Roads & Maritime

Mona Vale Road East upgrade – Manor Road, Ingleside to Foley Street, Mona Vale

Submissions Report

December 2015

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Roads and Maritime Services

Mona Vale Road East Upgrade

Submissions report
December 2015

Prepared by SMEC Australia Pty Ltd
RMS 15.647

Document tracking

Revision	Details	Date	Prepared	Approved
1-0	Draft 1 Submissions Report	10.11.2015	C. McCallig	A. Louis
2-0	Final Draft Submissions Report	27.11.2015	C. McCallig	A. Louis
3-0	Final Submissions Report	01.12.2015	C. McCallig	A. Louis
4-0	For Roads and Maritime website	11.12.2015	C. McCallig	A. Louis

Executive summary

NSW Roads and Maritime Services (Roads and Maritime) propose to upgrade and widen about 3.2 kilometres of Mona Vale Road between Manor Road / Lane Cove Road, Ingleside and Foley Street, Mona Vale (Mona Vale Road East Upgrade) (the proposal). The upgrade would be from a two lane (one in each direction) undivided road to a four lane (two lanes in each direction) divided road.

The main features of the proposal are as outlined in the Review of Environmental Factors (REF). Changes to the design are outlined in Section 1.2 (**Figures 1-1 – 1-6**) and Section 4 of this report.

The REF was publically displayed between 29 July 2015 and 28 August 2015 at Mona Vale and Avalon Beach libraries and on the Roads and Maritime website.

Roads and Maritime received 156 submissions in response to the REF including four government agencies (Pittwater Council, Katandra Bushland Sanctuary Trust, Shore Regional Organisation of Councils, Northern Beaches Health Promotion).

Of the 156 submissions received, seven submissions were in support of the proposal. The remaining 149 submissions did not oppose the proposal however did not support one or more elements of the proposal.

The main comments made by the respondents related to:

- Changing the Emma Street intersection to left turn in and left turn out only
- Location of truck arrester bed, about 150 metres long, for eastbound vehicles adjacent to Walana Crescent
- The extent of fauna connectivity offered by the proposed duplication of an existing culvert at the end of Lane Cove Road near Narrabeen Creek
- Changing the posted speed limit from 70 km/h to 80 km/h once the proposal and the Mona Vale Road West upgrade have been completed
- Implementing a 60 km/h truck and bus speed limit for the downhill descent from near Ingleside Road to base of the escarpment
- The left-turn lane from Mona Vale Road into Samuel Street as part of the proposed widening and upgrade to the intersection of Ponderosa Parade and Samuel Street
- Changes to Samuel Street including installing a concrete median
- The extent of facilities the proposal provides for cyclists (on road and off road) and horse ridiers
- Property impacts including access and partial acquisition
- Environmental mitigation measures for potential impacts to local water quality, visual amenity and biodiversity values
- Road traffic noise impacts and extent of mitigation proposed.

In response to the comments made, four changes to the proposal described in the REF have been made. These are:

- A revised layout of the Mona Vale Road and Emma Street intersection to provide a channelised right turn bay in the median for right turns into Emma Street and the allowance of right turns from Emma Street to Mona Vale Road.
- A revised lane configuration of the Mona Vale Road / Ponderosa Parade / Samuel Street intersection to remove the left turn slip lane from Mona Vale Road into Samuel Street of the intersection
- Shortening of the Samuel Street concrete median to improve property access near the Mona Vale Road intersection
- A revised location for the truck arrester bed, about 300 metres further west on Mona Vale Road (refer to **Figure 4-1**). The design change moves the proposed truck arrester bed away from residential properties on Walana Crescent / Wallaby Circuit and the Mona Vale General Cemetery
- Alternate alignment for the off road shared path between Lane Cove Road and Mona Vale Road in order to avoid the Katandra Bushland Sanctuary.

In light of changes to the proposal since the public display of the REF, additional assessments were carried out for traffic and transport, and noise and vibration (refer to **Appendix A** and **B** of this report).

After consideration of the matters raised in the public submissions and changes to the proposal, the management and mitigation measures have also been revised to include some additional measures. Additional management measures are shown in red in **Table 5-1** of this report.

Contents

Appendices

1 Introduction and background

1.1 Purpose

This submissions report relates to the review of environmental factors (REF) prepared for the Mona Vale Road East upgrade and should be read in conjunction with that document.

