrier, Dapto North Bound (NB) 2, would infringe the operational obstacle limitation surface inner horizontal surface and conical surface over a distance of approximately 170m. The maximum extent of infringement is identified at approximately 7.5m and the highest point of the barrier infringes the obstacle limitation surface by approximately 6.6m (Appendix B).

An assessment against the aspirational obstacle limitation surface indicated that a section of proposed noise barrier Dapto NB2 would infringe the operational obstacle limitation surface inner horizontal surface over a distance of approximately 490m. The maximum extent of intrusion is approximately 9.8m which is the highest point of the proposed noise barrier alignment. At the second-highest point the intrusion is approximately 4.8m (Appendix B).

Consideration of this management measure may therefore require adjustment to the height and/or location of the barrier during detailed design, subject to further investigation.

Summary

Traffic and transport

Operational Impacts 2041 environmental impact statement versus the project

The 2041 forecast average daily vehicle traffic at Macquarie Rivulet Bridge increased from 53,100 vehicles as stated in the environmental impact statement to 76,700 vehicles. The 2041 forecast average daily vehicle traffic south of Tongarra Road increased from 45,100 vehicles as stated in the environmental impact statement to 61,300 vehicles. This change is driven by a difference in the modelling approach used in the current assessment from the environmental impact statement including changes to the traffic forecast assumptions.

Average road network travel speeds in the study area are estimated to be 36 kilometres per hour without the project (same as the environmental impact statement) and 53 kilometres per hour with the project (down from 52 kilometres per hour in the environmental impact statement). This is 47 per cent higher than the do nothing scenario. With the project, vehicle kilometres travelled would increase by 11 per cent and vehicle hours travelled would reduce by 24 per cent. In the environmental impact statement vehicle kilometres travelled were predicted to increase by four per cent and vehicle hours travelled were predicted to reduce by 28 per cent.

A comparison of the existing route between Yallah Bay Road and Oak Flats interchange and the project proposal indicates that in comparison to do nothing, the project would save 11 minutes 42 seconds (64 per cent of time) northbound in the AM peak and 10 minutes 36 seconds (61 per cent of time) southbound in the PM Peak.

Construction

Potential construction impacts on traffic and transport due to the proposed design refinements are generally consistent with those detailed in the environmental impact statement.

Aviation

There would be no additional impacts on current operations at Illawarra Airport to those identified in the environmental impact statement.

The current Illawarra Highway would continue to not be compliant should the aspirational obstacle limitation surface be realised.

The potential management measure, noise barrier Dapto NB2, infringes the operational and aspirational obstacle limitation surfaces. Consideration of this management measure may therefore require adjustment to the height and/or location of the barrier during detailed design, subject to further investigation.

Revised environmental management measures

The addendum assessment identified that impacts relating to the proposed design refinements are consistent with the assessment outlined in the environmental impact statement, Technical Paper 1 – Traffic and Transport and Technical Paper 2 – Aviation. The mitigation measures included within the environmental impact statement and included in Section 6 of this report are still considered to be relevant and no amendments to these mitigation measures are required.

5.5.2 HYDROLOGY AND FLOODING

Assessment methodology and approach

An additional assessment was carried out to assess any changes in impacts to hydrology and flooding due to the proposed design refinements. The additional flooding and hydrology assessment is attached as Appendix C.

Assessment criteria were developed for the project through a review of local flooding issues, past project experience and consultation with a range of key stakeholders. The assessment criteria relate to flood immunity, flood impacts, and flooding and drainage design. The criteria used for the assessment of design refinements are unchanged from that used in the environmental impact statement and Technical Paper 3 – Hydrology and Flooding.

This project used catchment-wide flood modelling from Shellharbour City Council and Wollongong City Council for the three main project catchments which include Duck Creek, Macquarie Rivulet and Horsley Creek. These flood models form the 'base case' for the hydrological and hydraulic assessments.

The Macquarie Rivulet Flood Study is currently in progress, and a draft report was made available for public exhibition in July 2016 by Shellharbour City Council after the environmental impact statement was issued for public exhibition. In 2014, an advance copy of the Macquarie Rivulet flood model was made available to Roads and Maritime for the environmental impact statement. The model represented the most comprehensive flood model available at the time for this catchment.

After the flood model was provided to Roads and Maritime for the environmental impact statement, some changes were made to the Shellharbour City Council flood model for the issue of the draft Macquarie Rivulet flood study. These changes include:

- Changes to rainfall data
- Changes to rainfall loss rates
- Changes to blockage assumptions
- Changes to tail water assumptions at Lake Illawarra

All of these changes to the model mean that the results of the 2016 draft Macquarie Rivulet Flood Study are different to the results from the preliminary Macquarie Rivulet flood model provided to Roads and Maritime for the environmental impact statement in 2014. A comparison of the two models found that flow rates and flood levels are lower in the July 2016 draft flood model compared to the model used in the environmental impact statement for a range of design storm events between the 5 year ARI and 100 year ARI. In events greater than the 100 year ARI, the 2016 draft flood model predicts higher flow rates and flood levels.

The impacts and immunity of the design have been developed based on the Macquarie Rivulet flood model used in the environmental impact statement. This is considered justified because:

- It is a conservative approach due to the higher flow rates and flood levels in the design storm events
- It allows for a like for like comparison of impacts from the revised design compared to the environmental impact statement design
- The Macquarie Rivulet flood model has not yet been finalised.

As a sensitivity test, the revised design has been analysed using the 2016 draft Macquarie Rivulet flood model to determine what level of immunity and impacts would be achieved if the draft model was used. The results of this analysis are provided at Section 3.3.4 and Section 3.3.5 of Appendix C of this report.

Assessment Definitions

The environmental impact statement refers to Property 1, Property 2 and Property 3 in relation to potential negative impacts due to flooding (refer Figure 8-11 of the environmental impact statement).

To avoid confusion, and to allow comparison between the design assessed in the environmental impact statement and the proposed design refinements, the following terms are used in this report:

- Property 1
- Dwelling 1 – it is noted that Dwelling 1 is located on Property 2 as indicated in the environmental impact statement.
- Dwelling 2 – it is noted that Dwelling 2 is located on Property 3 as indicated in the environmental impact statement.

The terminology has been revised in the additional hydrology and flooding assessment (Appendix C) to indicate potential impacts as a result of the proposed design refinements as outlined in this report (refer Section 5.2).

Existing environment

The existing environment was described in Section 8.2 of the environmental impact statement and is still applicable to this assessment.

Brooks Creek catchment

The very northern portion of the project lies within the Brooks Creek catchment. The impact of hydrology and flooding associated with this catchment was not assessed in the environmental impact statement as the design was not considered to extend into this catchment at the time of the assessment. Whilst not specifically a design refinement, an assessment of the Brooks Creek Catchment has been included here for completeness.

Within the Brooks Creek catchment, two culverts convey flows under the existing Motorway in an easterly direction towards Brooks Creek. The northern catchment is 10.7 hectares and the southern catchment is 4.6 hectares at the motorway (refer to Figure 5-15).

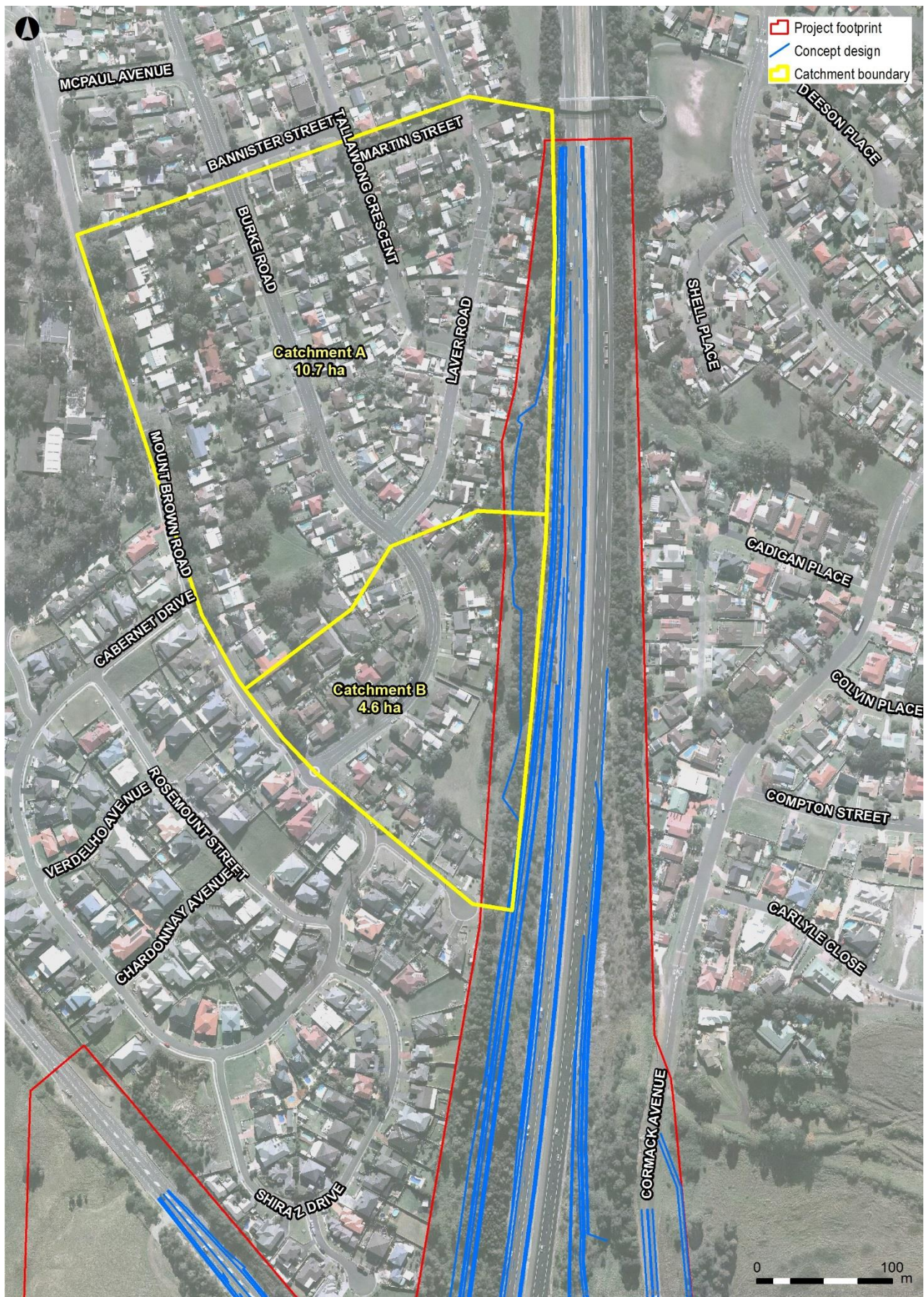


Figure 5-15 Northern and southern sub-catchments of Brooks Creek catchment. Flows are conveyed by two culverts in an easterly direction under the existing motorway.

Potential operational impacts associated with proposed design changes

Brooks Creek catchment

A previous study of the Mullet and Brooks Creek catchment for Wollongong City Council predicted this section of the existing motorway would not be impacted by flooding from Brooks Creek in events up to the probable maximum flood.

The motorway is proposed to be widened by about three metres under the culvert in catchment A (Figure 5-15). The proposed entry ramp would not impact on the inlet pit at this location and the existing drainage infrastructure would remain. The existing culvert would remain at its current capacity and the level of flood immunity on the motorway would be unchanged from existing levels.

The culvert in catchment B would be impacted by the proposed entry ramp (Figure 5-15). The motorway is proposed to be widened by about 15 metres at this location. It is proposed to construct a new culvert and associated pits to retain the existing capacity of the culvert crossing. A bund would be constructed between the culvert inlet and the motorway to maintain the existing level of flood immunity on the motorway.

Duck Creek catchment

There are no changes to the design which impact on flooding within the Duck Creek floodplain. The flood impacts and performance against criteria within the Duck Creek catchment for the project are as per the environmental impact statement. As there are no changes in this catchment, there are no changes to the level of impact on property 1.

It is noted that Wollongong City Council have recently revised their blockage policy, which generally has lower blockage values when compared to the previous Wollongong City Council blockage policy. The flood impacts and performance against criteria presented in the environmental impact statement within the Duck Creek catchment are based on the previous (more conservative) Wollongong City Council blockage policy and has not been re-assessed with the new blockage policy. An analysis of the project with the new blockage policy would generally result in lower flood levels upstream of bridges and culverts.

The motorway achieves 100 year ARI flood immunity (which means the road level is higher than the 100 year ARI flood level) for the full extent of the project with the exception of a low point south of the Duck Creek Bridge, where the project uses the existing bridge. At this location two of the three north bound lanes would be flooded in the 100 year ARI event, but the motorway would remain trafficable to emergency vehicles.

Macquarie Rivulet catchment

A summary of the changes to the transverse drainage design for the revised design compared to the environmental impact statement design are provided along with results at each location for the Macquarie Rivulet catchment in Table 5-10. The transverse drainage structure locations are shown in Figure 3-3 and Figure 3-4 of Appendix C.

Table 5-10 Changes to the Transverse Drainage Design Approach – Macquarie Rivulet Catchment

Transverse Drainage Structure	Design (Operational Activity)	Comments
M1a	Culvert opening as per environmental impact statement.	Culverts is (1x) 1800 mm diameter reinforced concrete pipe.
M1 CH 18650	Bridge opening as per environmental impact statement.	Bridge has 200 m opening measured at the toe of the abutment.
M2 CH 19600	Bridge opening as per environmental impact statement (150 m at toe), abutments shifted north 50 m to reduce impacts.	The bridge now spans deeper water within the floodplain which improves the conveyance under the bridge.
M2e (New)	A new culvert has been provided in the design to allow flood water to cross under the motorway during a flood.	This culvert allows water to flow between the floodplain to the west of the motorway and the floodplain to the east of the motorway.
M2a M2b M2c M2d (New) CH 20600	The Albion Park interchange has been changed to reduce the footprint and the northbound exit ramp has been moved to Tongarra Road. Due to the adjustments to the interchange, culvert M2a, which is under the northbound entry ramp, has been resized to (3x) 1200 mm height x 3000 mm width reinforced concrete box culvert which is a reduction from the environmental impact statement design which was (5x) 1200 mm height x 3000 mm width reinforced concrete box culvert. The two culverts under the motorway to the east of M2a (M2b and M2c) have been removed and an additional (4x) 1200 mm height x 3000 mm width culvert (M2d) has been included in the design under the southbound exit ramp to the west of the motorway. The adjustments to the culverts at this location cater for the changes to the motorway and ramp alignment and ensure that the level of immunity and impacts in this area meet the design criteria.	The northbound entry ramp and southbound exit ramp are not flooded in the 100 year ARI event.
M3 CH 21000	Bridge opening as per environmental impact statement.	Bridge has 90 m opening measured at the toe of the abutment.
M4 CH 21200	Culvert opening as per environmental impact statement.	Culverts are (3x) 2400 mm height x 3000 mm width reinforced concrete box culvert.
Tongarra Road CH 21450	The revised design is similar to the environmental impact statement at Tongarra Road with the addition of a new northbound exit ramp which connects to Tongarra Road.	The new northbound exit ramp achieves 5 year ARI immunity. This ramp connects to Tongarra Road where the immunity is increased from 2 year ARI to 5 year ARI as a result of the project. In the 10 year ARI event, Tongarra Road would be flooded at the intersection with the northbound exit ramp and at the existing low point to the west of the northbound exit ramp.
M5 CH 22100	Bridge, culvert opening and creek diversion as per environmental impact statement.	Bridge is 65 m span, culverts are (4x) 2100 mm diameter reinforced concrete pipe and creek diversion is 30 m wide at the bridge.