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

1.2 The proposal

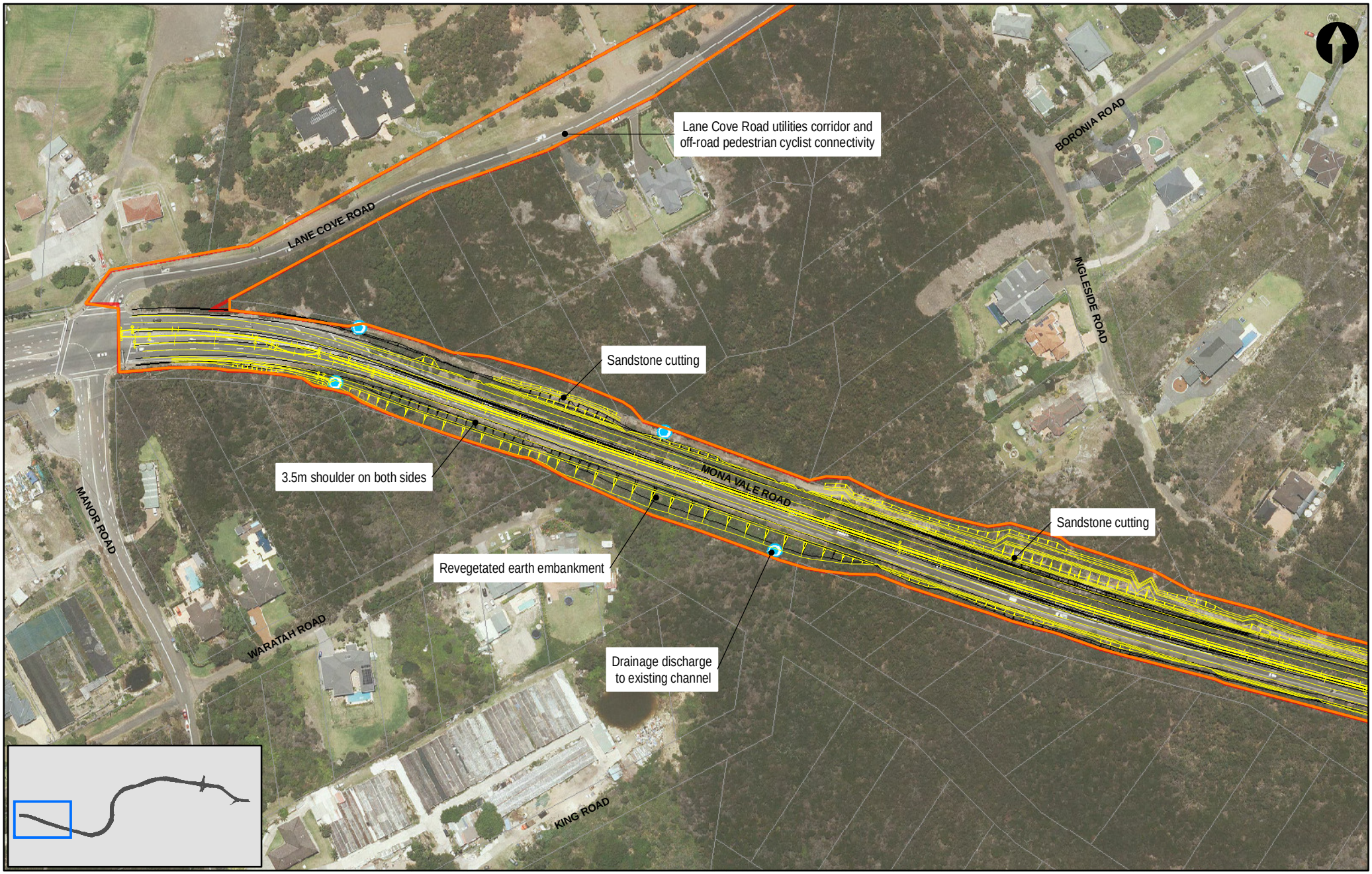
Mona Vale Road is the main east–west link between the Pacific Highway, Pymble and Pittwater Road at Mona Vale totalling about 20 kilometres in length and carrying about 22,000 vehicles per day approaching Mona Vale.

Roads and Maritime propose to upgrade and widen about 3.2 kilometres of Mona Vale Road between Manor Road / Lane Cove Road, Ingleside and Foley Street, Mona Vale (Mona Vale Road East Upgrade) (the proposal). The proposal would upgrade this section of Mona Vale Road from a two lane (one in each direction) undivided road to a four lane (two lanes in each direction) divided road. The proposal, as described in the REF, includes:

- Widening to provide an additional two traffic lanes (one in each direction) on Mona Vale Road between Manor Road / Lane Cove Road and Foley Street
- Construction of six fill retaining walls up to six metres in height
- Construction of five cuttings up to 16 metres in height
- Provision of a central concrete safety barrier east of Manor Road to west of Daydream Street
- Provision of three metre wide shoulders between Manor Road / Lane Cove Road and Samuel Street / Ponderosa Parade to provide a vehicle breakdown area clear of general traffic and provide on-road cyclists with a wider cycle lane
- Upgrade of the existing pavement and cross drainage systems including the construction, reconstruction and extension of pavement drainage lines
- Provision of a truck arrester bed, about 150 metres long, for eastbound vehicles adjacent to Walana Crescent
- Widening and upgrade to the intersection of Ponderosa Parade and Samuel Street including the provision of new traffic lights and signalised pedestrian crossings on all legs
- Provision of bus priority lanes along Mona Vale Road on the approaches to and departures from the intersection of Ponderosa Parade and Samuel Street

- Relocation of the eastbound bus stop along Mona Vale Road adjacent to the Ponderosa Parade / Samuel Street intersection further east to departure side of the intersection
- Changing the Emma Street intersection to left turn in and left turn out only
- Upgrading and widening the existing signalised T-intersection at Foley Street and Mona Vale Road to provide a westbound left turn lane into Foley Street and a westbound left turn lane out of Foley Street
- Provision of a three metre wide multi-use path along the southern side of Mona Vale Road between Ponderosa Parade and Foley Street for pedestrians and cyclists
- Provision of off-road pedestrian cyclist connectivity away from the Mona Vale Road corridor due to the steep descent from the Warriewood Escarpment. Connectivity would be provided via path along Lane Cove Road linking to Mona Vale Road near Walana Crescent
- Duplication of an existing culvert to provide fauna connectivity at the end of Lane Cove Road near Narrabeen Creek
- Changing the posted speed limit from 70 km/h to 80 km/h once both the proposal and the Mona Vale Road West upgrade have been completed
- Implementing a 60 km/h truck and bus speed limit for the downhill descent from near Ingleside Road to the base of the escarpment
- Establishment of temporary site compounds and stockpiles during construction
- Landscaping over the length of the proposal
- Installing traffic monitoring cameras at all signalised intersections to assist with traffic management
- Undertaking utility relocations where required and providing a utility corridor away from Mona Vale Road along Lane Cove Road.

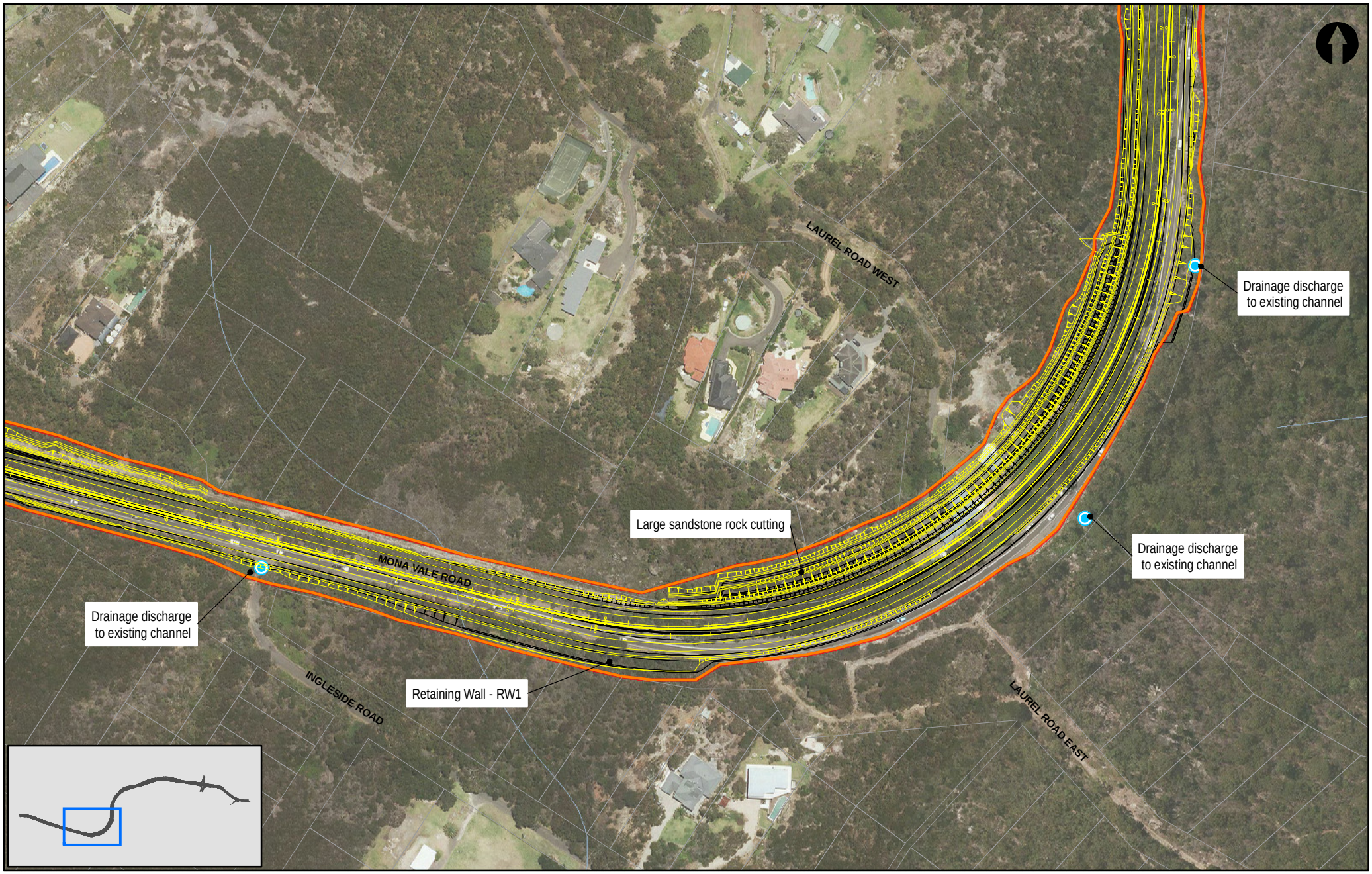
Figures 1-1 to 1-6 show the key features of the proposal including the changes made as a result of feedback received from the display of the REF and proposed concept design. A description of the design changes proposed in response to submissions is provided in Section 4 of this report.



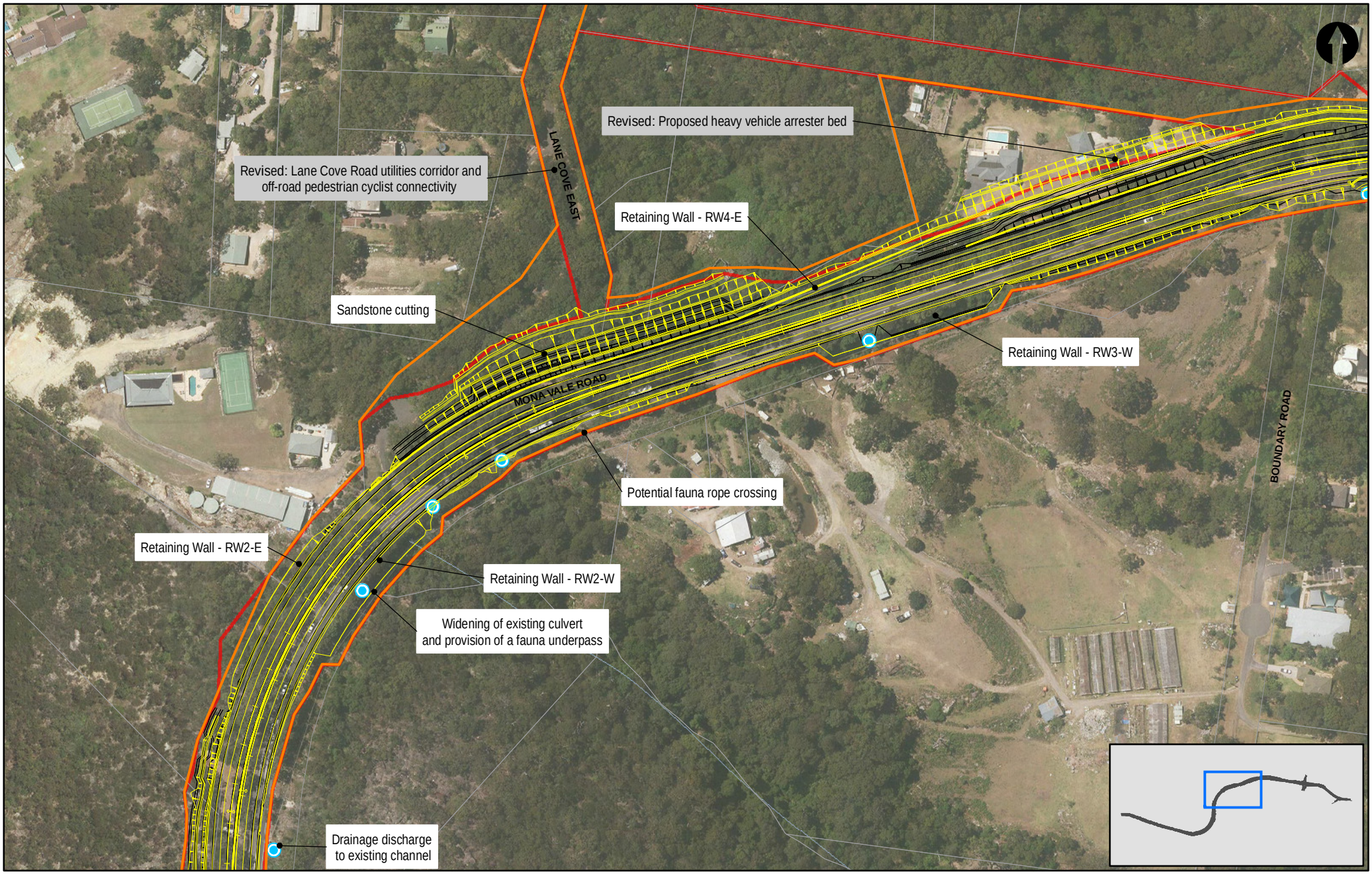
DRAINAGE OUTLETS
NEW CONSTRUCTION BOUNDARY
NEW ROAD DESIGN
ROAD DESIGN
PROPERTY BOUNDARIES
CONSTRUCTION IMPACT AREA