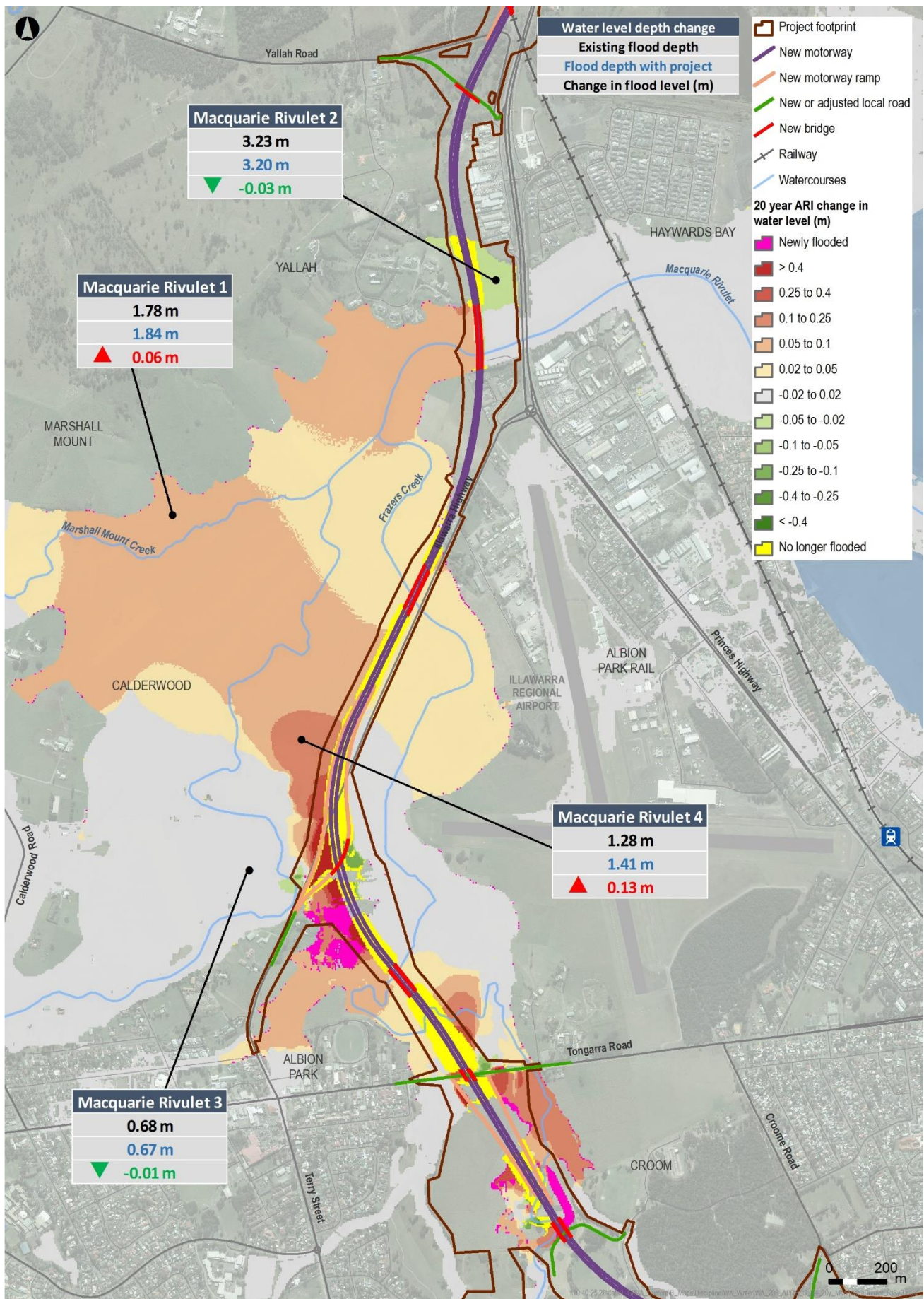


Figure 5-16 Macquarie Rivulet 20 year ARI

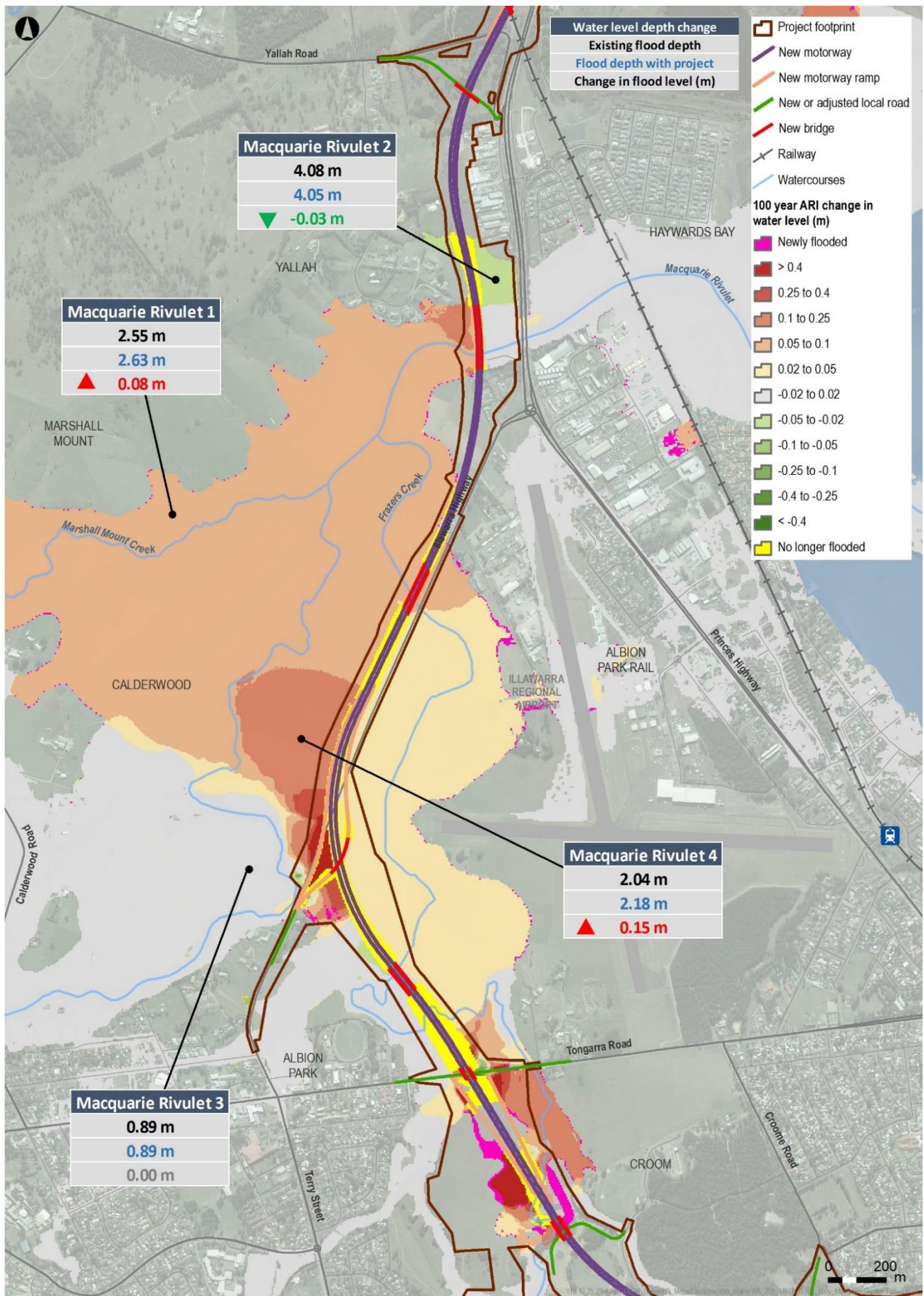


Figure 5-17 Macquarie Rivulet 100 year ARI

The environmental impact statement predicted increased over floor flooding at a single dwelling (Dwelling 1) at Property 2 and a single dwelling (Dwelling 2) at Property 3 in the 100 year ARI event. For the project, at Dwelling 1, the 100 year ARI event increase in water level is predicted to be 35 millimetres, which is a reduction from the increase predicted in the environmental impact statement (83 millimetres).

For the project at Dwelling 2, the 100 year ARI event increase in flood level is predicted to be 20 millimetres, which is less than the 54 millimetres predicted in the environmental impact statement. This is within the nominated design criteria and is less than the impacts presented in the environmental impact statement.

Interchange at Albion Park

The revised layout of the interchange at Albion Park would result in changes to drainage structures proposed in the environmental impact statement. The environmental impact statement proposed five box culverts under the north bound entry ramp; this has been reduced to three box culverts. Two culverts proposed under the motorway are no longer required and an additional four box culverts would be built under the south bound exit ramp to the west of the motorway. The adjustments to the culverts at this location cater for the changes to the motorway and ramp alignment and ensure that the level of immunity and impacts in this area are within the design criteria. The north bound entry ramp and southbound exit ramp are not flooded in the 100 year ARI event. The new north bound exit ramp at Tongarra Road achieves five year ARI flood immunity. This is as a result of the connecting ramp to Tongarra Road where the immunity has improved from two year ARI to five year ARI as a result of the project. The southbound entry ramp achieves 10 year ARI immunity (refer Figure 5-18) due to the connection to Tongarra Road.

Horsley Creek catchment

There are no proposed design refinements which impact on flooding within the Horsley Creek floodplain. The flood impacts and performance against criteria for the Horsley Creek catchment are as per the environmental impact statement.

Potential construction impacts associated with proposed design changes

The construction related flooding impacts related to each of the construction activities is unchanged from the environmental impact statement.

The proposed expanded ancillary site (AS13) has been assessed to determine the level of flood immunity. The site is located above the 20 year ARI flood extent (refer Section 5.2.3).

Emergency Management, Evacuation and Access

Except for changes to stock movement, the revised design does not result in any changes to the assessment of emergency management, evacuation and access provided in the environmental impact statement. The project offers significant improvements to some evacuation routes during flooding due to improved flood immunity (see Figure 5-1 of Appendix C of this report).

The environmental impact statement states the project would reduce the area of high ground available for cattle to shelter during a flood. In a 20 year ARI event, the area of flood free land between the Illawarra Highway and Macquarie Rivulet is reduced from 7.6 hectares to 3.6 hectares (up from 3.3 hectares in the environmental impact statement) as a result of the project. It is noted that this reduction in flood free area is primarily due to the land required for the project, not due to changes in the flood extent.

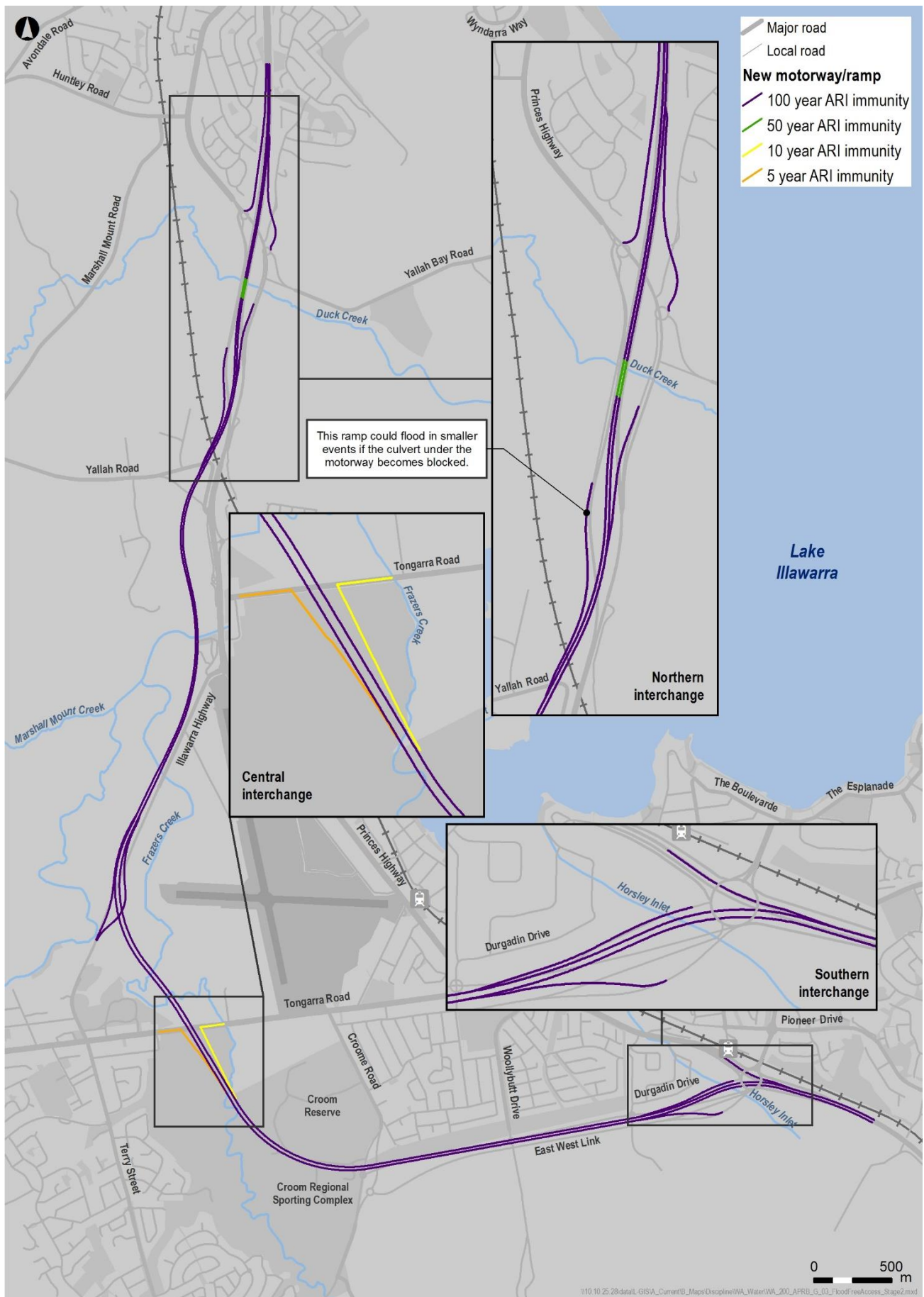


Figure 5-18 Flood immunity on the proposed Albion Park Rail bypass

Summary

This hydrology and flooding assessment has provided detail on how the revised design would impact on flooding and has compared the predicted impacts to those outlined in the environmental impact statement. In summary:

- Extension of one culvert in Brooks Creek would be completed in a way to maintain the existing flood immunity at that location
- Impacts in Duck Creek are unchanged from the environmental impact statement and as such there are no changes to the flood impacts to Property 1
- Impacts within Macquarie Rivulet catchment are generally less than impacts predicted from the environmental impact statement, and still meet the design criteria
- Within the Macquarie Rivulet floodplain, the motorway achieves 100 year ARI immunity
- Impacts in Horsley Creek are unchanged from the environmental impact statement
- Impacts within Macquarie Rivulet are within the design criteria with the exception of impacts on Dwelling 1 which predicts a 35 mm increase for the 100 year ARI from existing levels. This is a reduction from the 83 mm increase predicted in the environmental impact statement.
- 100 year ARI increase in water level at Dwelling 2 is 20 millimetres which is less than the 54 millimetres impact predicted in the environmental impact statement
- The construction related flooding impacts related to each of the construction activities is unchanged from the environmental impact statement.

Revised environmental management measures

The mitigation and management measures presented within the environmental impact statement have been reviewed in consideration of the identified design refinements. Minor changes are proposed as identified in italics in Table 5-11.

Table 5-11 Proposed amendments to management measures from the environmental impact statement

Impact	ID No.	Environmental management measure/ mitigation	Responsibility	Timing
Operational phase impacts on flood behaviour	HF06	The potential negative flood impacts on Properties 1, 2 (<i>Dwelling 1</i>) and 3 (<i>Dwelling 2</i>) will be reassessed <i>reviewed</i> during the detailed design by flood modelling <i>to seek to further avoid or minimise impacts</i> . If the properties are still impacted, and if mitigation is required, <i>investigation into site-specific flood management measures will be undertaken</i> in consultation with the landowner.	Roads and Maritime / Contractor	Detailed design

5.5.3 BIODIVERSITY

Assessment methodology and approach

A biodiversity assessment report was prepared as part of the environmental impact statement to address the requirements of the Framework for Biodiversity Assessment, which was newly developed for major projects, and to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements. The biodiversity assessment report has since been revised to assess the potential impacts associated with the proposed design refinements and is included in Appendix D of this report.

As stated in the environmental impact statement, flora and fauna field surveys were carried out in 2013 and 2014. Another seven vegetation plots were surveyed in January 2017. They are:

- Three vegetation plots in Derived Forest Red Gum – Thin-leaved Stringybark grassy woodland
- One plot in Swamp Mahogany swamp sclerophyll
- One plot in River Oak
- Two plots in Swamp Paperbark – Swamp Oak.

A further two plots were surveyed in February 2017; one in Swamp Paperbark – Swamp Oak, one in Illawarra Lowlands Grassy Woodland.

The full biodiversity assessment report is attached as Appendix D.

Existing environment

The existing environment is described in Section 9.2 of the environmental impact statement and is updated in the biodiversity assessment report (Appendix D of this report). Due to the proposed design refinements, the area of some vegetation types within the project footprint have changed. These changes are shown in Table 5-12.

Field surveys carried out during the environmental assessment phase (2014-2015) identified two endangered ecological communities listed under the *Threatened Species Conservation Act 1995*, Illawarra Lowlands Grassy Woodland and Freshwater Wetlands on Coastal Floodplains. In 2016, the Threatened Species Scientific Committee declared Illawarra and South Coast Lowland Forest and Woodland as a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999*. This community corresponds closely with the *Threatened Species Conservation Act, 1995* listed Illawarra Lowlands Grassy Woodland community in the study area (Threatened Species Scientific Committee, 2016).

Swamp Oak-Prickly Tea Tree – Swamp Paperbark swamp forest on coastal floodplains

Additional investigations since the environmental impact statement have confirmed two areas of vegetation within the project footprint that fall under the definition of the endangered ecological community Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Swamp Oak Floodplain Forest endangered ecological community). This vegetation community was not identified in the environmental impact statement.

One patch of Swamp Oak Floodplain Forest endangered ecological community occurs adjacent to Croom Reserve, within the Croom Regional Sporting Complex. The vegetation in the riparian zone has been previously mapped as 'Swamp Oak Forest' by Shellharbour City Council. This was confirmed by survey as being Swamp Oak Floodplain Swamp Forest, Sydney Basin Bioregion and South East Corner Bioregion. Although weeds were present, the vegetation was relatively intact.