Key features of the proposal **Fig. 1-1**

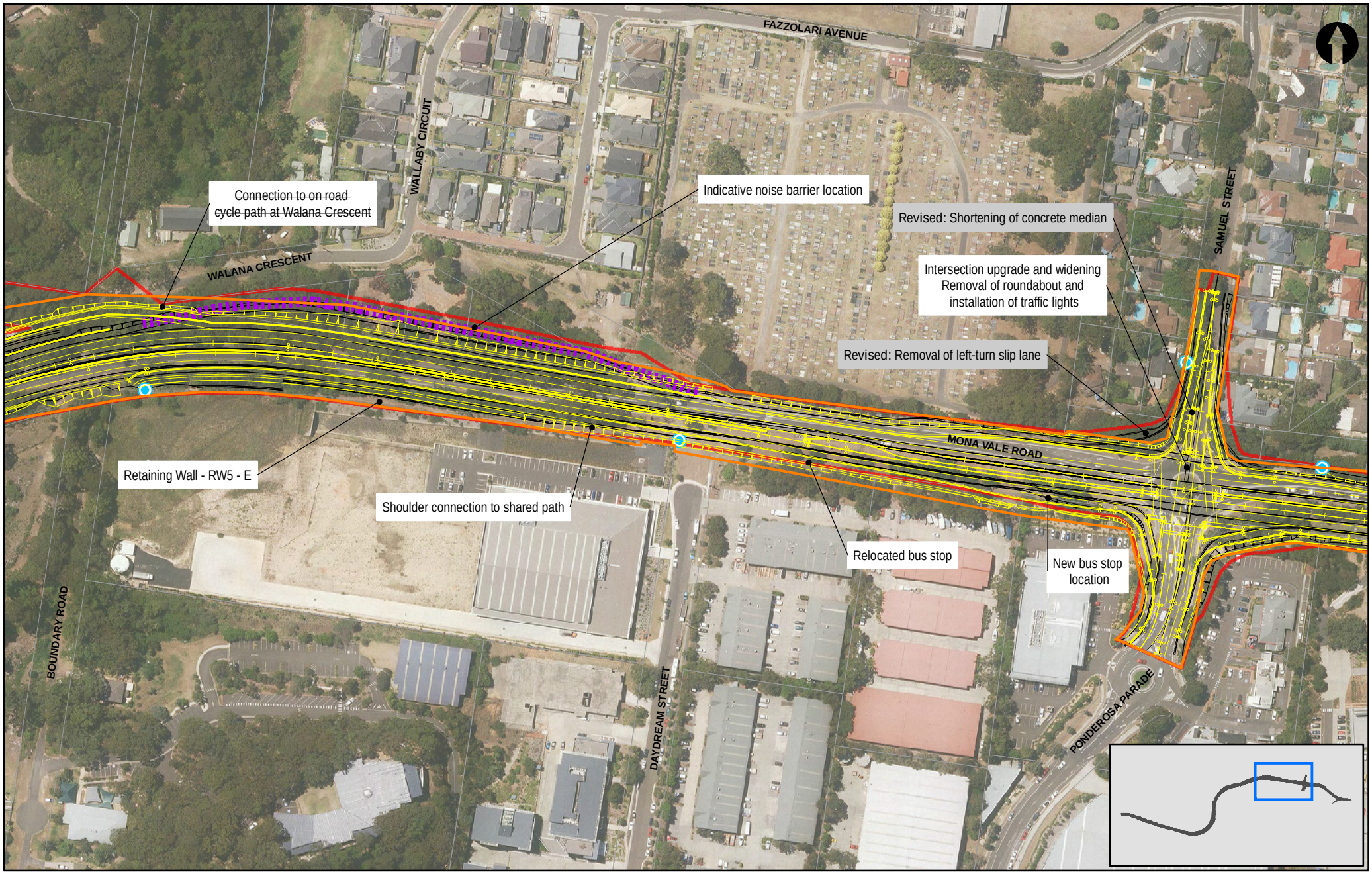
0 50 100 m



Key features of the proposal **Fig. 1-2**



Key features of the proposal **Fig. 1-3**



DRAINAGE OUTLETS
NEW CONSTRUCTION BOUNDARY
NEW ROAD DESIGN
INDICATIVE NOISE BARRIER
ROAD DESIGN
PROPERTY BOUNDARIES
CONSTRUCTION IMPACT AREA

Key features of the proposal **Fig. 1-4**

0 50 100 m

DRAINAGE OUTLETS
NEW CONSTRUCTION BOUNDARY
NEW ROAD DESIGN
ROAD DESIGN
PROPERTY BOUNDARIES
CONSTRUCTION IMPACT AREA

Key features of the proposal **Fig. 1-5**

0 50 100 m

NEW CONSTRUCTION BOUNDARY
NEW ROAD DESIGN
DRAINAGE OUTLETS
ROAD DESIGN
PROPERTY BOUNDARIES
CONSTRUCTION IMPACT AREA

Key features of the proposal **Fig. 1-6**

0 50 100 m

1.3 REF display

Roads and Maritime prepared a review of environmental factors (REF) to assess the environmental impacts of the proposed works. The REF was publicly displayed between 29 July 2015 and 28 August 2015 at Mona Vale and Avalon Beach libraries and on the Roads and Maritime website, as detailed in Table 1.1.

Table 1.1: Display locations

Location	Address
Mona Vale Library	1 Park Street, Mona Vale
Avalon Community Library	59a Old Barrenjoey Road, Avalon

The community and stakeholders were encouraged to provide their feedback to the project team via mail, email or phone.

The table below provides details on the communication and consultation tools used for the Mona Vale Road East REF display.

Table 1.2: Consultation for the Mona Vale Road West REF

Consultation tool or channel	Description
Local media/Newspaper advertisements	Press advertisements were placed in the Manly Daily to raise awareness of the consultation for Mona Vale Road East and the two community information sessions.
Community update newsletters	A community updates for Mona Vale Road East was distributed to 8,500 residents and businesses within the suburbs of Terrey Hills, Ingleside, Warriewood, Elanora Heights and Mona Vale from 29 July. The updates were also published on the Roads and Maritime website.
Video animation	A video fly-through of the proposed road upgrades for Mona Vale Road East and Mona Vale Road West was developed and made available at the community information sessions to help the community to clearly visualise the proposed road upgrades. The video was also published on the project web page or can be found using the following link http://www.media-server.com/m/go/MonaValeRoad_upgrade/ftag/hq1
Web page	The project web page included the community update, information on the community information sessions and a video animation and survey.
Community information sessions	Two community information sessions were held on: • Saturday 8 August, 10am to midday, Mona Vale Memorial Hall (Main Hall), Mona Vale • Monday 10 August, 5pm to 7pm, Mona Vale Memorial Hall (Main Hall), Mona Vale.

Consultation tool or channel	Description
	The information sessions provided local residents with the opportunity to speak with the project team as well as representatives from other invited key stakeholders. The sessions attracted about 100 members of the public.
Stakeholder briefings	Roads and Maritime held meetings with key stakeholders about the proposed road upgrade for Mona Vale Road East and potential impacts.
Door knocking	Roads and Maritime door knocked directly impacted residents and businesses about the proposed road upgrade for Mona Vale Road East, potential impacts and to answer any questions.

2 Response to matters

Roads and Maritime received 156 submissions, accepted up until the end of August 2015 **Table 2.1** lists the respondents and each respondent's allocated submission number. The table also indicates where the matters from each submission have been addressed in this report.

Table 2.1: Respondents

Respondent	Submission No.	Section number where matters are addressed
Individual	1	2.7.1, 2.7.2, 2.11
Individual	2	2.7.1, 2.10
Individual	3	2.7.1, 2.11, 2.12.1
Individual	4	2.3.1, 2.7.1, 2.7.2, 2.10, 2.11
Individual	5	2.7.1
Individual	6	2.7.1
Individual	7	2.3
Individual	8	2.3.2, 2.7.1, 2.11
Individual	9	2.7.2
Individual	10	2.3.1
Individual	11	2.5, 2.11
Individual	12	2.7.1,
Individual	13	2.7.1
Individual	14	2.7.1
Individual	15	2.3.2, 2.5, 2.10, 2.11, 2.12.1, 2.12.2
Individual	16	2.7.1
Individual	17	2.3.1
Individual	18	2.3.2, 2.7.1, 2.7.2
Individual	19	2.3.2, 2.7.1, 2.11, 2.12.1
Northern Beaches Health Promotion	20	2.3.1
Individual	21	2.3.1, 2.3.2, 2.7.2
Individual	22	2.3.1
Individual	23	2.3.1
Individual	24	2.7.1
Individual	25	2.7.1
Individual	26	2.3.1
Individual	27	2.3.1
Individual	28	2.3.1
Individual	29	2.3.2, 2.7.1, 2.7.2
Individual	30	2.4
Individual	31	2.12.3
Livpac Developments	32	2.3.1
CBS Foodtech	33	2.3.1
Individual	34	2.5, 2.6, 2.10
Individual	35	2.7.2
Individual	36	2.3.1, 2.3.2, 2.10, 2.11
Individual	37	2.12.3
Individual	38	2.3.1
Individual	39	2.7.1
Individual	40	2.3.5, 2.7.2

Respondent	Submission No.	Section number where matters are addressed
Individual	41	2.2
Individual	42	2.12.1
Individual	43	2.3.1
Individual	44	2.3.1
Individual	45	2.7.1, 2.7.2
Individual	46	2.3.1
Individual	47	2.7.1
Individual	48	2.7.1
Individual	49	2.5
Individual	50	2.3.1, 2.4, 2.7.1, 2.7.2, 2.11
Individual	51	2.7.1
Harvest Seeds Native Plants	52	2.5
Trail Care Inc	53	2.12.3
Individual	54	2.12.3
Individual	55	2.12.3
Individual	56	2.3.2, 2.5,2.10, 2.11
Individual	57	2.7.1
Individual	58	2.3.3, 2.6, 2.7.1
Individual	59	2.5, 2.6
Individual	60	2.12.3
Individual	61	2.3.1, 2.7.1
Sydney MTB Riders (Club) Inc	62	2.12.3
Individual	63	2.12.3
Individual	64	2.12.3
Individual	65	2.3.1, 2.3.2, 2.4, 2.7.1, 2.7.2, 2.11
Individual	66	2.3.1, 2.7.1, 2.7.2, 2.10, 2.11
Individual	67	2.3.1, 2.7.1, 2.7.2, 2.10, 2.11
Individual	68	2.5
Individual	69	2.3.1, 2.7.1
Individual	70	2.12.3
Individual	71	2.12.3
Sydney Wildlife	72	2.5, 2.6
Wildlife Roadkill Prevention Association	73	2.6
Individual	74	2.5
Katandra Bushland Sanctuary Trust	75	2.3.5, 2.5
Individual	76	2.5
Individual	77	2.5, 2.6
Individual	78	2.5
Individual	79	2.5
Individual	80	2.4, 2.7.1
Individual	81	2.7.1
Individual	82	2.12.3
Individual	83	2.2, 2.3.1, 2.3.2, 2.5, 2.11, 2.12.3, 2.13
Individual	84	2.12.3
Individual	85	2.12.3
Individual	86	2.5