The vegetation on both the northern and southern sides of Macquarie Rivulet were inspected in October 2016 and February 2017 to confirm the status of the community present. Two vegetation patches on the northern bank (only one is within the revised project footprint) were confirmed as the endangered ecological community Swamp Oak Floodplain Swamp Forest, Sydney Basin Bioregion and South East Corner Bioregion. The vegetation on the southern bank does not meet the requirements of the endangered ecological community.

Revised project footprint

The design refinements have resulted in a slightly adjusted project footprint compared with the environmental impact statement project boundary. This has led to some changes to the impacts on vegetation communities. These are shown in Table 5-12.

Table 5-12 Changes to vegetation communities within the project footprint

Vegetation community	Area within environmental impact statement project footprint (hectares)	Area within new project footprint (hectares)	Change from environmental impact statement
Woollybutt – White Stringybark – Forest Red Gum Grassy Woodland (listed as an endangered ecological community known as Illawarra Lowlands Grassy Woodland under the <i>Threatened Species Conservation Act, 1995</i>)	7.0 ha	7.22 ha	Increase of 0.22 ha
Swamp Oak-Prickly Tea Tree – Swamp Paperbark swamp forest on coastal floodplains (listed as Swamp Oak Floodplain Forest endangered ecological community)	Not identified	0.55 ha	Increase of 0.55 ha
Coastal Freshwater Lagoons (forms part of the endangered ecological community known as Freshwater Wetlands on Coastal Floodplains in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions)	7.12 ha	7.2 ha	Increase of 0.08 ha
Derived Forest Red Gum – Thin-leaved Stringybark Grassy Woodland	23.6 ha	23.12 ha	Decrease of 0.48 ha
Disturbed riparian vegetation	3.57 ha	2.97 ha	Decrease of 0.6 ha
Non-indigenous vegetation	>30 ha	>30 ha	No recorded change

The environmental impact statement predicted there were 110 individual Eastern Flame Pea plants (listed as threatened under the *Threatened Species Conservation Act, 1995*) within the environmental impact statement project boundary, mostly found within the Woollybutt – White Stringybark – Forest Red Gum grassy woodland community. The refined project footprint contains up to 115 individuals.

There are no changes to existing fauna or other threatened species recorded in the environmental impact statement.

Potential impacts associated with proposed design changes

The proposed design refinements have been developed to minimise additional impacts on biodiversity, where possible.

Direct and indirect impacts

Any potential direct and indirect impacts associated with the proposed design refinements are consistent with those recorded in the environmental impact statement. These would be managed through the implementation of standard mitigation measures.

Quantification of impacts

Impacts on native vegetation

The proposed design refinements would result in the removal of about 7.22 hectares of Illawarra Lowlands Grassy Woodland endangered ecological community (which corresponds to 7.22 hectares of *Environment Protection and Biodiversity Conservation Act, 1999* listed Illawarra and South Coast Lowland Forest and Woodland critically endangered ecological community) across the project, compared to 7.0 hectares stated in the environmental impact statement.

The environmental impact statement does not identify any impact on Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains. This community corresponds with Swamp Oak Floodplain Forest endangered ecological community. About 0.55 hectares would be impacted, all of which is considered an endangered ecological community.

About 7.20 hectares of Freshwater Wetlands on Coastal Floodplains endangered ecological community would also be impacted by the project, compared to 7.12 hectares in the environmental impact statement.

Table 5-13 shows the updated ecosystem credits required for the project for these vegetation communities, in accordance with the Framework for Biodiversity Assessment.

Table 5-13 Ecosystems credits required for the project

Plant community type name	Plant community type (PCT) code	Impact area (hectares)	Threatened species with highest credit requirement	Ecosystem credits required
Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	SR669 / PCT #1326	7.22 ha	Powerful Owl	361
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	SR649 / PCT #1232	0.55 ha	Yellow-bellied Sheath-tail-bat	19
Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	SR536 / PCT #781	7.20	Black-tailed Godwit	293

Impacts on species and populations

Surveys for the environmental impact statement recorded 110 individual Eastern Flame Pea plants within the development footprint. The new footprint incorporating the proposed design refinements contains 115 individuals; that is, the project would impact five additional plants.

As stated in the environmental impact statement, this loss would have a substantial impact on this species and an adverse effect on the life cycle of this population. Therefore, offsetting would be required. Revised species credit requirements for the Eastern Flame Pea are shown in Table 5-14.

Table 5-14 Species credits required for the Eastern Flame Pea

Scientific name	Common name	Species credits required
<i>Chorizema parviflorum</i> Benth. (a shrub) population, Wollongong and Shellharbour local government areas	Eastern Flame Pea (a shrub) population, Wollongong and Shellharbour local government areas	1725

Croom Reserve Conservation Area

As stated in the environmental impact statement, part of the Croom Regional Sporting Complex is protected through a voluntary conservation agreement between Shellharbour City Council and the NSW Minister for the Environment. The aim of the conservation agreement is to protect a 21.9 hectare open forest area comprising ten percent of the population of the Illawarra Greenhood Orchid (*Pterostylis gibbosa*) and remnant Illawarra Lowlands Grassy Woodland endangered ecological community.

The area directly impacted by the project has not changed from the environmental impact statement. The area represents less than one per cent of the total area protected by the conservation agreement. This impact area has been included within the credit calculations and therefore is included in the offset requirement calculated for the project.

Aquatic habitat and species, groundwater dependent ecosystems and wetlands impacts

Impacts on aquatic habitat and species, groundwater dependent ecosystems and wetlands would be consistent with those stated in the environmental impact statement. There would be no changes to the required aquatic habitat offsets listed in the environmental impact statement.

Impacts on matters of national environmental significance

Illawarra and South Coast Lowland Forest and Woodland was listed as a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act, 1999* on 16 September 2016. As the environmental impact statement was publicly exhibited in October 2015, this community was not assessed in the environmental impact statement for the project. The critically endangered ecological community corresponds closely to the Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion endangered ecological community, listed under the *Threatened Species Conservation Act, 1995* (NSW Scientific Committee, 1999). The Illawarra Lowlands Grassy Woodland endangered ecological community was assessed in the environmental impact statement for the project.

The revised biodiversity assessment report (Appendix D of this report) incorporates an assessment of impacts to Illawarra and South Coast Lowland Forest and Woodland. Areas of the critically endangered ecological community within and adjacent to the project were determined during field assessment in June 2016 using the condition thresholds for patches of Illawarra and South Coast Lowland Forest and Woodland. All patches of Woollybutt – White Stringybark – Forest Red Gum grassy woodland that met the Illawarra Lowlands Grassy Woodland *Threatened Species Conservation Act, 1995* listing criteria were reassessed to determine which patches conformed to the key diagnostic criteria and minimum condition thresholds under the *Environment Protection and Biodiversity Conservation Act, 1999*.

The assessment found that all patches of Woollybutt – White Stringybark – Forest Red Gum grassy woodland that met the Illawarra Lowlands Grassy Woodland *Threatened Species Conservation Act, 1995* listing criteria also meet the criteria for Illawarra and South Coast Lowland Forest and Woodland.

Roads and Maritime have now prepared and submitted a referral under the *Environment Protection and Biodiversity Conservation Act, 1999*.

Revised environmental management measures

No additional or revised biodiversity environmental management measures are proposed.

Biodiversity offset strategy

The biodiversity offset strategy (Appendix E of this report) documents the process for identifying and evaluating offset options for the project. The strategy has been updated to incorporate additional areas that would be affected by the proposed design refinements.

Revised offset requirements are presented in Table 5-15. This shows the number of credits required for each community, along with the number of sites and associated credits available within proximity of the project. Further details of identified sites and possible credits is contained in Appendix E of this report.

Environmental management measures identified in Section 9.5 of the environmental impact statement note that the biodiversity offset strategy would be further developed in consultation

with the Office of Environment and Heritage and Department of Primary Industries (Fisheries) following project approval.

Table 5-15 Revised offset requirements for the project

Community	Number of sites identified	Total potential credits available	Total credits required
SR669 Woollybutt – White Stringybark – Forest Red Gum Grassy Woodlands (Illawarra Lowlands Grassy Woodland endangered ecological community)	6	823	361
SR649 Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Swamp Oak Floodplain Forest endangered ecological community)	1	22	19
SR536 Coastal Freshwater Lagoons (Freshwater Wetlands on Coastal Floodplains endangered ecological community)	5	377	293
Eastern Flame Pea <i>Chorizema parviflorum</i> Benth. (a shrub) population, Wollongong and Shellharbour local government areas	3	2839	1725

5.5.4 ABORIGINAL HERITAGE

Assessment methodology and approach

An Aboriginal cultural heritage assessment report was prepared for the project as part of Technical Paper 6 – Aboriginal Heritage of the environmental impact statement. An addendum to this report was prepared to assess potential changes to impacts associated with the proposed design refinements. The addendum is provided as Appendix F of this report.

The design refinements were located within the areas assessed during the heritage investigations for the environmental impact statement, which were carried out in accordance with the Roads and Maritime Procedure for Aboriginal Cultural Heritage, Consultation and Investigation and the Aboriginal Cultural Heritage Consultation Requirements for Proponents (Office of Environment and Heritage, 2010).

Existing environment

The existing environment is described in Section 10.2 of the environmental impact statement and is still applicable to this assessment.

Potential impacts associated with proposed design changes

Aboriginal sites

A total of 21 Aboriginal sites were recorded in the study area and identified in the environmental impact statement, of which 13 are likely to be impacted. The addendum assessment found there would be no changes to the impacts identified at these sites in the environmental impact statement as a result of the proposed design refinements.

Areas of cultural significance

There would be no additional impacts to areas of cultural significance compared to the environmental impact statement.

Revised environmental management measures

The addendum assessment identified that impacts relating to the proposed design refinements are consistent with the assessment outlined in Technical Paper 6 – Aboriginal Heritage of the environmental impact statement.

Minor amendments have been made to the mitigation measures proposed in the environmental impact statement and are presented in *italics* in Table 5-16. Other mitigation measures presented in the environmental impact statement are still considered to be relevant and accurate.

Table 5-16 Proposed changes to Aboriginal heritage mitigation measures

Issue	ID No.	Mitigation Measure	Responsibility	Timing
Site management	AH01	An Aboriginal Heritage Management Plan will be prepared to manage the impacts of construction works on Aboriginal cultural heritage, to include, but not be limited to: ▪ Details of the management measures and procedures to be carried out during construction ▪ Site inductions and training for construction personnel, including Aboriginal cultural awareness training and their obligations under the <i>National Parks and Wildlife Act 1974</i>, to be	Contractor	Construction

Issue	ID No.	Mitigation Measure	Responsibility	Timing
		conducted by a heritage specialist ▪ <i>Ongoing consultation with the Aboriginal community in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and Maritime, 2012) and the Aboriginal heritage consultation requirements for applicants (Department of Environment, Climate Change and Water, 2010)</i> ▪ A framework for ongoing consultation with Aboriginal stakeholders regarding any salvage excavations, reburial of retrieved artefacts and in the event of any unexpected Aboriginal objects being identified during works The mitigation measures outlined in Aboriginal Cultural Heritage Assessment Report.		
Site protection	AH03	The Aboriginal Heritage Management Plan will address the requirements to protect and preserve the cultural heritage values associated with the Macquarie Rivulet Cultural Site, this will include: ▪ The erection of temporary fencing for the protection of the old growth eucalypt identified within this site, to be undertaken in consultation with a heritage specialist ▪ The separation and stockpiling, if possible within the adjacent ancillary area, of the topsoil ▪ Reinstating the topsoil to the Site ▪ Rehabilitation of the Site with locally native vegetation <i>in consultation with Aboriginal knowledge holders</i> ▪ Interpretative signage and a booklet developed by a heritage specialist in consultation with the Aboriginal knowledge holders <i>prior to the start of any construction with the potential to impact Cultural Site B Macquarie Rivulet.</i>	Roads and Maritime / Contractor	Construction
Site protection	AH04	Sensitive areas must be delineated on a sensitive areas map will be mapped and temporarily fenced unless agreed with RMS to ensure they are not subject to disturbance during construction. This includes, but is not limited to the portion of the Aboriginal cultural heritage sites YTOF-AS-2, YTOF-AS-4, YTOF-AS-6, YTOF-AS-7, YTOF IF 4, PAD 3, PAD 8, PAD 9, 52-5-0473, 52-2-0512, Macquarie Rivulet and HLA 2007 that are adjacent to the project boundary. <i>An updated AHIMS search will be carried out prior to the start of construction..</i>	Contractor	Construction

5.5.5 NON-ABORIGINAL HERITAGE

Assessment methodology and approach

A statement of heritage impact was prepared as part of Technical Paper 7 – Non-Aboriginal Heritage for the environmental impact statement. An addendum was prepared to assess potential changes to impacts associated with the proposed design refinements. The addendum is provided as Appendix G of this report.

The design refinements are located entirely within the area assessed during the environmental impact statement investigations, so further site investigations were not required.

Existing environment

The existing environment is described in Section 11.2 of the environmental impact statement and is still applicable to this assessment.

Potential impacts associated with proposed design changes

The environmental impact statement identifies 13 non-Aboriginal heritage items of local significance potentially impacted by the project. The proposed design refinements would potentially alter impacts at eight of these items. Impacts at all other sites identified within the environmental impact statement would not change. An assessment of potential impacts on each item is summarised in Table 5-17. A description and assessment of significance for each item is included as Appendix G of this report.

Table 5-17 Assessment of impacts on non-Aboriginal items associated with proposed design refinements

Heritage item	Assessment	Revised impact
Swansea Dairy site, fig tree and silo (Shellharbour LEP no. I182)	The design refinements would not alter the overall intent of the original proposal as assessed in the environmental impact statement. The project would continue to include an adjustment to Croome Road, the construction of a new service road, and development of a roundabout. The design refinements include the southward extension of the project footprint to include a temporary ancillary site which would result in the demolition of the twentieth century weatherboard residence on the property. Additional impacts associated with the temporary ancillary site include moderate temporary impacts to the views and vistas to and from the Swansea Dairy site, fig tree and silo as the project footprint encompasses a larger portion of the curtilage closer to the main elements of the listing. Impact to the existing 20th century sheds on the property are consistent with impacts identified in the environmental impact statement. As the weatherboard house is an element of low significance, the removal of the building would not result in impacts to significant fabric and would not impact the significance of the item	Visual: Moderate temporary impacts on views and vistas. Minor long-term impact.
Swansea Farm House (Shellharbour LEP no. I198)	The design refinements would not alter the overall intent of the original proposal as assessed in the environmental impact assessment. The project would continue to include an adjustment to Croome Road, the construction of a new service road and development of the Croom Regional Sports Complex. The project would also continue to impact the existing property boundary and views and vistas to and from the item. The design refinements include further encroachment of the project footprint to the south and west of the Swansea Farm House and	Impacts on built fabric: Moderate impact on item's curtilage. No impact on structures.

Heritage item	Assessment	Revised impact
	nearby outbuildings. The additional work includes the location of ancillary sites as well as the provision of access to Croome Road during construction. It is intended that following temporary use during construction works, that this portion of the site will be remediated and returned to its preconstruction state. The use of the area for temporary construction represents a moderate impact to the curtilage of the item and a moderate reversible impact to the views and vistas of the item. One of the proposed temporary access routes is located in between Swansea Farm House and the associated outbuildings. The area between the two structures is currently comprised of blue metal gravels with a gate indicating the areas intended use as an access route for large vehicles. The use of this area as an access route is therefore consistent with the existing use of the site. The proposed route does not impact the built structures of the item and is temporary in nature. It is considered that these activities will result in a moderate impact to the curtilage of the item and a moderate reversible impact to the views and vistas of the item. Design amendments to the Croom Regional Sports Complex include the westward shift of several new outdoor sports courts. The shift lessens the visual impact to Swansea Farm House. Consistent with the heritage assessment presented in the EIS, no built fabric of the heritage item would be impacted by the proposed works. As the sporting facility is already a dominant feature within the landscape the enlargement of the sporting facility would not result in a substantial additional impact to the views and vistas from the heritage elements of the site. The works would therefore remain as a moderate impact to the heritage views and vista of the item. Impacts to heritage views and vistas would be consistent with those already assessed in the EIS. The proposed works would result in a moderate impact to the views and heritage of the item. Proposed changes to the alignment of Croome Road would result in the reduction of the curtilage of this item by approximately 9,400m². While the items curtilage has historical significance in maintaining the regional setting of the Farm house the portion that would be impacted is immediately adjacent to existing road and sporting infrastructure and subsequently consistent with the established views in the area. In addition, as the size of the item's curtilage is approximately 319,000m² in extent, the removal of this portion of the curtilage would only result in a minor impact to the overall curtilage of the item. As no archaeological resources within the heritage item have been identified, there would be nil impacts to archaeological remains.	
Stapletons Bridge (SHI Database no. 4309612)	The proposed design refinements would not alter the overall intent of the original proposal as assessed in the environmental impact statement. The project would continue to include localised widening along Tongarra Road, with works terminating just west of Stapletons Bridge. Present refinements to the proposal include further encroachment of the project footprint to the east along Tongarra Road, therefore including the entirety of Stapletons Bridge. Works within the vicinity of the bridge are limited to minor vegetation modification. The Tongarra	No change

Heritage item	Assessment	Revised impact
	Road alignment has also shifted slightly south from the environmental impact statement design however this is unlikely to alter the visual impact to the Bridge identified in the environmental impact statement. Subsequently development would continue to have minor visual impacts to views and vistas to and from the item. Impacts to fabric associated with the bridge would not occur.	
Ravensthorpe, Grounds and Workers Cottages (Shellharbour LEP no. I006)	The proposed design refinements would not alter the overall intent of the original proposal as assessed in the environmental impact statement. The project would continue to include localised widening along Tongarra Road, with works terminating just west of the Ravensthorpe property boundary. Refinements to the proposal include further encroachment of the project footprint to the east along Tongarra Road. The updated project footprint would now terminate just west of the Ravensthorpe property boundary, rather than 50 metres to the west. Works within this extension are limited to vegetation modification, which is anticipated to have a negligible additional visual impact to Ravensthorpe. Consequently, the project would continue to have a minor visual impact to views and vistas to and from the item. No direct impacts to the item are proposed. Plantings at the Ravensthorpe grounds were installed in October 2016 in order to develop visual screening for the site.	No change
Illawarra Regional Airport (Shellharbour LEP no. I338)	The design refinements would not alter the overall intent of the original proposal as assessed in the environmental impact statement. The project would continue to include localised widening and extension of the Illawarra Highway to the north and east of the item. The refinements to the proposal include reduction of the project footprint to the east of the Illawarra Regional Airport's local environment plan boundary and further expansion of the project footprint to include part of the Princes Highway, east of the item boundary. No direct impacts to the item are proposed. The design refinement is considered to have resulted in a negligible change in visual impact to the item. Consequently, development would continue to have minor visual impacts to views and vistas to and from the item.	No change
House (Wollongong LEP no. 6437)	The curtilage of the item for the current assessment is based off the item's description provided in the state heritage inventory listing. As such the geographic extent of the item is limited to the concrete house. The refinements to the proposal include further encroachment of the project footprint to the west of the house. No direct impacts to item are proposed. The refined design would continue to have moderate visual impacts to views and vistas to and from the item.	No change
Albion Park Showground (Shellharbour LEP no. 301)	The change to the layout of the interchange at Albion Park would alter the impact on Albion Park Showground. There would be a minor impact on views from the Showground and associated structures towards the east, west and north. Some portions of the Showground are screened by established trees, which would minimise visual impacts associated with the project. However, the northern boundary	Impacts on built fabric: Minor impact on item's curtilage. No impact on structures.