Respondent	Submission No.	Section number where matters are addressed
Individual	87	2.12.3
Individual	88	2.5
Individual	89	2.7.1
Individual	90	2.5
Individual	91	2.12.3
Individual	92	2.12.3
Individual	93	2.12.3
Individual	94	2.12.3
Individual	95	2.12.3
Individual	96	2.12.3
Individual	97	2.3.1, 2.5, 2.6
Individual	98	2.12.3
Blackmores	99	2.3.4, 2.3.5. 2.10, 2.12.1, 2.12.2
Garigal Landcare	100	2.5
Individual	101	2.12.3
Individual	102	2.12.3
Individual	103	2.12.3
Individual	104	2.12.3
Individual	105	2.3.4, 2.5
Duffy Forest Residents Association Inc	106	2.5, 2.8, 2.10
Individual	107	2.7.1
Pittwater Council	108	2.3.1, 2.3.5, 2.5, 2.6, 2.7.1, 2.7.3, 2.9, 2.11, 2.12.2, 2.13
Individual	109	2.12.3
Individual	110	2.5
Individual	111	2.3.1
North Shore Horse and Pony Association	112	2.12.3
Individual	113	2.7.1
Individual	114	2.5
Individual	115	2.5
Shore Regional Organisation of Councils	116	2.3.1, 2.12.3, 2.13
Pittwater Natural Heritage Association	117	2.5
Individual	118	2.3.3, 2.5, 2.11, 2.12.1
Individual	119	2.7.1
Individual	120	2.5, 2.6
Individual	121	2.5, 2.6
Individual	122	2.3.1, 2.3.2, 2.6, 2.7.1
Individual	123	2.3.1, 2.7.1, 2.7.2, 2.11
Individual	124	2.5
Individual	125	2.5
Individual	126	2.3.1, 2.4, 2.7.1, 2.7.2, 2.11
Individual	127	2.12.3
Individual	128	2.3.1, 2.7.1, 2.7.2

Respondent	Submission No.	Section number where matters are addressed
Individual	129	2.5
Individual	130	2.12.3
Individual	131	2.12.1
Individual	132	2.7.1
Individual	133	2.12.3
Individual	134	2.3.1, 2.3.2, 2.4, 2.7.1, 2.11, 2.12.1
Individual	135	2.3.1, 2.7.1, 2.7.2
Individual	136	2.3.1, 2.7.1, 2.7.2
Mona Vale Residents Association	137	2.3.1, 2.3.2, 2.3.5, 2.5, 2.7.1, 2.9, 2.10, 2.12.3
Individual	138	2.2, 2.3.1, 2.3.2, 2.5, 2.7.1, 2.10, 2.13
Individual	139	2.3.1, 2.7.1, 2.7.2
Individual	140	2.3.1, 2.7.1, 2.7.2
Individual	141	2.3.1, 2.7.1, 2.7.2
Individual	142	2.3.1, 2.7.1, 2.7.2
Individual	143	2.3.1, 2.7.1, 2.7.2
Individual	144	2.3.1, 2.7.1, 2.7.2
Individual	145	2.3.1, 2.7.1, 2.7.2
Individual	146	2.3.1, 2.7.1, 2.7.2
Individual	147	2.3.1, 2.7.1, 2.7.2
Individual	148	2.3.1, 2.7.1, 2.7.2
Individual	149	2.3.1, 2.7.1, 2.7.2
Individual	150	2.3.1, 2.7.1, 2.7.2
Individual	151	2.3.1, 2.7.1, 2.7.2
Individual	152	2.3.1, 2.7.1, 2.7.2
Individual	153	2.3.1, 2.7.1, 2.7.2
Individual	154	2.3.1, 2.7.1, 2.7.2
Individual	155	2.3.1, 2.7.1, 2.7.2
Individual	156	2.3.1, 2.7.1, 2.7.2

2.1 Overview of matters raised

A total of 156 submissions were received by Roads and Maritime in response to the display of the environmental assessment including four from government agencies and 152 from the community, as both groups and individuals.

Each submission has been examined individually to understand the matters being raised. The matters raised in each submission have been extracted and collated, and corresponding responses to the matters have been provided. Where similar matters have been raised in different submissions, only one response has been provided. The matters raised and Roads and Maritime response to these comments form the basis of this chapter.

Of the 156 submissions received, seven submissions were in support of the proposal. The remaining 149 submissions did not oppose the proposal however did not support one or more elements of the proposal.

2.1.1 Government submissions

Roads and Maritime received submissions from the following Government agencies:

- Katandra Bushland Sanctuary Trust
- Pittwater Council
- Shore Regional Organisation of Councils
- Northern Beaches Health Promotion.

Katandra Bushland Sanctuary Trust

Katandra Bushland Sanctuary Trust (the Trust) has responsibility for the management of Katandra Bushland Sanctuary, a Crown Reserve situated on the Ingleside/Warriewood escarpment which is administered by the Department of Lands.

The Trust raised two concerns regarding aspects of the proposal as outlined below:

- The lack of adequate provision for fauna crossings across Mona Vale Road East near Lane Cove Road
- The route of the proposed shared pedestrian / cycle pathway ("paper road") down Foley's Hill.

Pittwater Council

The proposal is within the Pittwater local government area (LGA). Pittwater Council provided a submission with comments regarding several aspects of the proposal. The submission expressed support for both the Mona Vale East upgrade and the proposed Mona Vale Road West upgrade. Detailed comments for consideration provided within the submission included:

- The need to complete the full upgrade of the whole of Mona Vale Road to dual carriageway – East as well as West
- Provision for active travel / transport
- Enabling and facilitating fast public transport
- Importance of the full Mona Vale Road upgrade to the feasibility and viability of the Ingleside Precinct Planning project
- Commitment to and guarantee of funding for the detail design and construction phases for Mona Vale Road upgrade
- Impacts to biodiversity, specifically loss of vegetation, fauna connectivity, edge effects including water quality and weed management, species preservation (Angus' Onion Orchid), and biobanking opportunities
- Management of traffic and transport across the region during construction
- Residual traffic impacts on Powder Works Road
- Deteriorating performance at the intersection of Mona Vale Road and Pittwater Road – upgrades to improve performance should be included
- Truck speed as they descend into Mona Vale
- Impacts on Mona Vale Cemetery

- Impacts on heritage items (existing and potential)

Shore Regional Organisation of Councils

Shore Regional Organisation of Councils (SHOROC) is a partnership of Manly, Mosman, Pittwater and Warringah councils led by a Board of the council Mayors and General Managers.

Roads and Maritime received a submission from SHOROC expressing support for both the Mona Vale Road East upgrade and the proposed Mona Vale West upgrade. Comments within the SHOROC submission for Roads and Maritime consideration included:

- Details requested on the construction program for the proposal and Mona Vale West upgrade proposal
- Direct express bus services should be provided on the Mona Vale Road corridor between Mona Vale and Macquarie Park to encourage a greater use of public transport and ease congestion on this corridor. Furthermore provision should be made for the future implementation of a Bus Rapid Transit service on this route
- Enabling and encouraging active transport (walking and cycling) across the region including on this major route is a priority. As such every effort should be made to maximise walking and cycling connections and encourage active transport use
- Concurrent to the construction timetable for this proposal could also be construction of on-road infrastructure for the Pittwater / Spit / Military Road Bus Rapid Transit, increased traffic due to the Northern Beaches Hospital construction, the Northern Beaches Hospital Road Connectivity and Network Enhancement Project, and other impacts including major construction in the CBD. Management of traffic and public transport across the region during this time, not just locally, to minimise the cumulative impact on travel times and congestion will be required. Alternative arrangements such as increased express bus services, more direct bus services to the ferries, encouraging commuters to adapt their travel times and other opportunities should be explored from a regional transport planning basis in conjunction with SHOROC and councils.