Heritage item	Assessment	Revised impact
	of the Showground is not well screened by trees or vegetation, which may result in minor visual impacts on north-facing views from the item. Views to and from the item are not a recognised element of the heritage significance; therefore, visual impacts are assessed to be minor overall, which is consistent with assessment in the environmental impact statement. The item would not be physically impacted by the project and, therefore, the project would not impact potential archaeological deposits associated with the item.	
Boles Meadow (Shellharbour LEP no. 198)	The changed layout of the interchange at Albion Park has removed the northbound exit ramp from passing directly through this item. However, given the location of the structures, they would still need to be demolished to allow construction of the project.	No change

Summary

Three design refinements would result in several impacts on heritage sites that would differ from those assessed in the environmental impact statement:

- The proposed expanded ancillary site (AS13) east of Croome Road would result in a change from minor temporary indirect impacts to moderate temporary indirect impacts to the views and vistas to and from the Swansea Dairy site, fig tree and silo
- The proposed design refinements to the layout at Croom Regional Sporting Complex would result in an increased impact (minor to moderate) on the curtilage at Swansea Farm House
- The changes to the interchange at Albion Park (relocation of northbound exit ramp to Tongarra Road) would have a negligible additional visual impact on Ravensthorpe, Grounds and Workers Cottages.

All other impacts have been assessed as being consistent with the impacts presented in the environmental impact statement.

Revised environmental management measures

The addendum assessment identified that impacts relating to the proposed design refinements are consistent with the assessment outlined in the environmental impact statement and Technical Paper 7 – Non-Aboriginal Heritage. The mitigation measures included within the environmental impact statement are still considered to be relevant and no amendments to these mitigation measures are required.

5.5.6 NOISE AND VIBRATION

Assessment methodology and approach

The environmental impact statement included a detailed assessment of noise and vibration impacts which was included within Technical Paper 8 – Noise and Vibration. An addendum assessment has been carried out to assess any changes in impacts relating to noise and vibration due to the proposed design refinements. The assessment is attached as Appendix H of this report.

Noise catchment areas were assigned during the assessment for the environmental impact statement. These have been carried forward into this assessment, with expansion of NCA 11 and NCA 12 as a result of revised traffic modelling, and are shown in Appendix H.

The revised traffic noise assessment required different modelled traffic scenarios to be assessed because of the changes to the traffic models outlined in Section 5.5.1 of this report. The assessment considers both the 'build' (with the project) and 'no build' (without the project) scenarios for the year of opening (2021) and 10 years after opening (2031).

The project has been designed for two lanes in each direction at the year of opening with potential for three lanes in the future as required. Roads and Maritime will be reviewing the need for the additional lanes in 2041. Any future widening of the Princes Motorway to three lanes would be subject to additional assessment.

Noise predictions are based on a method called 'Calculation of Road Traffic Noise (1988)' – known as the CoRTN method – which was developed by the United Kingdom Department of Environment. This method has been adapted to Australian conditions and extensively tested by the Australian Road Research Board and is recognised and accepted by the NSW Environment Protection Authority.

The CoRTN algorithms are contained within the 'CadnaA' noise modelling software, which has been used to calculate traffic noise levels at receivers. Other than the new traffic data supplied for this revised assessment, there were no changes to the noise model input parameter settings compared to the assessment presented in the environmental impact statement. One additional existing noise barrier was included in the model on the west side of noise catchment area 12 after closer inspection of the area around the Princes Highway adjacent to the Haywards Bay interchange.

Existing environment

The existing environment is described in Section 12.2 of the environmental impact statement and is still applicable to this assessment.

Following the public exhibition of the environmental impact statement, the traffic model was updated to include revisions to residential and employment forecasts and alterations to the model network, as discussed in detail in the addendum traffic and transport assessment report (Appendix A of this report).

Having updated the traffic modelling for the year of opening (2021) and ten years after opening (2031) to take into account the design changes (see Appendix A), the noise model was updated with the new traffic modelling results. There are generally higher traffic volumes for the revised design than the environmental impact statement. The traffic data used to determine the predicted road traffic noise levels are presented in Appendix H.

Noise and vibration criteria

The noise and vibration criteria adopted for this assessment are the same as those presented in the environmental impact statement.

Potential construction impacts associated with proposed design changes

Construction plant

The potential construction noise and vibration impacts due to the proposed design refinements were also assessed. Construction plant would be the same as reported in the environmental impact statement.

Impact of extended work hours

As part of the design refinements, and following additional consultation as described in Section 1.2.3, extended work hours are proposed to be implemented as standard construction hours for the project.

The project standard construction hours would be:

- Monday to Friday, between 6am and 7pm
- Saturdays, between 8am and 5pm
- No work on Sundays or public holidays.

An additional assessment was carried out to identify residences that were likely to be noise affected during the extended work hours. Predicted noise levels for each catchment are presented in Table 9 and Table 10 of Appendix H. Activities during the morning extended hours period (Monday to Friday 6am to 7am) would be low noise activities, as assessed in the environmental impact statement and so were not remodelled. Modelling indicated that receivers in all noise catchments, with the exception of noise catchment areas 6 and 7, may be noise affected during the extended work hours. Receivers in noise catchment areas 3, 11, 13 and 15 may be exposed to moderately intrusive noise levels during construction, in particular during corridor clearing and bulk earth works. Receivers in noise catchment areas 4 and 10 may be highly noise affected during construction work due to impacts likely caused by corridor clearing and bulk earthworks.

Predicted noise levels indicate that ancillary sites can be operated during the extended hours period with minimal impact on the nearest noise sensitive receivers.

Impact of expanded ancillary sites AS10 and AS13

There would be no additional construction noise and vibration impacts associated with the use of these sites compared to those assessed in the environmental impact statement. The use of AS10 for temporary construction results in a moderate impact to the curtilage of the Swansea Farm House and a moderate reversible impact to the views and vistas of the Heritage item. Activities can be carried out within these ancillary facilities during the proposed construction hours with minimal impact on the nearest noise sensitive receivers.

Vibration impacts

Potential construction vibration impacts would be generally consistent with those presented in the environmental impact statement.

Construction traffic

The predicted impact of increased construction traffic on the existing road network is likely to be low, with less than a 2 dB(A) change in road traffic noise level at the worst affected sensitive receivers and so would not result in a substantial change in impact. All predicted noise levels comply with the NSW Road Noise Policy (Department of Environment and Climate Change, 2011) criteria.

Air blast limits

To be consistent with recent major infrastructure project approvals, the air blast limits have been revised and are based on Australian Standard AS2187.2-2006 for this report, rather than the Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC, 1990). The revised limits reduce the separation distances for the nominated maximum instantaneous charge. The management levels (and separation distances) and associated impacts have not changed in relation to ground vibration in comparison with the environmental impact statement.

Potential operational impacts associated with proposed design changes

Table 5-18 summarises the number of receivers at which exceedances of the criteria in the Noise Criteria Guideline occur before any road corridor treatments (such as quiet pavement or noise barriers) have been implemented. Based on the revised design, traffic noise levels for the year 2030, ten years following completion of the project, are predicted to exceed the criteria at 795 sensitive receivers with no mitigation applied.

Table 5-18 Receivers triggered for consideration of noise mitigation

Noise catchment area	Receivers triggered for consideration of noise mitigation			
	0 - 5dB	5 - 10dB	>10dB	Total
NCA 1	0	0	1	1
NCA 2	1	0	0	1
NCA 3	342	88	2	432
NCA 4	0	2	0	2
NCA 5	143	7	0	150
NCA 6	0	1	0	1
NCA 7	0	0	0	0
NCA 8	2	3	0	5
NCA 9	2	4	3	9
NCA 10	4	11	0	15
NCA 11	28	5	4	37
NCA 12	8	6	0	14
NCA 13	9	8	4	21
NCA 14	0	1	0	1
NCA 15	10	35	11	56
NCA 16	16	32	2	50
Total	565	203	27	795

The results of the revised operational assessment are summarised in Table 5-19. This table also shows the revised number of receivers in each noise catchment area that exceed the relevant criteria in the Noise Criteria Guideline (Roads and Maritime, 2015a) and qualify for consideration for noise mitigation. Comparison is also made to the environmental impact statement results.

Table 5-19 Receivers that exceed relevant criteria and qualify for consideration of noise mitigation

Noise catchment area	Environmental impact statement	Revised receivers	Difference from environmental impact statement
NCA 1	2	1	-1
NCA 2	1	1	0
NCA 3	414	432	+18
NCA 4	2	2	0
NCA 5	139	150	+11
NCA 6	1	1	0
NCA 7	0	0	0
NCA 8	6	5	-1
NCA 9	9	9	0
NCA 10	19	15	-4
NCA 11	23	37	+14
NCA 12	15	14	-1
NCA 13	21	21	0
NCA 14	1	1	0
NCA 15	45	56	+11
NCA 16	34	50	+16
Total	732	795	+63

As the proposed main alignment has not changed substantially from the environmental impact statement, maximum traffic noise levels during operation of the project are also not expected to change substantially. The increased number of properties qualifying for treatment in NCA 3, NCA 5, NCA 11, NCA 15 and NCA 16 is primarily due to the revised traffic modelling and associated increased traffic volumes. The increased volumes also resulted in the enlargement of the catchment area boundary for NCA 11 and NCA 12. The reduced number of properties in NCA 10 is due to the reduced extent of work at the Tongarra Road central interchange.

The maximum noise levels for all other noise catchment areas are expected to remain broadly the same as those presented in the environmental impact statement, with traffic noise levels increasing by up to 3 dB(A) due to revised traffic volumes. The changes in maximum predicted noise levels at the sixteen noise catchment areas are shown in Table 5-20.

Table 5-20 Changes in maximum predicted noise levels

Noise catchment area	Maximum increase, dB(A)
NCA 1	2
NCA 2	1
NCA 3	2
NCA 4	0
NCA 5	3
NCA 6	1
NCA 7	0
NCA 8	0
NCA 9	2
NCA 10	1
NCA 11	2
NCA 12	2
NCA 13	1
NCA 14	2
NCA 15	3
NCA 16	3

Noise mitigation options

Noise mitigation measures proposed in the environmental impact statement were reviewed to determine if they were still suitable based on the revised operational traffic noise assessment.

The potential noise mitigation measures, in order of preference given in the NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011) are:

- 1 Quieter pavement surfaces
- 2 Noise mounds
- 3 Noise walls
- 4 At-property treatments.

These treatments are described below.

Quieter pavement surfaces

The environmental impact statement proposes low-noise pavement at several locations along the main alignment. It is proposed to extend this treatment to include the section north of Tongarra Road to Yallah Road. This was found to be beneficial in mitigating the higher noise levels resulting from the higher traffic volumes used in the revised assessment. Low noise pavement has been reduced in comparison to the environmental impact statement near the northern interchange after a scope clarification confirmed that no resurfacing of the main carriageways is proposed in this area.

Noise barriers

A noise barrier can be a noise mound or a noise wall, or a combination of both. The environmental impact statement proposes noise barriers at a number of locations. The height and location of these barriers have been reassessed as part of this assessment. The barriers proposed in the environmental impact statement and the revised barriers are compared in Table 5-21. These barriers are indicative and subject to refinement during community consultation and detailed design.

The main differences in the barriers considered for the revised design and revised traffic modelling compared to those considered in the environmental impact statement are:

- The Dapto northbound (NB) and Dapto southbound (SB) barrier analysis has been refined by analysing the barriers in sections. This sectioning was conducted due to the variability in the local ground topography along the entire length of the barriers and to better understand the effectiveness of each section. The new analysis included consideration of replacing or extending the existing barriers at Dapto.
- Consideration of the Dapto NB barrier in the environmental impact statement determined a design height of 5 metres, which achieved the required insertion loss and provided a benefit in terms of number of houses requiring treatment. Application of the Noise Mitigation Guideline (Roads and Maritime, 2015b) to the Dapto NB 1 barrier, considering the revised design and revised traffic modelling, determined a design barrier height of 6.5 metres.
- Replacement of the existing barriers at Dapto NB 3 and Dapto SB 1 was not considered in the environmental impact statement. By applying the Noise Mitigation Guideline (Roads and Maritime, 2015b) on a barrier in the same locations as the existing barriers, design heights of 8 metres and 7.5 metres (respectively) have been determined. These barriers would meet the required insertion loss and achieve compliance with the Noise Criteria Guideline (Roads and Maritime, 2015a) at several additional residences. If visual impact, cost and aeronautical assessment are acceptable, then replacement barriers at these locations are considered reasonable.

Table 5-21 Indicative noise barrier location and dimensions

Barrier name	Location	Barrier assessment summary	Environmental impact statement barrier height	Revised design barrier height
Dapto SB1	East side of Princes Motorway in same location as existing barrier, stopping at northern project boundary.	Design barrier of 7.5m and provides more than 2.0dB benefit compared to the existing barrier.	New barrier not considered. Existing barrier remains.	7.5m barrier
Dapto SB2	East side of Princes Motorway from southern most house in Cormack Ave to meet existing noise wall in the north.	Design barrier height of 7.5m does not achieve required insertion loss. Barrier not reasonable.	Barrier not feasible and reasonable	Barrier not feasible and reasonable
Dapto NB1	West side of Princes Motorway between Princes Hwy overpass and Dapto NB2	Houses set high above the road. Design barrier height of 6.5m achieves approximately 9dB insertion loss which is close to the 10dB requirement. Due to this, it has been proposed to retain this barrier, subject to confirmation during detailed design as described below.	5m	6.5m
Dapto NB2	West side of Princes Motorway between Dapto NB1 and start of existing barrier to the north	The design barrier of 6.5m achieves required insertion loss.	5m	6.5m barrier
Dapto NB3	West side of Princes Motorway in same location as existing barrier, stopping at the northern project boundary.	Design barrier 8m achieves required insertion loss and provides more than 2.0dB benefit compared to the existing barrier.	New barrier not considered. Existing barrier remains.	8m barrier
Yallah NB	West side of new bypass from river in the south to where bypass goes into cutting	Design barrier of 4.5m does not achieve required insertion loss and only achieves compliance at 1 residence as houses are set higher than the road. Barrier not a reasonable mitigation solution.	Barrier not feasible and reasonable	Barrier not feasible and reasonable

Barrier name	Location	Barrier assessment summary	Environmental impact statement barrier height	Revised design barrier height
Yallah SB	East side of bypass between bypass and Illawarra Hwy, near Croome Lane	Design barrier height of 4m not feasible due to infringement on the Illawarra Regional Airport obstacle limitation surface, the 3-dimensional space that is kept clear of obstacles to allow the take-off and landing of aircraft. There is also flooding in this location, between Larkins Lane and the river, and a noise wall may result in adverse flood impacts.	Barrier not feasible and reasonable	Barrier not feasible and reasonable
Albion Park NB	West side of elevated section of bypass over Tongarra Road	Design barrier height of 2.5m does not achieve required insertion loss due to traffic noise from Tongarra Road. Extending the proposed length of kerbside concrete safety barriers approx. 0.9m high was found to be beneficial. Concrete safety barriers to be continuous on western side of bypass from northern Frazers Creek crossing to southern Frazers Creek crossing, and on Tongarra Road off ramp.	0.82m concrete safety barrier	0.82m extended concrete safety barrier with an extended length
Albion Park SB	North side of bypass from Croome Road in the west to Colden Drive in the east.	Design barrier height of 6m does not achieve required insertion loss and there is minimal benefit in terms of the number of property treatments when increasing from 5m to 6m. Therefore, it is considered reasonable to build 5m high barrier.	5m	5m

The Dapto NB and Dapto SB noise barriers presented in this report have been determined following the Roads and Maritime Noise Criteria and Noise Mitigation Guidelines. However, these barriers need to be confirmed during detailed design. This process would be:

1. Consideration of the protrusions into the operational and aspirational obstacle limitation surface that are identified in the Aviation Impact Assessment addendum report. In the event that the protrusion is deemed unacceptable, this may restrict the height of the noise barrier
2. Ensure no engineering feasibility issues preclude the construction of the noise barriers presented in this report
3. Establish a community group for each corresponding barrier at Dapto, which consists of the residents from properties identified as exceeding, without mitigation, the Noise Criteria Guideline (Roads and Maritime, 2015a) in the adjoining noise catchment area and other residents impacted by the noise barrier
4. Develop feasible options for each barrier and identify the associated potential impacts for each option such as noise, visual and overshadowing. A “no change to existing barrier” or “no barrier” option will be considered

5. Present the options to the relevant community groups and consider their feedback to identify two preferred options
6. Select the final noise barrier based on majority community support from the relevant community group.