Northern Beaches Health Promotion (part of Northern Sydney Health Promotion)

The Northern Sydney Health Promotion is part of the Northern Sydney Local Health District (Health NSW) with units located across Northern Sydney including Northern Beaches.

Roads and Maritime received a submission from the Northern Beaches Health Promotion containing comments for consideration as follows:

- Supports the enhancement of cyclist and pedestrian safety and connectivity, which will also allow Mona Vale Road to operate as a regional cycle route and is consistent with the Pittwater Walks and Rides Masterplan. Requests the shared path is sufficiently lit at night time
- Supports additional bus services and requests that sufficient park and ride facilities are provided at Mona Vale to cater for both north- south and east-west public transport commuters (including secure bike parking facilities)

- Car-pooling should be encouraged on Mona Vale Road to reduce peak period congestion. To promote this it is recommended that the feasibility of a transit lane (T2) operating during peak periods be investigated.

2.1.2 Community group and business submissions

Several community groups and private businesses provided submissions to Roads and Maritime on the proposal. Submissions were received from:

- Harvest Seeds Native Plants
- Trail Care Incorporated
- Sydney Mountain Bike Riders (Club) Incorporated
- Sydney Wildlife
- Wildlife Roadkill Prevention Association
- Specialised Bicycle Components
- Blackmores
- Garigal Landcare
- Duffys Forest Residents Association
- Belrose Rural Community Association
- North Shore Horse and Pony Association
- Pittwater Natural Heritage Association
- Belrose Rural Community Association
- Mona Vale Residents Association

The submissions received from the above community groups and businesses contained comments for consideration on the following aspects of the proposal:

- Tree / plant retrieval following any tree removal undertaken as part of the proposal
- Provisions for mountain bikers to access Ingleside Reserve
- Management of water quality within local creeks and weed management during construction and operation of the proposal
- Potential impacts to biodiversity including tree removal and fauna connectivity between Katandra Bushland Sanctuary and Ingleside Reserve
- Potential property and access impacts associated with widening of Mona Vale Road
- Potential for increased road kill as a result of the proposal
- Include provision for horse-riding linking to the proposed Mona Vale West upgrade and facilities for horses crossing Mona Vale Road
- Changing the Emma Street intersection to left turn in and left turn out only and potential for increased traffic on alternate routes
- Proposed location of truck arrester bed

- Changes to posted speed on Mona Vale Road and speed enforcement
- Changes at intersection of Mona Vale Road and Samuel Street.

2.1.3 Individual submissions

Roads and Maritime received 138 submissions from individual members of the community, 20 of which were signatories on petitions. The main elements of the proposal that were raised in these submissions include:

- Changing the Emma Street intersection to left turn in and left turn out only
- Location of truck arrester bed, about 150 metres long, for eastbound vehicles adjacent to Walana Crescent
- The extent of fauna connectivity offered by the proposed duplication of an existing culvert at the end of Lane Cove Road near Narrabeen Creek
- Changing the posted speed limit from 70 km/h to 80 km/h once both the proposal and the Mona Vale Road West upgrade have been completed
- Implementing a 60 km/h truck and bus speed limit for the downhill descent from near Ingleside Road to base of the escarpment
- The left-turn lane from Mona Vale Road into Samuel Street as part of the proposed widening and upgrade to the intersection of Ponderosa Parade and Samuel Street
- Changes to Samuel Street including installation of concrete median
- The extent the proposal provides for cyclists (on road and off road) and horse riding
- Property impacts including access and partial acquisition
- Environmental mitigation measures for potential impacts to local water quality, visual amenity and biodiversity values
- Road traffic noise impacts and extent of mitigation proposed.

2.2 Alternatives and options considered

Submission numbers

41, 83, 138

Matter description

Submissions received addressed alternatives and options considered in the development of the proposal, specifically:

1) Preference for a metropolitan rail system that extends to Northern Beaches rather than current reliance on buses or cars (both road based transportation)
2) Support for an offline option (sub-option 3B) with a separated / divided alignment on the steep climbing section of the proposal as this would provide safety benefits and travel time savings.
3) The upgrade of Mona Vale Road should be on the alignment of the original Mona Vale Road corridor, designed by the County of Cumberland Planning Scheme 1948, and later abandoned by Premier Greiner and Local Member Longley. This original corridor is on easy grades from Lane Cove Road (east) to Terrey Hills.

Response

1) There are no current plans to provide a train service to the Northern Beaches. The proposal is aimed at supporting urban growth, reducing travel times, improving congestion, improving connectivity and improving road safety along Mona Vale Road. Further, the provision of a rail service to the Northern Beaches is not considered in the *NSW Long Term Transport Master Plan*.
2) The evaluation of sub options, as outlined in section 2.6 of the REF focused on constructability, extent of the construction footprint, environmental impacts and value for money. It identified that for sub-option 3B traffic switches between the carriageways would allow most construction to occur away from live traffic which would provide a benefit however there is a risk of adverse geotechnical conditions being present leading to the need for major stabilisation work and property acquisition. On balance sub-option 3B was not selected as the preferred option.
3) Two strategic options were considered for the proposal:

    - Deviate from the existing alignment
    - Upgrade along the existing alignment.

    The strategic option to deviate from the existing road alignment would provide a new westbound carriageway to the south of the current alignment while maintaining the existing Mona Vale Road alignment for eastbound traffic. This option included the following features:

    - Locating 2.4 kilometres of the westbound carriageway from Boundary Street to just east of Manor Road to the south of the existing alignment
    - Providing two lanes westbound and two lanes eastbound
    - Rehabilitation of the existing eastbound carriageway including drainage upgrades and stabilisation of existing rock cuttings
    - Provision of a culvert at the eastern end of Lane Cove Road to provide a fauna crossing.