At property treatments

Table 5-22 summarises the number of properties within each noise catchment that remain above the relevant criteria in the Noise Criteria Guideline after implementation of low noise pavement and noise barriers, and therefore trigger for consideration of at-property treatment. At-property treatments would be confirmed during detailed design.

Table 5-22 Summary of predicted exceedances of Noise Criteria Guideline criteria (with mitigation)

Noise catchment area	Exceedance of Noise Criteria Guideline criteria (with mitigation)			
	0 - 5dB	5 - 10dB	>10dB	Total
NCA 1	0	0	1	1
NCA 2	1	0	0	1
NCA 3	10	2	0	12
NCA 4	0	2	0	2
NCA 5	70	6	0	76
NCA 6	0	1	0	1
NCA 7	0	0	0	0
NCA 8	4	1	0	5
NCA 9	3	3	3	9
NCA 10	6	8	0	14
NCA 11	19	3	4	26
NCA 12	10	4	0	14
NCA 13	11	8	2	21
NCA 14	0	1	0	1
NCA 15	18	19	0	37
NCA 16	22	13	1	36
Total	174	71	11	256

Table 5-23 provides a comparison of the predicted exceedance of the Noise Criteria Guideline criteria (with mitigation) between the environmental impact statement design and the proposed design refinements.

Table 5-23 Number of properties exceeding relevant criteria (with mitigation)

NCA	Environmental impact statement	Revised properties exceeding	Difference from environmental impact statement
NCA 1	2	1	-1
NCA 2	1	1	0
NCA 3	12	12	0
NCA 4	2	2	0
NCA 5	43	76	+33
NCA 6	1	1	0
NCA 7	0	0	0
NCA 8	6	5	-1
NCA 9	9	9	0
NCA 10	19	14	-5
NCA 11	14	26	+12
NCA 12	15	14	-1
NCA 13	21	21	0
NCA 14	1	1	0
NCA 15	35	37	+2
NCA 16	34	36	+2
Total	215	256	+41

Reconfiguration of Croom Regional Sporting Complex

The proposed minor changes to the design of the Croom Regional Sporting Complex (refer Section 5.2.2) are not expected to have implications for noise and vibration. Potential impacts associated with the proposed design refinement are considered consistent with those detailed in the environmental impact statement.

Summary

The assessment of the revised design and revised traffic modelling has resulted in the following changes from the environmental impact statement in relation to the noise and vibration impacts of the project:

- Operational phase traffic noise levels are predicted to exceed the relevant criteria in the Noise Criteria Guideline at 256 sensitive receivers with mitigation applied, compared to 215 in the environmental impact statement
- Construction impacts during standard construction hours, as presented in the environmental impact statement, have not significantly changed from the construction noise impact from that presented in the environmental impact statement
- The extension of standard construction hours would result in additional impacts to sensitive receivers, however, consultation undertaken has indicated support from receivers in efforts to complete the construction activities in a shorter timeframe.

Noise treatments have been reconsidered based on the revised assessment outcomes and would be confirmed during detailed design.

Revised environmental management measures

The addendum assessment considered impacts relating to the proposed design refinements and reviewed the proposed management measures accordingly. Minor amendments have been made to the mitigation measures proposed in the environmental impact statement and are presented in italics for additions and strikethrough for deletions in Table 5-24. Other mitigation measures presented in the environmental impact statement are still considered to be relevant and accurate.

Table 5-24 Proposed amendments to management measures from the environmental impact statement

Issue	ID no.	Environmental management measure	Responsibility	Timing
Construction noise and vibration	NV01	A Construction Noise and Vibration Management Plan will be prepared for the project. The Plan will provide details of noise and vibration management measures and procedures to be carried out during construction to minimise and manage noise impacts on sensitive receivers, including: - Noise and vibration monitoring and reporting requirements - A map showing the location of all sensitive receivers - Specific mitigation treatments, management methods and procedures to be implemented to control noise and vibration during construction - Construction timetabling to minimise noise impacts including time and duration restrictions, respite periods and frequency - Procedures for notifying residents, business owners, and other sensitive receivers of construction activities likely to affect their amenity through noise and vibration - Contingency procedures to be implemented in the event of non-compliances and / or noise complaints. The type of noise mitigation measures that may<i>will</i> be adopted in the Plan include: - Carrying out only low noise activities during the weekday morning (6am to 7am) period - Selection of less noisy plant and equipment, where feasible - Avoiding simultaneous operation of noisy plant, where feasible - Avoiding queueing and idling of construction vehicles outside of the project standard construction hours - Maintaining plant and equipment so as to ensure optimum operating conditions - Planning construction traffic flow to minimise reversing and noise from reversing alarms <i>where feasible</i>. The type of vibration mitigation measures that may<i>will</i>	Contractor	Construction

		be adopted in the Plan include: ▪ Undertaking building dilapidation surveys for buildings that could be impacted by vibration ▪ Consideration of feasible alternative construction methodologies or equipment where vibration intensive equipment is expected to exceed the criteria.		
Construction hours	NV02	Work will be carried out generally in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). Where work is to be carried out outside of recommended working hours, <i>Prior to out of hours work being carried out,</i> all affected receivers will be notified of all relevant details of the proposed activities.	Contractor	Construction
Operational noise impacts	NV04	The need for operational phase noise mitigation measures, including low noise pavement, noise walls <i>barriers</i> or architectural treatments, will be confirmed during detailed design. <i>The final noise barrier design will be selected following investigations into the obstacle limitation surface and engineering feasibility of the proposed mitigation measures and community consultation with residents from properties identified as exceeding, without mitigation, the Noise Criteria Guideline (Roads and Maritime, 2015a) in the adjoining noise catchment area.</i> The mitigation measures will be provided as early as practicable in the construction program to reduce potential noise impacts associated with construction.	Roads and Maritime / Contractor	Detailed design

5.5.7 SOCIO-ECONOMIC

Assessment methodology and approach

A socio-economic assessment was prepared as part of the environmental impact statement (Technical Paper 9 and Chapter 13 of the environmental impact statement). The proposed design refinements have been assessed to identify any additional socio-economic impacts likely to be associated with the design changes.

Existing environment

The socio-economic environment is essentially the same as that described in Technical Paper 9 -Socio-economic.

Potential impacts associated with proposed design changes

In general, it is considered that the proposed design changes would have a negligible impact on the socio-economic environment with some positive impacts on land use and agricultural operations when compared to the environmental impact statement. A description of impacts is provided in Table 5-25.

Table 5-25 Changes to impacts on socio-economic environment from the environmental impact statement

ID no	Design refinement	Change to socio-economic impact
1	Reduction in project footprint on agricultural lands	The proposed design refinement would have a positive impact on land use and agricultural operations compared to the project outlined in the environmental impact statement. This design refinement is one of several refinements that facilitate a reduction in the direct impact to dairy land.
2	Changed layout of the interchange at Albion Park	The proposed design refinement would have a positive impact on land use and agricultural operations, with a reduced direct impact on agricultural (dairy) land of about 10.3 hectares for the operational boundary. The relocation of the northbound exit ramp further from the Terry Road exit would have positive impacts on road safety, as it would eliminate a potential safety issue associated with weaving traffic. Figure 5-2 of the Addendum Traffic and Transport Assessment Report (Appendix A) describes the change in traffic volumes in Albion Park as a result of this design refinement. The project would result in an increase in traffic in Albion Park compared to the environmental impact statement design. However, no significant average daily traffic volume differences are highlighted around the Albion Park town centre area between the revised design and the do nothing traffic volumes. The average daily traffic volume differences varied between 5% and 15% along the town centre study area.

ID no	Design refinement	Change to socio-economic impact
3	Revised layout of Croom Regional Sporting Complex	Detailed design of the Croom Regional Sporting Complex has progressed since the display of the environmental impact statement, in consultation with the Croom Regional Sporting Complex Working Group and Shellharbour City Council. The changes generally provide for better functionality and allow construction of the new cricket field and netball courts to proceed without the need for large scale excavation. Further consolidation of parking would result in 57 more formal parking spaces than proposed in the environmental impact statement (557 spaces are now proposed). The changes to facilities at Croom Regional Sporting Complex would not generate any new negative socio-economic impacts.
4	Removal of ancillary site AS02	Reduction in socio-economic impact due to a reduction in the footprint area.
5	Removal of ancillary site AS05	Reduction in socio-economic impact due to a reduction in the footprint area within agricultural (dairy) land (3.8 hectare reduction).
6	Modifications to culverts	No changes to impact.
7	Relocation of shared cycle and pedestrian path between Albion Park and the north of Albion Park Rail	Submissions received from adjacent property owners and other dairy industry representatives raised concerns about the safety of the interaction between pedestrians and cyclists and cattle crossing the alignment along this section of the existing Illawarra Highway. Roads and Maritime carried out a review of the project to minimise impact on the dairy enterprise. The proposed shared path between Terry Street and the Illawarra Highway (shown in Figure 5-16 of the environmental impact statement) has been relocated to the eastern side of the motorway to reduce the project footprint and co-locate the shared path with the existing Illawarra Highway and access for utilities. Measures to reduce the potential risk of interaction between farm operations and users of the shared path will be investigated during detailed design such as cycle friendly cattle crossings. Shellharbour City Council has developed a plan in consultation with Roads and Maritime to provide a continuous off-road shared path for cyclists and pedestrians along Tongarra Road to link the towns of Albion Park Rail and Albion Park (part of a separate project). The shared path to be constructed as part of the project would now connect with the Tongarra Road shared path rather than the Illawarra Highway as identified in the environmental impact statement. No change to impacts as a result of this design change.
8	Removal of ancillary site AS07	Reduction in socio-economic impact due to a reduction in the footprint area.
9	Adjusted project footprint for dedicated haul routes along the north-west corner of Croom Reserve (east of Princes Highway)	No changes to impact
10	Expanded ancillary site AS13	No changes to impact

ID no	Design refinement	Change to socio-economic impact
11	Adjusted project footprint along the southern side of Woollybutt Drive	No changes to impact.
12	Addition of traffic lights at the access to Holcim Quarry	The addition of traffic lights at the access intersection would improve traffic control for heavy vehicle movements in this intersection resulting in an improvement in road safety. This would be a positive impact due to enhanced road safety and business operation.
13	Adjusted project footprint at the intersection of Woollybutt Drive and the Princes Highway	No changes to impact.
14	Addition of traffic lights at the access to Cleary Brothers Quarry	The addition of traffic lights at the access intersection would improve traffic control for heavy vehicle movements in this intersection resulting in an improvement in road safety. This would be a positive impact due to enhanced road safety and business operation.
15	Adjusted project footprint at Durgadin Drive	No changes to impact.
16	Adjusted project footprint along the western side of the project alignment near the end of the project	The project footprint has been reduced on private property and agricultural land. This is a positive impact as it would decrease the areas of agricultural land being utilised for the project and would reduce the project interaction with private and agricultural land.
17	Roundabout at Oak Flats interchange	Design changes at the roundabout would provide better functionality and safety.
18	Extended work hours	Although the change to extended work hours has the potential for negative social impacts in some instances, it would reduce the overall construction timeframe and the duration of noise, visual, air quality (dust), soil erosion and traffic impacts. Based on consultation with affected residents, overwhelming support (84% of respondents) was given to the implementation of extended work hours across the project. As such, this change is considered to represent a reduction in the social impact of the project.
19	Minor project footprint adjustments off Yallah Road and Princes Highway, Yallah	No changes to impact
20	Removal of ancillary site AS12	Reduction in socioeconomic impact due to the removal of the site from an area adjacent to residential areas.
21	Expanded ancillary site AS10	No changes to impact

Revised environmental management measures

The management measures presented within the environmental impact statement to address socio-economic issues have been reviewed in consideration of the identified design refinements. The management measures provided in the environmental impact statement are still considered to be suitable for the project and are provided in Section 6.

5.5.8 LANDSCAPE CHARACTER AND VISUAL AMENITY

Assessment methodology and approach

An urban design and landscape character strategy was presented in Technical Paper 10 – Landscape Character and Visual Impact as part of the environmental impact statement. An addendum assessment was carried out to assess potential changes to impacts due to the proposed design refinements. The assessment is attached as Appendix I of this report.

The design refinements are located entirely within the area assessed during the environmental impact statement investigations, and further site investigations were not required.

Existing environment

The 12 landscape character zones and the visual environment presented in the environmental impact statement remain unchanged.

Potential impacts associated with proposed design changes

Landscape character

The proposed design changes would not alter the landscape character zone impact ratings presented in the environmental impact statement.

Visual impact

Although the proposed design changes would reduce the project footprint, the impact to the visibility from some of the selected viewpoints in the assessment may change as a result. Four different areas are mainly affected by those changes:

- Southern Dapto
- Illawarra Regional Airport
- Stapleton's Bridge / Tongarra Road
- Swansea Dairy site and farmhouse.

Changes in visual impacts in these areas are described in Table 5-26. It is noted that additional viewpoints have been added to further consider those changes. A summary of viewpoints and associated visual impacts is provided in Table 5-27.

Table 5-26 Changes to visual impacts, by location

Location	Changes in impact from those described in the environmental impact statement
Southern Dapto – Princes Motorway	Viewpoint 40 is located along the Princes Motorway, looking north towards the project boundary. Viewpoint 41 is located at the eastern end of Mount Brown Road, a residential cul-de-sac in southern Dapto, west of the Princes Motorway. The current design proposes to replace existing noise walls with noise barriers up to 8m high along the north-bound carriageway and up to 7.5 metres high along the south-bound carriageway. This would result in the additional removal of existing vegetation which is unlikely to be replaced due to safety and maintenance requirements within the road corridor. In addition, there would be a notable increase in the height of the barriers framing the corridor, creating an effect of driving along a sunken road amongst walls in excess of 2.5 storeys tall at viewpoint 40. At viewpoint 41, the proposed new Dapto northbound noise barrier would be located along residential property boundaries and terminate the view along the street. The wall is proposed to be up to 6.5m high above existing ground level and would include a combined drainage and maintenance access apron between the wall and private properties, leaving little space for vegetative screening. The barrier would fundamentally alter the outlook along the street and from residential properties from a tree-lined backdrop to a noise barrier almost two storeys tall. The barrier would also block attractive long-distance views across the Macquarie Valley, currently enjoyed from an estimated three properties. Located east of residential properties, the barrier would block the eastern sun and create over-shadowing effects on residential properties, affecting both internal living spaces and backyards.
Illawarra Regional Airport	Relevant views affected by changes are those from viewpoints 14, 15, 16 and 18. In the area adjacent to the Illawarra Regional Airport and north of Tongarra Road, the boundary and the road alignment have been moved away from the airport precinct. The interchange alignment has also been moved further toward the Albion Park Showground. The visual impact from viewpoint 14 would be reduced as the existing vegetation would be potentially retained due to relocation of the northbound exit lane to south of and exiting onto Tongarra Road. Also, the relocation of the northbound exit lane and the retention of existing vegetation alongside the Illawarra Highway, would result in the visual impact from viewpoint 15 being lower, looking north towards the Illawarra Highway. However, the resulting retention of existing vegetation would somewhat reduce visual changes to this view in relation to the environmental impact statement. Viewpoint 16 from Albion Park Showground would remain at the same impact rating due to the minimal changes of the road design and distance to the Princes Highway. The twin bridges (BR09) over Frazers Creek have been rotated slightly toward the northwest and have moved further away from viewpoint 18, Ravensthorpe. Due to the distance (in excess of 500 metres) the visual impact would remain the same from this viewpoint. The visual impact on this view is more affected by the bridge structure over Tongarra Road which has not changed from the environmental impact statement design.
Stapleton's Bridge / Tongarra Road	Visual impact from viewpoints potentially affected in this area (17 to 23) would remain the same due to the minimal changes of the road design. The current design moves the works boundary slightly to the east, closer toward Ravensthorpe. However, the Tongarra Road alignment has moved slightly to the south, away from Ravensthorpe, to tie back into the existing road prior to reaching Stapleton's Bridge, which is now fully within the works boundary. Affected viewpoints in this area would remain at the same impact rating due to the minimal changes of the revised road design.

Location	Changes in impact from those described in the environmental impact statement
Swansea Dairy site and farmhouse.	Visual impact from viewpoints potentially affected in this area (27, 28 and 29) would remain the same due to the minimal changes of the road design in the long term. However, the temporary visual impact during construction increases, due to the higher visual exposure of the Swansea dairy site. Due to construction activities and the need for larger ancillary site areas (AS10 and AS13), the temporary works boundary has been extended towards the Swansea farmhouse, which would move works closer to the Swansea Dairy site. This adjustment would lead to a larger disturbed area which would need to be rehabilitated following construction. The new boundary adjustments would lead to an increase in temporary visual impacts during construction. However, long term, the impacts on the Swansea farmhouse and dairy site would be minimal due to the minor impact of clearing of the existing grassy vegetation, which would be easy to restore to its previous original condition.

In summary, 13 of the 39 viewpoints used in the visual assessment in the environmental impact statement are potentially affected by the revised road design and adjustments to the project footprint mentioned above. Viewpoints affected by the changes in the current road design and adjustments in the project footprint, together with visual impacts changes are summarised in Table 5-27.

There is only one area where the revised road design has changed enough to affect the visual impact rating. That is the area south of the Illawarra Regional Airport where the footprint of the proposed highway has been reduced and the northbound exit lane moved away to south of Stapleton's Bridge. Therefore, visual impact of the motorway from the viewpoint with direct views into this area (14) would have a lower visual impact as the existing vegetation would be potentially retained.

Two new views were introduced to assess the visual impact of the proposed noise barriers in southern Dapto on motorists and residents. The assessment has found that there is an increase in visual impact as a result of the noise barriers that produce a moderate-high and high visual impact respectively.

Table 5-27 Summary of viewpoints affected by changes to the road design and boundary

Viewpoint	Visual Impact – Environmental Impact Statement			Visual Impact – Design Changes		
	Sensitivity	Magnitude	Impact	Sensitivity	Magnitude	Impact
VP 14	M	M	Moderate	M	L	Moderate-Low
VP 15	M	M	Moderate	M	M	Moderate
VP 16	H	H	High	H	H	High
VP 17	M	H	High-Moderate	M	H	High-Moderate
VP 18	H	H	High	H	H	High
VP 19	M	M	Moderate	M	M	Moderate
VP 20	M	M	Moderate	M	M	Moderate
VP 27	M	H	High-Moderate	M	H	High-Moderate
VP 28	M	M	Moderate	M	M	Moderate
VP29	M	H	High-Moderate	M	H	High-Moderate
VP40	Not applicable, new viewpoint			M	H	High-Moderate
VP41	Not applicable, new viewpoint			H	H	High

Changes to visual impacts shown in yellow. New viewpoints are shown in orange.

Revised environmental management measures

The management measures described in the environmental impact assessment would remain the same, other than adjustments in the landscape design that would be required to suit the revised road design as presented in Appendix I. The management measures are provided in Table 6-1 of this report.

5.5.9 LAND USE

Assessment methodology and approach

The assessment in the environmental impact statement considered potential impacts of the project on land use and property within the project area and the wider region (the Shellharbour and Wollongong local government areas). This assessment was reviewed and updated, where required, to identify potential changes in impacts associated with the design refinements.

Existing environment

The existing environment is described in Section 15.2 of the environmental impact statement and is still relevant to this assessment.

Future land use

The environmental impact statement considers the contribution of future growth areas at Tallawarra, Calderwood, Tullimbar and West Dapto. Since the exhibition of the environmental impact statement, the Department of Planning and Environment has provided Roads and Maritime with updated (2016) annual forecast rates based on dwelling numbers. Wollongong City Council supplemented these forecasts to include existing released development and to reflect Council's knowledge of development and employment area release rates in the West Lake Illawarra region. The revised future dwelling numbers for the year 2041 are:

- Tallawarra - 1000 dwellings (1010 dwellings presented in the environmental impact statement)
- West Dapto - 11,300 dwellings (17,500 dwellings presented in the environmental impact statement)
- Calderwood - 5060 dwellings (4800 dwellings presented in the environmental impact statement)
- Tullimbar village - 1410 dwellings (2000 dwellings presented in the environmental impact statement).

Potential construction impacts associated with proposed design changes

Potential construction impacts on land use would be consistent with those in the environmental impact statement. There has been an overall reduction (12.8 hectares) in the land impacted by the construction site boundaries as a result of the design refinements. Where possible, access would be maintained or alternative access provided to properties with impacted access during construction of the project. Roads and Maritime would continue to consult with affected landowners regarding temporary construction impacts.

Potential operational impacts associated with proposed design changes

The design refinements have led to changes to the impacts on operational land use described in the environmental impact statement, as described below.

Local and regional land uses

Agricultural land

Dairy farming

The environmental impact statement determined that the project would have an impact on 27 hectares of dairy farm land and require partial acquisition of the dairy enterprise. The proposed refinements, particularly the changes to the interchange at Albion Park, would see a reduction in impact on dairy land as demonstrated in Figure 5-20 (by about 10.3 hectares for the operational boundary and a further reduction of 3.8 hectares for the construction footprint as a result of the removal of ancillary site AS05). Partial acquisition of the dairy enterprise would still be required; however, the area is less than that assessed in the environmental impact statement and would have less impact on overall dairy operations.

Other agricultural land

The proposed design refinements would result in a reduction in impact of approximately 2.1 hectares of agricultural land other than dairy when compared with the areas identified in the environmental impact statement (based on operational site boundaries).

- A property south of the Oak Flats interchange would be less impacted due to the reduced project footprint along the western side of the project alignment at the southern end of the project
- The parcel of land to the south of the existing East West Link, between the two quarries, would be slightly less impacted due to the reduced project footprint along the western side of the project alignment at the southern end of the project.

Residential land

There would be negligible changes in the impact on residential land compared to the environmental impact statement, based on the operational site boundaries.

Commercial, industrial and extractive industries

Impacts on commercial, industrial and extractive industries land would be consistent with those presented in the environmental impact statement.

Access to the quarries (Holcim and Cleary Brothers) is now proposed to be provided via traffic lights on the new East-West Link, rather than via T-intersections as proposed in the environmental impact statement.

Open space

Croom Regional Sporting Complex

The revised reconfiguration of the Croom Regional Sporting Complex would still include construction of new sporting fields and associated buildings and amenities to replace those directly impacted by the project, as well as internal roads, pedestrian / cycle paths and parking. The revised configuration would provide for greater overall functionality than the design presented in the environmental impact statement while still improving the quality of the venue by providing new facilities and better access.

Other open space

Impacts on other open space within and adjacent to the project footprint would be consistent with those presented in the environmental impact statement.

Crown land

Impacts on Crown land would be consistent with those presented in the environmental impact statement.

Utilities and services

Impacts on utilities and services would be consistent with those presented in the environmental impact statement.

Direct impacts on properties

Based on the operational site boundaries, 53 individual land parcels would be directly impacted by the project, either in total or in part (refer Figure 5-19). This would affect around 38 landowners. It is noted that Roads and Maritime have acquired 15 properties since the environmental impact statement.

For the remaining lots, in many cases, one landowner owns a number of land parcels. An assessment of each directly affected land parcel was undertaken to determine the likely level of impact of the project on current use, future use, functionality and viability of the land. Impacts to 14 land parcels have changed due to the proposed design refinements (Table 5-28). A number of these land parcels have had the area of impact reduced because of the revised design. As demonstrated in Figure 5-20, there would be a reduction 10.3 hectares of impact as a result to the refined project boundary (operational boundary). In addition to this, the 3.8 hectares of agricultural (dairy) land area required in the environmental impact statement for ancillary site AS05 is no longer included within the construction footprint reducing construction impacts.

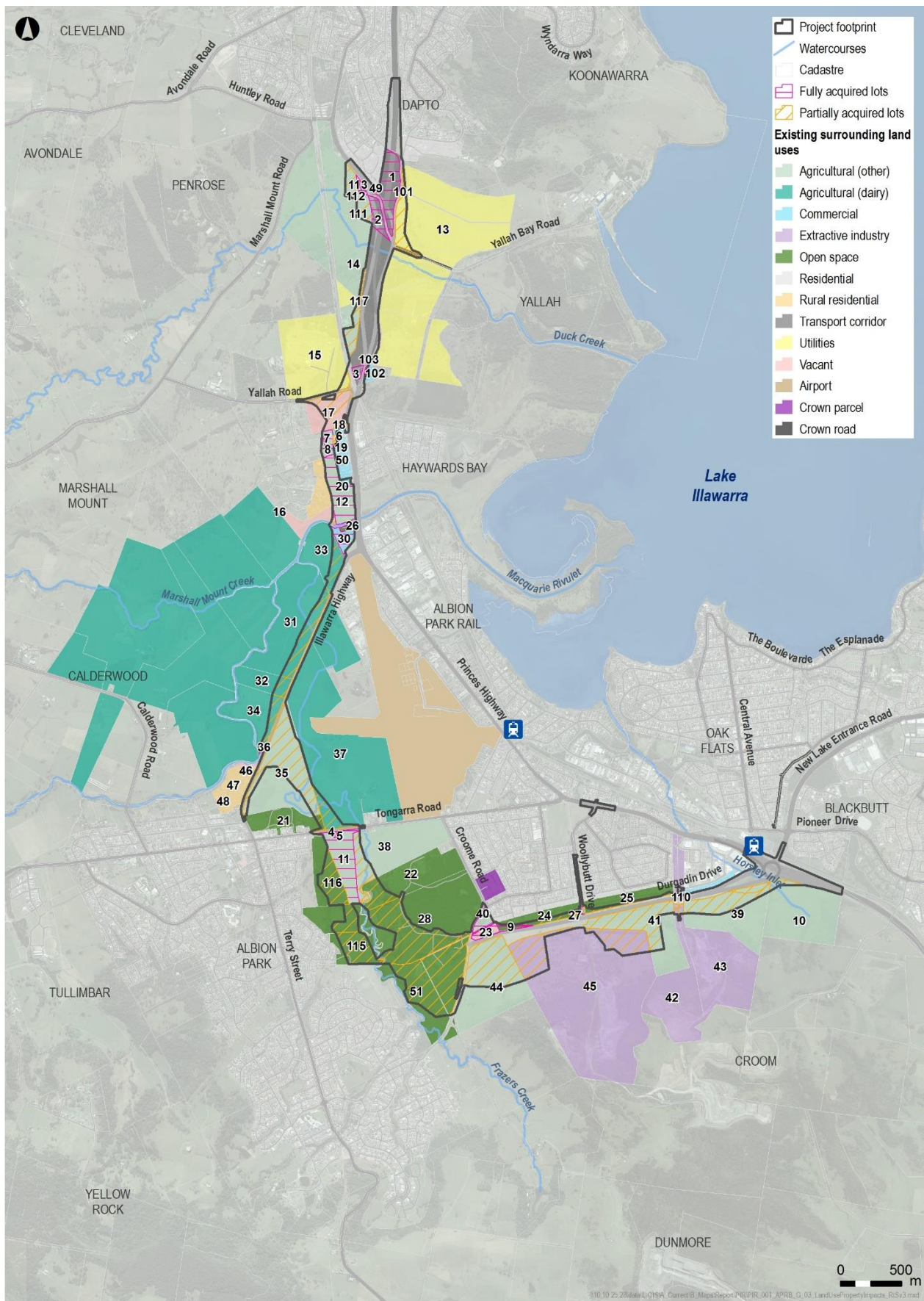


Figure 5-19 Directly impacted properties

Table 5-28 Directly impacted land parcels (project operational boundary)

Land parcel ID	Current land use	Total lot size (ha)	Area of direct impact in environmental impact statement (ha)	Revised area of direct impact (ha)	Difference in impact area	Ownership
11	Agriculture (other)	10.0	9.7	9.9	+0.2	Roads and Maritime
13	Utilities service provider	53.0	5.4	0.5	-4.9	TruEnergy Pty Ltd
17	Vacant (former golf course)	10.1	6.9	4.0	-2.9	Wollongong City Council
22	Open space (Croom Regional Sporting Complex)	20.0	4.2	4.0	-0.2	Shellharbour City Council
24	Open space (other)	6.2	1.6	2.0	+0.4	Shellharbour City Council
25	Open space (other)	7.3	1.2	1.4	+0.2	Shellharbour City Council
31	Agriculture (dairy)	32.5	7.5	6.7	-0.8	Private landowner
32	Agriculture (dairy)	7.2	2.0	1.5	-0.5	Private landowner
33	Agriculture (dairy)	12.5	4.0	3.6	-0.4	Private landowner
34	Agriculture (dairy)	13.3	5.1	2.1	-3.0	Private landowner
35	Agriculture (other)	30.5	17.7	17.4	-0.3	Private landowner
37	Agriculture (dairy)	69.7	9.2	3.6	-5.6	Private landowner
39	Agriculture (other)	23.3	8.7	8.0	-0.7	Private landowner
51	Open space (Croom Regional Sporting Complex)	31.6	0.4	0.5	+0.1	Shellharbour City Council

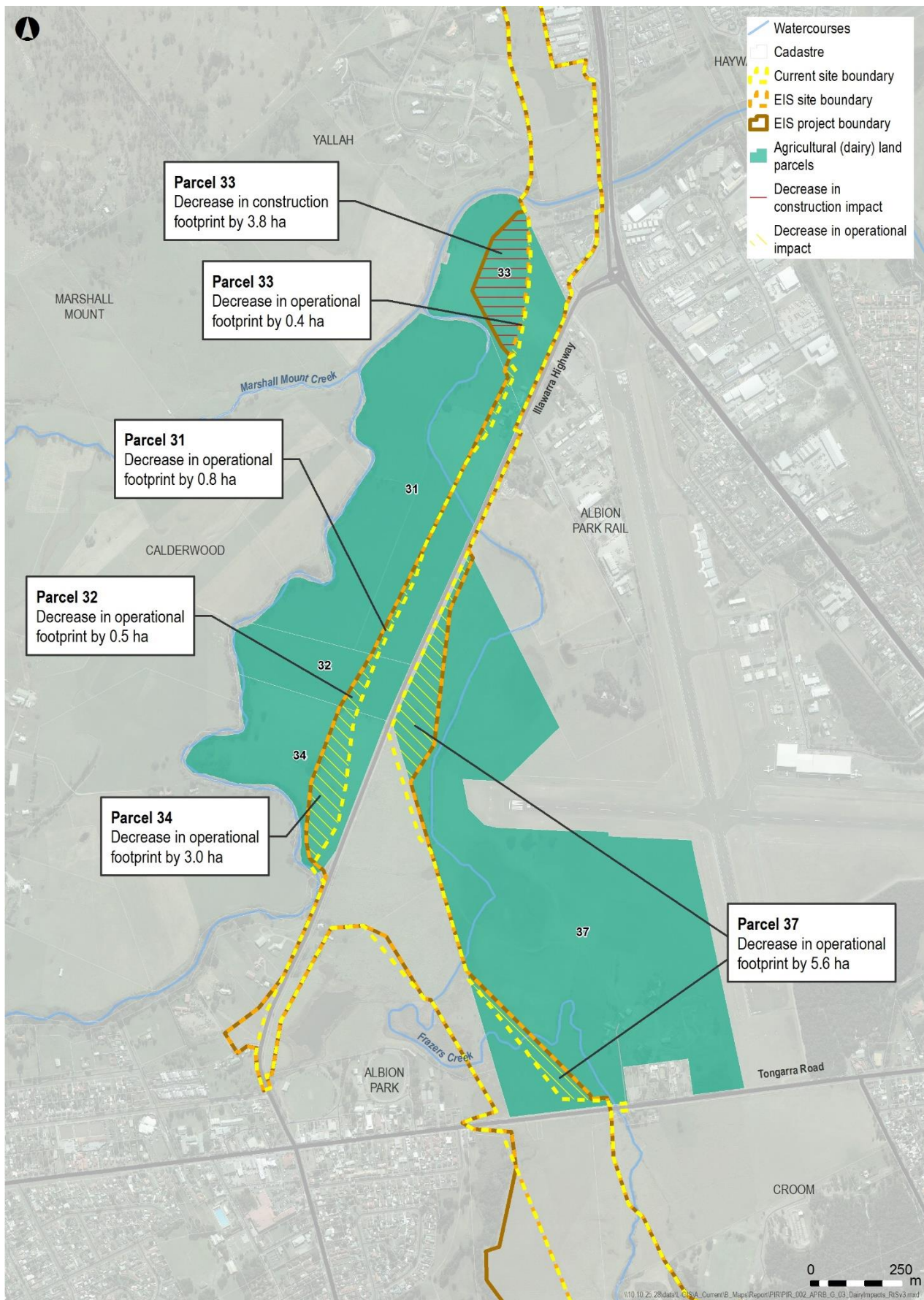


Figure 5-20 Change in impact on agricultural (dairy) land parcels

Impact on access

Impact on property access

Changes to impacts on property access are discussed in the assessment of impacts on local and regional land use above. These changes include:

- Agricultural land (dairy) - Access to flood free land would be provided via BR07 under the motorway
- Extractive industries - Access to the two local quarries would be provided via traffic lights on the new East West Link.

As stated in the environmental impact statement, alternate access arrangements would be provided in consultation with individual landholders.

Flooding

Flooding impacts on land use as a result of the proposed design refinements would be consistent with those presented in the environmental impact statement (refer to Section 5.5.2 of this report).

Traffic

Traffic impacts on land use as a result of the proposed design refinements would be consistent with those presented in the environmental impact statement (refer to Section 5.5.1).

Impact on future land use

The revised traffic assessment (refer Section 5.5.1 of this report) and flooding and hydrology assessment (refer Section 5.5.2 of this report) considers the cumulative impact of future growth areas, based on the revised growth estimates. The potential benefits of the project on future land use would be consistent with those presented in the environmental impact statement.

The design refinements would not directly impact urban release areas identified for future residential or employment land.

Revised environmental management measures

No additional management measures have been proposed as those described in the project environmental impact statement are considered sufficient in addressing the changes in impacts outlined above and are included in Section 6.

5.5.10 OTHER ENVIRONMENTAL IMPACTS

Table 5-29 Other environmental impacts assessment

Aspect	Potential impacts associated with proposed design changes	Additional mitigation required?
Soils and surface water quality	Construction and operational impacts to soils are consistent with those assessed in the environmental impact statement. It is likely that the construction timeframe would be reduced by extending the construction hours across the project. This would reduce the time soils are exposed to the elements and slightly reduce the risk of soil erosion. There would be no changes to impacts on acid sulfate soils and acid sulfate rock or contaminated land.	No
Groundwater	There were no identified changes to construction or operational groundwater impacts assessed in the environmental impact statement due to the proposed design refinements. Risks to groundwater flows and negative impacts on groundwater quality from the proposed design refinements are considered to be low.	No
Air Quality	Construction and operational impacts to air quality are consistent with those assessed in the environmental impact statement. It is likely that the construction timeframe would be reduced by extending the construction hours across the project. This would reduce the potential for dust due to a reduction in the time soils are exposed and the number of days that are subject to construction vehicle/plant movements.	No
Greenhouse gas	The proposed design refinements would not result in a substantial change to the generation of greenhouse gases or the use of resources. Impacts are consistent with the environmental impact statement.	No
Waste	There were no identified changes to construction or operational waste impacts assessed in the environmental impact statement due to the proposed design refinements.	No
Cumulative impacts and interactions	Cumulative construction and operational impacts are consistent with those assessed in the environmental impact statement. It is likely that the construction timeframe would be reduced by extending the construction hours across the project. This would reduce the cross-over time and potential interactions with projects scheduled for construction in the same time period as this project.	No
Sustainability	The proposed design refinements would not change the climate risk profile of the project. The project remains consistent with the Transport Environment and Sustainability Policy Framework (Transport for NSW, 2013), as assessed in the environmental impact statement. The inclusion of the proposed design refinements does not alter the conclusions of the assessment of the project against the principles of ecologically sustainable development, as detailed in the environmental impact statement. As stated in the environmental impact statement, the project has been registered under the infrastructure sustainability rating scheme, and would be subject to assessment under the framework through the delivery phase. An infrastructure sustainability rating scheme rating of “commendable” would be sought.	No

Revised environmental management measures

Minor amendments have been made to the management measures proposed in the environmental impact statement and are presented in italics in Table 5-30. Other management measures presented in the environmental impact statement are still considered to be relevant and accurate.

Table 5-30 Proposed changes to mitigation measures

Issue	ID No.	Mitigation Measure	Responsibility	Timing
Stormwater runoff, risk of erosion and sedimentation, and risk to water quality	SW01	Industry standard erosion and sediment controls will be designed and implemented in accordance with the following specifications and guidelines: - Managing Urban Stormwater: Soils and Construction (Landcom, 2004) - Roads and Maritime's Erosion and Sedimentation Management Procedure (PN143) - Roads and Maritime's Soil and Water Management Specification (G38) - The NSW Office of Water's <i>Department of Primary Industries (Water)</i> guidelines for Controlled Activities <i>Volume 2D Main Road Construction published (DECC, 2008).</i> These controls will be established before the start of construction and maintained in effective working order for the duration of the construction period until the site is restored.	Contractor	Construction
Air quality management	AQ01	The Construction environmental management plan will include a strategy to manage air quality during construction. It will include, but not be limited to: - Air quality and dust management objectives - Potential sources and impacts of dust, identifying all dust-sensitive receptors - Mitigation measures to minimise dust impact, such as the use of water carts to suppress dust, stabilisation of exposed soils, covering trucks transporting loose material, and stopping dust generating activities during windy conditions - A monitoring program to assess compliance with the identified objectives - Contingency plans to be implemented in the event of non-compliances and / or complaints about dust <i>Reporting on the use and performance of off-road diesel plant and equipment.</i>	Contractor	Construction

6 REVISED ENVIRONMENTAL MANAGEMENT MEASURES

The environment impact statement for the project identified a range of environmental outcomes and management measures that would be required to avoid or reduce the environmental impacts.

After consideration of the issues raised in the public submissions, the environmental management measures for the project (refer to Chapter 23 of the environmental impact statement) have been revised.

The adjustments to the measures were made to:

- Make additional commitments based on the response to submissions within this report
- Make additional commitments based on the findings of the studies within this report
- Modify the wording so that the outcome of the commitment is clearer to implement
- Delete a measure as the commitment has been achieved
- Delete a measure as it is sufficiently covered by a preceding measure

Where new commitments have been added or new text has been added to an existing measure it has been *italicised*. Where a commitment has been deleted or text from the commitment has been deleted, it appears as ~~strike through text~~.

Should this project be approved, the environmental management measures in Table 6-1 would guide the subsequent project development phases (design and construction) of the Albion Park Rail bypass. These measures supersede those presented in the environmental impact statement and associated technical papers.

Table 6-1 Revised environmental management measures

Issue	ID no.	Environmental management measure	Responsibility	Timing
Traffic and transport				
Construction traffic management	TT01	A traffic management plan will be prepared (in accordance with Roads and Maritime specification G10) including: ▪ Traffic Control Plans showing the access arrangements to ancillary sites and the location of required signs and devices ▪ Pedestrian and cyclist management plan where necessary to ensure access is maintained where it is safe and feasible during construction ▪ Road safety audit requirements ▪ Any localised improvements / adjustments to existing traffic management arrangements.	Contractor	Construction
Construction impacts on the Airport operations	TT02	Once a contractor is appointed, Roads and Maritime would require <i>As part of the project</i> a Method of Working Plan, in accordance with the CASA Manual of Standards Part 139, <i>is</i> to be prepared. The Method of Working Plan would set out the arrangements for carrying out all works which may impact on aviation safety, any necessary restrictions to aircraft operations, how these would be implemented, administered and managed to ensure safety. The Method of Working Plan will be agreed with the aerodrome operator (Shellharbour City Council) and subject to consultation with all stakeholders including regulatory agencies (CASA, Airservices Australia) and all aircraft operators at Illawarra Regional Airport prior to the commencement of works which may affect operations at the airport.	Contractor	Construction
	TT03	Any construction impact on the airspace operational requirements of the Illawarra Regional Airport will be managed in consultation with Shellharbour City Council and incorporated into the construction environmental management plan.	Roads and Maritime	Detailed design / construction
Operational impacts on the Airport operations	TT04	The detailed design of the project will comply with the airspace operational requirements of the Shellharbour City Council for the Illawarra Regional Airport. <i>The design will be undertaken in consideration of the requirements of the Civil Aviation Safety Authority Manual of Standards Part 139, and will consider aspects such as the risk of intrusions of the obstacle limitation surfaces and potential for windshear and turbulence.</i>	Contractor	Detailed design
	TT05	The detailed design of lighting for the project will demonstrate it has considered: ▪ The operational airspace requirements of the Illawarra Regional Airport in accordance with Civil Aviation Safety Authority Manual of Standards Part 139 ▪ Impacts on nearby residences or sensitive receivers.	Contractor	Detailed design

Issue	ID no.	Environmental management measure	Responsibility	Timing
	TT06	<i>Where the shoulders of the motorway do not fully accommodate a 4.6 metre vehicle envelope, the area will be marked as no stopping, to ensure that the area remains free of any intrusions on the aspirational (Code 3) obstacle limitation surface.</i>	Contractor	Construction
Flooding and hydrology				
Impacts on flood behaviour during construction	HF01	Temporary works will consider flood impacts during construction including flood duration as well as warning and response times. Should construction staging require a temporary departure from the design (e.g. higher embankments for preloading, temporary diversions or temporary crossings), flood impacts will be assessed utilising the proposed design before finalising the approach.	Contractor	Construction
	HF02	Where stockpiles are to be located in the floodplain, they will be located and sized to ensure that temporary impacts are not greater than those specified in the design criteria.	Contractor	Construction
Impact of flooding on construction activities	HF03	For ancillary sites with flood immunity of less than 20 year ARI, a flood contingency plan will be prepared. This plan will consider likelihood of flooding, evacuation routes, warning times, and potential impacts from the site flooding. It will include, but not be limited to: - Any monitoring requirements to ensure advance notice of a flood event - Procedures to be implemented in the event of a flood - Details of the required training and staff inductions.	Contractor	Construction
Bed and bank stability during construction	HF04	Temporary watercourse crossings will be designed to minimise impacts on hydrology, aquatic habitat and fauna by: - Maintaining low-flow conditions - Being designed with consideration of the potential for flooding during construction - Be removed and the area rehabilitated following completion of construction. These crossings will not be used for Class 1 waterways, and will take into consideration the requirements of the Policy and guidelines for fish habitat conservation and management (NSW Department of Primary Industries, 2013).	Contractor	Construction
Frazers Creek adjustment	HF05	The Frazers Creek adjustment shall be designed and constructed in a way that mimics natural flow conditions, creates habitat for aquatic animals, and incorporates locally native riparian vegetation, in accordance with the requirements of the Policy and guidelines for fish habitat conservation and management (NSW Department of Primary Industries, 2013) in consultation with NSW Fisheries <i>Department of Primary Industries (Fisheries)</i> and the NSW Office of Water <i>Department of Primary Industries (Water)</i> .	Contractor	Detailed design

Issue	ID no.	Environmental management measure	Responsibility	Timing
Operational phase impacts on flood behaviour	HF06	The potential negative flood impacts on Properties 1, 2 (<i>Dwelling 1</i>) and 3 (<i>Dwelling 2</i>) will be reassessed <i>reviewed</i> during the detailed design by flood modelling <i>to seek to further avoid or minimise impacts</i> . If the properties are still impacted, and if mitigation is required, <i>investigation into site-specific flood management measures will be undertaken</i> in consultation with the landowner.	Roads and Maritime / Contractor	Detailed design
Bed and bank stability during the operational phase	HF07	A geomorphological assessment will be undertaken at the detailed design phase for all watercourses, with an aim to minimise changes to natural stream flow and velocity. This assessment will consider impacts on stream geomorphology from regular stream flows as a result of increased flow velocities, changes to direction of flow and instream structures.	Contractor	Detailed design
	HF08	The detailed design of bridges and culverts will consider the requirement for fish passage and scour protection under the Policy and Guidelines for Fish Habitat Conservation and Management (NSW Department of Primary Industries, 2013) and the NSW Office of Water <i>Department of Primary Industries (Water)</i> guidelines for Controlled Activities.	Contractor	Detailed design
Reconfiguration of Green Meadows detention basin	HF09	A dam break assessment will be undertaken to assess the risk associated with the Green Meadows Basin.	Contractor	Detailed design
Flood access	HF10	Consultation would be undertaken where access to farms is to be temporarily impacted during construction. Property access will be maintained or alternative arrangements made in consultation with the affected landowners.	Contractor	Construction
Emergency access and evacuation during construction	HF11	Consultation would be undertaken with the emergency services and the SES once the construction staging and program has been developed, to discuss any potential impacts on emergency access and flood evacuation, and (if required) alternative access / egress routes during construction.	RMS	Construction
Biodiversity				
Biodiversity offsets	BD01	The Biodiversity Offset Strategy will be further developed in consultation with the Office of Environment and Heritage and the NSW Fisheries <i>Department of Primary Industries (Fisheries)</i> . The Biodiversity Offset Strategy will be implemented as part of the delivery of the project.	Roads and Maritime	Construction / operation
Vegetation clearing	BD02	The detailed design and construction planning will demonstrate that it has sought to minimise the extent of vegetation clearing within the project boundary. The detailed design will demonstrate it has minimised the amount of clearing of the Eastern Flame Pea and endangered ecological communities in particular.	Contractor	Detailed design

Issue	ID no.	Environmental management measure	Responsibility	Timing
Construction phase management	BD03	The construction environmental management plan will include flora and fauna management measures will be prepared for the project, in consultation with the Office of Environment and Heritage and NSW Fisheries Department of Primary Industries (Fisheries). The Plan will describe the management measures to be implemented to limit the impact of the project on biodiversity, in accordance with Roads and Maritime's Biodiversity Guidelines (2011), including, but not limited to ▪ Pre-clearing process ▪ Exclusion zones and fencing or other means to demarcate vegetation to be retained (endangered ecological communities and Eastern Flame Pea populations) in close proximity to the works ▪ Re-establishment of native vegetation ▪ Clearing of vegetation and removal of bushrock ▪ Weed management (see Guide 6) ▪ Pathogen management (see Guide 7) ▪ Nest boxes ▪ Fauna handling ▪ Aquatic habitats and riparian zones.	Contractor	Construction
Site rehabilitation and revegetation	BD04	Plantings selected will be in accordance with the landscape plan. Where possible plantings will be carried out that increase the diversity of the existing vegetation, and improve the connectivity between patches in the landscape. Plantings will be monitored and maintained for at least one year to ensure they survive and become established.	Roads and Maritime / Contractor	Construction / operation
	BD05	Construction programming will show how progressive rehabilitation of disturbed areas will be undertaken to minimise soils exposure and the potential for dust generation, erosion and sedimentation, and visual impacts.	Contractor	Construction
Habitat management	BD06	Sensitive areas must be delineated on a sensitive areas map and the map included in the construction environmental management plan. These areas will be temporarily fenced, unless agreed otherwise with Roads and Maritime, to ensure they are not subject to disturbance during construction. This includes, but is not limited to: ▪ The environmental protection areas located at Yallah Road identified within the project boundary (refer Figure 5-2) ▪ Areas where Eastern Flame Pea is growing in close proximity to the project boundary (shown in Figure 4-2 in Technical Paper 4 – Biodiversity Assessment Report). An environmental work method statement will be developed that identifies measures to minimise the risk of	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
		impacting the environmentally sensitive areas.		
	BD07	Prior to the demolition of the existing Duck Creek bridge and any larger culverts, they will be inspected for roosting bats in accordance with the pre-clearing process identified in the Biodiversity Guidelines (Roads and Traffic Authority, 2011). Should bats be identified these would be identified by an ecologist and managed in accordance with the Biodiversity Guidelines (Roads and Traffic Authority, 2011).	Contractor	Construction
Disturbance of riparian areas	BD08	Disturbance to riparian areas caused by grubbing and excavation works will be minimised for areas identified for post construction rehabilitation. Clearing in these areas will seek to retain root mass and existing seed banks to aid in stabilisation and post construction rehabilitation.	Contractor	Construction
	BD09	A Vegetation Management Plan will be prepared for all major watercourse crossings including the Duck Creek, Macquarie Rivulet, Frazers Creek crossings, and the Frazers Creek adjustment. Maintenance of rehabilitated riparian areas will be undertaken after the completion of works, in accordance with the Guidelines for vegetation management plans on waterfront land (NSW DPI 2012).	Contractor	Construction
Aboriginal heritage				
Site management	AH01	An Aboriginal Heritage Management Plan will be prepared to manage the impacts of construction works on Aboriginal cultural heritage, to include, but not be limited to: ▪ Details of the management measures and procedures to be carried out during construction ▪ Site inductions and training for construction personnel, including Aboriginal cultural awareness training and their obligations under the <i>National Parks and Wildlife Act 1974</i>, to be conducted by a heritage specialist ▪ <i>Ongoing consultation with the Aboriginal community in accordance with the Procedure for Aboriginal cultural heritage consultation and investigation (Roads and Maritime, 2012) and the Aboriginal heritage consultation requirements for applicants (Department of Environment, Climate Change and Water, 2010)</i> ▪ A framework for ongoing consultation with Aboriginal stakeholders regarding any salvage excavations, reburial of retrieved artefacts and in the event of any unexpected Aboriginal objects being identified during works ▪ The mitigation measures outlined in Aboriginal Cultural Heritage Assessment Report.	Contractor	Construction
Site protection	AH02	The Aboriginal Heritage Management Plan will address the requirements to protect and preserve the cultural heritage values associated with the Duck Creek Cultural Site, this will include exclusion fencing prior to the works to ensure no inadvertent impacts during construction. The location of fencing should be confirmed with a heritage specialist prior to implementation.	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
	AH03	The Aboriginal Heritage Management Plan will address the requirements to protect and preserve the cultural heritage values associated with the Macquarie Rivulet Cultural Site, this will include: ▪ The erection of temporary fencing for the protection of the old growth eucalypt identified within this site, to be undertaken in consultation with a heritage specialist ▪ The separation and stockpiling, if possible within the adjacent ancillary area, of the topsoil ▪ Reinstating the topsoil to the Site ▪ Rehabilitation of the Site with locally native vegetation <i>in consultation with Aboriginal knowledge holders</i> ▪ Interpretative signage and a booklet developed by a heritage specialist in consultation with the Aboriginal knowledge holders <i>prior to the start of any construction with the potential to impact Cultural Site B Macquarie Rivulet.</i>	Roads and Maritime / Contractor	Construction
	AH04	Sensitive areas must be delineated on a sensitive areas map will be mapped and temporarily fenced unless agreed with RMS to ensure they are not subject to disturbance during construction. This includes, but is not limited to the portion of the Aboriginal cultural heritage sites YTOF-AS-2, YTOF-AS-4, YTOF-AS-6, YTOF-AS-7, YTOF IF 4, PAD 3, PAD 8, PAD 9, 52-5-0473, 52-2-0512, Macquarie Rivulet and HLA 2007 that are adjacent to the project boundary. <i>An updated AHIMS search will be carried out prior to the start of construction.</i>	Contractor	Construction
Archaeological salvage	AH05	Salvage excavation will occur at sites YTOF AS 4 and YTOF AS 5 if impacts are unavoidable. Decisions regarding the area of excavation and management of salvaged artefacts will be made in consultation with the Aboriginal stakeholders and Office of Environment and Heritage.	Roads and Maritime	Construction
Unexpected discoveries	AH06	In the event of the unexpected discovery of suspected archaeological Aboriginal human remains during the proposed works, in addition to the procedures outlined in the Roads and Maritime Unexpected Heritage Items Procedure (2015a), the Aboriginal Heritage Management Plan require that Roads and Maritime immediately notify the identified knowledge holders of the discovery. If the material is confirmed to be archaeological Aboriginal human remains that consultation occur with the identified knowledge holders in relation to: ▪ The development of a Management Plan for future proposed works in the relevant area ▪ Cultural ceremonies in relation to the human remains and the site of their occurrence ▪ Repatriation of the human remains.	Roads and Maritime / Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
Non-Aboriginal heritage				
Visual impacts	HH01	The landscape plan will be developed to minimise visual impacts on heritage items, including the Ravensthorpe Grounds and Workers Cottages, and the House on the Princes Highway, Yallah. The landscape plan may include the opportunity for planting on private land in consultation with the property owners, to screen the visual impact of the motorway on these items.	Roads and Maritime	Construction
Archival recording	HH02	Archival recording of the existing Boles Meadows homestead, vegetation and outbuildings will be undertaken prior to construction <i>any impact on these items</i> . This recording will include a photographic record of the homestead, significant outbuildings, their original context, layout, building materials and methods used during their construction. The recording will be undertaken in accordance with the guidelines in How to Prepare Archival Records of Heritage Items (NSW Heritage Office, 1998).	Roads and Maritime	Construction
Investigation of heritage items	HH03	An archaeological investigation will be undertaken for the heritage listed sites at: - Terry's Meadows (Boles Meadows) - Tongarra Road homestead An excavation and salvage methodology will be prepared in consultation with the Department of Planning and Environment and the Heritage Council prior to commencement. A report will be prepared to outline the results of the investigation.	Roads and Maritime	Construction
Protection of heritage items	HH04	The location of the former Yallah platform and rail corridor will be identified in the sensitive areas mapping, and communicated to construction personnel during their induction. In the event remains associated with this heritage site are uncovered during the proposed works, the Unexpected Finds Procedure will be followed (Roads and Maritime, 2015a). Consultation with the Illawarra Light Railway Museum will be undertaken.	Roads and Maritime / Contractor	Construction
	HH05	If unexpected archaeological finds are discovered during construction, the Unexpected Finds Procedure will be followed (Roads and Maritime, 2015a). The NSW Heritage Division will be notified of the discovery of a relic in accordance with Section 146 of the <i>Heritage Act 1977</i> . Construction personnel will be inducted in their responsibilities under the <i>Heritage Act 1977</i> and trained in the Procedure.	Roads and Maritime	Construction
Noise and vibration				
Construction noise and vibration	NV01	A Construction Noise and Vibration Management Plan will be prepared for the project. The Plan will provide details of noise and vibration management measures and procedures to be carried out during construction to minimise and manage noise impacts on sensitive receivers, including: Noise and vibration monitoring and reporting requirements	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
		▪ A map showing the location of all sensitive receivers ▪ Specific mitigation treatments, management methods and procedures to be implemented to control noise and vibration during construction ▪ Construction timetabling to minimise noise impacts including time and duration restrictions, respite periods and frequency ▪ Procedures for notifying residents, business owners, and other sensitive receivers of construction activities likely to affect their amenity through noise and vibration ▪ Contingency procedures to be implemented in the event of non-compliances and / or noise complaints. The type of noise mitigation measures that may be adopted in the Plan include: ▪ Carrying out only low noise activities during the weekday morning (6am to 7am) period ▪ Selection of less noisy plant and equipment, where feasible ▪ Avoiding simultaneous operation of noisy plant, where feasible ▪ Avoiding queueing and idling of construction vehicles outside of the project standard construction hours ▪ Maintaining plant and equipment so as to ensure optimum operating conditions ▪ Planning construction traffic flow to minimise reversing and noise from reversing alarms. The type of vibration mitigation measures that may be adopted in the Plan include: ▪ Undertaking building dilapidation surveys for buildings that could be impacted by vibration ▪ Consideration of feasible alternative construction methodologies or equipment where vibration intensive equipment is expected to exceed the criteria.		
Construction hours	NV02	Work will be carried out <i>generally in accordance with</i> the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). Where work is to be carried out outside of recommended working hours, <i>Prior to out of hours work being carried out,</i> all affected receivers will be notified of all relevant details of the proposed activities.	Contractor	Construction
Blasting	NV03	If blasting is required, the Construction Noise and Vibration Management Plan will incorporate a Blast	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
		Management Strategy. The Strategy will be prepared in consultation with the Environment Protection Agency, will aim to demonstrate that all blasting and associated activities will be undertaken in a manner that will not generate unacceptable noise and vibration impacts or pose a significant risk impact to residences and sensitive receivers. The Blast Management Strategy will address: ▪ Details of blasting to be performed, including location, method and justification of the need to blast ▪ Identification of any potentially affected noise and vibration sensitive sites including heritage buildings and utilities ▪ Establishment of appropriate criteria for blast overpressure and ground vibration levels at each category of noise sensitive site ▪ Details of the storage and handling arrangements for explosive materials and the proposed transport of those materials to the construction site ▪ Identification of hazardous situations that may arise from the storage and handling of explosives, the blasting process and recovery of the blast site after detonation of the explosives ▪ Determination of potential noise and vibration and risk impacts from blasting and appropriate best management practices ▪ Community consultation procedures.		
Operational noise impacts	NV04	The need for operational phase noise mitigation-measures, including low noise pavement, noise walls <i>barriers</i> or architectural treatments, will be confirmed during detailed design. <i>The final noise barrier design will be selected following investigations into the obstacle limitation surface and engineering feasibility of the proposed mitigation measures and community consultation with residents from properties identified as exceeding, without mitigation, the Noise Criteria Guideline (Roads and Maritime, 2015a) in the adjoining noise catchment area.</i> The mitigation measures will be provided as early as practicable in the construction program to reduce potential noise impacts associated with construction.	Roads and Maritime / Contractor	Detailed design
	NV05	Within 12 months of project opening an operational noise review will be carried out. This will include: ▪ Monitoring to compare actual noise performance against predicted noise performance ▪ An assessment of the performance and effectiveness of the applied mitigation measures together with a review and, if necessary, reassessment of all feasible and reasonable mitigation measures ▪ Identification of any additional feasible and reasonable measures that will be implemented with the objective of meeting the criteria in the Noise Criteria Guideline (Roads and Maritime, 2015b), when these	Roads and Maritime	Operation

Issue	ID no.	Environmental management measure	Responsibility	Timing
		measures will be implemented and how their effectiveness will be measured and reported.		
Socio-economic				
Consultation	SE01	The Community Involvement Framework will address, but not be limited to: ▪ Consultation purpose and objectives ▪ Communications tools ▪ Monitoring and evaluation ▪ Stakeholder analysis, to provide details on all stakeholders and indicative tools for engaging with these stakeholders ▪ Procedures for gathering, managing and using feedback provided by stakeholders ▪ Identification of specific issues, communications and management strategies for: ○ Traffic management (including property access, pedestrian access) ○ Social and business impacts ○ Landscaping / urban design matters ▪ Construction programming and activities, including extended working hours and out of hours work ▪ Noise and vibration ▪ Inquiries and complaints handling framework.	Roads and Maritime	Construction
Darcy Dunster Reserve	SE02	Darcy Dunster Reserve will be rehabilitated following construction and any adjustments for the site discussed with Shellharbour City Council.	Roads and Maritime	Detailed design
Croom Regional Sporting Complex	SE03	The construction planning for the reconfiguration of the Croom Regional Sporting Complex will be developed in consultation with Shellharbour City Council and the Sporting Complex user groups so as to minimise impacts on the ongoing use of the Sporting Complex during construction.	Roads and Maritime	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
Landscape character and visual amenity				
Visual impacts	LC01	Operational water quality devices will be designed to avoid the use of fencing.	Contractor	Detailed design
	LC02	The detailed design will minimise visual impacts and demonstrate integration of urban design principles and objectives adopted for the project. Detailed design of structural elements, including noise barriers, bridges, retaining walls and retaining walls finishes, will be in accordance with Beyond the Pavement, urban design policy, procedure and design principles (Roads and Maritime, 2014b) and the associated design guidelines.	Contractor	Detailed design
Light spill	LC03	The design of temporary and permanent lighting will be undertaken in accordance with AS 1158.1-1986 and will avoid unnecessary light spill on adjacent residents or sensitive receivers.	Contractor	Construction
Structures	LC04	The detailed design of the Green Meadows basin should demonstrate that the footprint and visual impacts have been minimised.	Contractor	Detailed design
Landscaping implementation	LC05	Landscape planting will be in accordance with the landscape plan, and will consider the operational airspace requirements of the Illawarra Regional Airport and the biodiversity offsetting requirements (including for aquatic habitat).	Contractor	Construction
	LC06	Landscaping and design of the Croom Regional Sporting Complex will be in accordance with the Croom Regional Sporting Complex concept design, and will consider the visual impact of the reconfiguration of the complex.	Contractor	Construction
Land use				
Property acquisitions	LU01	Property acquisitions will be carried out in accordance with the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> .	Roads and Maritime	Construction
Property access	LU02	Property access will be maintained or alternative arrangements made in consultation with the affected landowners.	Roads and Maritime	Construction
Soils and water quality				
Stormwater runoff, risk of erosion and sedimentation, and risk to water	SW01	Industry standard erosion and sediment controls will be designed and implemented in accordance with the following specifications and guidelines: - Managing Urban Stormwater: Soils and Construction (Landcom, 2004) - Roads and Maritime's Erosion and Sedimentation Management Procedure (PN143)	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
quality		▪ Roads and Maritime's Soil and Water Management Specification (G38) ▪ The NSW Office of Water's <i>Department of Primary Industry (Water)</i> guidelines for Controlled Activities ▪ <i>Volume 2D Main Road Construction published (DECC, 2008).</i> These controls will be established before the start of construction and maintained in effective working order for the duration of the construction period until the site is restored.		
	SW02	The construction environmental management plan will include a construction soil and water quality management plan to manage potential impacts on soils and receiving watercourses, to include, but not be limited to: ○ Objectives and targets for soil and water quality management ○ Information on the relevant statutory and other requirements relating to soils and water quality, including any permits or licences required for the project ○ Details of any consultation requirements under the Plan ○ An overview of the existing environment and potential impacts related to the construction works ○ Measures to manage impacts of the project including in relation to: ○ Soils, erosion and sedimentation ○ Stockpile management ○ Spoil and fill management ○ Surface water quality ○ Groundwater levels ○ Discharges from sedimentation basins, acid sulfate soil treatment areas and groundwater de-watering ○ Acid sulfate soils and contaminated lands ○ Significant weather events (such as heavy rainfall or flooding) ○ Re-fuelling of vehicles and other equipment and accidental spills ○ Unexpected finds such as asbestos or contaminated fill ▪ A surface water quality monitoring program that as a minimum addresses the requirements of the project Environment Protection Licence ▪ Auditing and reporting requirements ▪ Site inductions and training for construction personnel in the implementation of the Plan.	Contractor	Construction

Issue	ID no.	Environmental management measure	Responsibility	Timing
		The strategy will be prepared in accordance with the relevant industry standard guidelines and procedures.		
	SW03	The size, location and number of temporary sedimentation basins to treat site runoff during construction will be confirmed during detailed design. The design process will consider the site constraints (such as topography and ecology), land take, and proximity to receiving waters and / or sensitive receiving waters. They will be designed in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).	Contractor	Detailed design
Accidental spills during construction	SW04	An emergency spill response procedure will be prepared to minimise the impact of any accidental spills, and include details on the requirements for managing spills, disposing of any contaminated waste, and reporting of any such incidents.	Contractor	Construction
Areas of potential concern	SW05	Areas of potential environmental concern with respect to contamination are identified in this environmental impact statement. The risks posed by work in these areas will be evaluated and managed through a Phase 2 Assessment including: ▪ A review of historical information ▪ Targeted sampling and analysis of samples at the areas of potential environmental concern in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure (2013). In the event the Phase 2 Assessment identifies any areas of contamination that are to be impacted by the project, the Construction Environmental Management Plan will include a strategy to manage these areas, prepared in accordance with the Guidelines for the Management of Contamination (Roads and Maritime, 2013e).	Contractor	Construction
Groundwater				
Groundwater management during operation and construction	GW01	Groundwater monitoring will be undertaken adjacent to groundwater dependent ecosystems in close proximity to the project to identify the potential impacts of dewatering or depressurisation of groundwater as a result of the project. The decision to cease groundwater monitoring in the operational phase, following construction, will be confirmed in consultation with a suitably qualified independent expert.	Contractor	Construction
Interception of groundwater by water quality and detention basins	GW02	The design will investigate options to reintroduce intercepted groundwater to the groundwater system.	Contractor	Detailed design
	GW03	The potential for detention basins and water quality basins to intercept groundwater will be considered, and if identified as a potential impact, the detailed design will demonstrate how it has managed the impact.	Contractor	Detailed design
Air quality				

Issue	ID no.	Environmental management measure	Responsibility	Timing
Air quality management	AQ01	The Construction Environmental Management Plan will include a strategy to manage air quality during construction. It will include, but not be limited to: ▪ Air quality and dust management objectives ▪ Potential sources and impacts of dust, identifying all dust-sensitive receptors ▪ Mitigation measures to minimise dust impact, such as the use of water carts to suppress dust, stabilisation of exposed soils, covering trucks transporting loose material, and stopping dust generating activities during windy conditions ▪ A monitoring program to assess compliance with the identified objectives ▪ Contingency plans to be implemented in the event of non-compliances and / or complaints about dust ▪ <i>Reporting on the use and performance of off-road diesel plant and equipment.</i>	Contractor	Construction
Greenhouse gas				
Greenhouse gas emission reductions	GH01	The procurement strategy developed for the construction phase will demonstrate value for money and that it has considered opportunities to procure goods and services: ▪ From local suppliers ▪ That are energy efficient or have low embodied energy ▪ That minimise the generation of waste ▪ That make use of recycled materials.	Contractor	Construction
Waste				
Inappropriate handling and / or disposal of waste	WM01	A Resource and Waste Management Plan will be prepared to identify the hierarchy for sourcing and the use of resources. The plan will adopt the Resource Management Hierarchy principles of the <i>Waste Avoidance and Resource Recovery Act 2001</i>, Roads and Maritime Services waste management procedures and Environmental Management System. The plan will include, but not be limited to: ▪ Identification of the waste stream that will be generated during construction ▪ A waste register detailing types of waste collected, amounts, date, time, transportation method and details of disposal ▪ A resource management strategy detailing beneficial reuse options for surplus and / or unsuitable material ▪ Consideration of procurement strategies to minimise unnecessary consumption of materials and waste generation in accordance with NSW Government Code of Practice for Procurement and Implementation Guidelines and guidelines.	Contractor	Construction

The Department of Planning and Environment will consider the responses to submissions and design refinements described in this submissions and preferred infrastructure report during its assessment of the Albion Park Rail bypass. The Secretary will prepare the Secretary's assessment report in accordance with section 115ZA of the *Environmental Planning and Assessment Act 1979*. The Minister for Planning will then decide whether or not to approve the project and identify any conditions of approval that would apply. If approved, Roads and Maritime will continue to consult with community members, government agencies and other stakeholders during the detailed design and construction phases of the Albion Park Rail bypass.

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