    The strategic option to provide a new westbound carriageway to the south of the current alignment was not progressed for the following reasons:

    - The proposed realigned carriageway to the south would have significant impacts on biodiversity as it requires the clearing of approximately 5.5 hectares of vegetation primarily in the Ingleside Chase Reserve. This includes significant impacts on the habitat of the Eastern Pygmy Possum which is listed under the *NSW Threatened Species Conservation Act 1995* as being vulnerable
    - The proposal would require the construction of two bridges and four retaining walls
    - At least three cuttings into the existing landform, up to six metres high, would be required
    - The realigned westbound carriageway would impact on about 25 properties causing significant social impacts
    - Significant utility adjustments would be required including high voltage electricity infrastructure

- New stormwater drainage infrastructure would have to be constructed to service the new westbound carriageway
- The land between the existing and proposed new carriageway would become isolated, significantly impacting on the integrity of the Ingleside Nature Reserve and limiting alternative land use
- The visual impacts of the new westbound carriageway would be significant.

It was essential that options considered for the proposal was within or proximal to the existing road corridor to enable a tie in to Mona Vale Road at both the western and eastern extents of the proposal.

2.3 Description of the proposal

2.3.1 The proposal

Submission numbers

4, 7, 10, 17, Northern Beaches Hospital Promotion (20), 21, 22, 23, 26, 27, 28, 32, 33, 36, 38, 43, 44, 46, 50, 61, 65, 66, 67, 69, 83, 97, Pittwater Council (108), 111, Shore Regional Organisation of Councils (116), 122, 123, 126, 128, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156

Issue description

Submissions received addressed various aspects of the proposal including:

1) Widening to provide an additional two traffic lanes on Mona Vale Road between Manor Road and Foley Street.
2) Provision of a three metre wide shared path along the southern side of Mona Vale Road between Ponderosa Parade and Foley Street.
3) Changing the posted speed limit from 70 km/h to 80 km/h once both the proposal and the Mona Vale Road West upgrade have been completed.
4) Implementing a 60 km/h truck and bus speed limit for the downhill descent from near Ingleside Road to the base of the escarpment.

In summary, the respondents raised the following matters:

1) Many respondents commented that the proposal should extend further west than Manor Road. The main areas referenced were Terrey Hills, Belrose Junction (Forest Way), Bahai Temple Way, Powder Works Road, Chiltern Road, Lane Cove Road and Manor Road.
2) An upgrade to the intersection of Mona Vale Road and Oliver Way was sought particularly with changes proposed at Emma Street intersection.
3) Respondents commented that the Mona Vale Road and Daydream Street intersection should be re-opened.
4) Fast and reliable public transport should be a priority for the Northern Beaches including Pittwater. There should be a focus on facilitating the introduction of rapid bus transit in the future to encourage greater use of public transport which would ease congestion on Mona Vale Road. In the meantime dedicated bus lanes should be provided on Mona Vale Road. Car-pooling should be encouraged with the introduction of transit lane (T2) operating during peak periods on Mona Vale Road.

5) Consideration should be given to extending the proposed shared path further west up the Mona Vale Road. Clarification was sought regarding on road cycling provisions particularly between Ponderosa Parade and Samuel Street intersection and Foley Street. The importance of providing for active transport options within Pittwater local government area was emphasised by Council.
6) The proposed increase in posted speed from 70 km/h to 80 km/h was not supported by some respondents due to potential property access constraints, poor site distances, crash history, and pedestrian / cyclist safety. Similarly, the proposed posted speed of 60 km/h for heavy vehicles is considered too high given the crash history on that part of Mona Vale Road. Enforcement of posted speed (with speed and red light cameras) and installation of appropriate road safety signs should be included in the proposal.
7) An additional slow lane for heavy vehicles (in both directions) should be considered as part of the proposal.
8) The timing and staging of Mona Vale Road West upgrade is unclear. The full benefits of the Mona Vale Road East upgrade will be realised only when Mona Vale Road West upgrade is completed. Both projects should be constructed within a similar timeframe. Some respondents suggested that the Mona Vale Road West Upgrade should proceed in advance of Mona Vale Road East.

Response

1) The proposal is stage two of a broader upgrade of Mona Vale Road between Terrey Hills and Mona Vale. Stage one involved improving the Mona Vale Road / Ponderosa Parade / Samuel Street intersection at Mona Vale and was completed in late 2014. Stage three is the Mona Vale Road West upgrade which involves upgrading 3.2 kilometres of Mona Vale Road from two lanes to four lanes between McCarrs Creek Road, Terrey Hills and Powder Works Road, Ingleside. The Mona Vale Road West upgrade will be the subject of a separate environmental impact assessment that is currently being prepared.
2) Roads and Maritime has re-designed the Emma Street intersection to enable right turn movements into and out of Emma Street. This design change means that other intersections such as Oliver Way will not be required as an alternative route and therefore traffic movements at the Oliver Way intersection are not expected to increase as a result of the proposal.
3) Daydream Street has a cul-de-sac at the end of the road and has no existing access to Mona Vale Road. The Mona Vale Road East upgrade proposal has no plans to change the current access arrangement. Formal access to Mona Vale Road is via the Ponderosa Parade intersection. Mona Vale Road is a main arterial road with controlled access points and limited local road connections, to ensure efficiency and safety on a main arterial route is maintained.
4) Bus priority lanes have been included at the proposed traffic signals at the Ponderosa Parade and Samuel Street intersection of the project. There is no current consideration of providing bus rapid transit along the extent of the Mona Vale Road East upgrade. Further information regarding the provision of bus rapid transit in the region can be found in the Northern Beaches Transport Action Plan on the Transport for New South Wales website www.transport.nsw.gov.au.
5) The provision of an off-road shared path west of the project extent is not within the proposed scope of the project. Existing and future suggestions on pedestrian and cycle paths on the local road network can be included in Pittwater Council's Active Travel Strategy.
6) The proposal was designed to be consistent with Roads and Maritime design criteria and other specifications, including the Austroads Guide to Road Design (Austroads, 2009). The new road alignment meets the relevant design and safety standards for a posted speed of 80 km/h in the rural zone and 60 km/h in the

urban area. For heavy vehicles a 60 km/h truck and bus speed limit for the downhill descent from near Ingleside Road to the base of the escarpment is proposed, given the steep grade. Speed limit enforcement and the potential installation of a speed camera and advisory signs would be considered during detailed design.

7) The proposed widening to four lanes (two lanes in each direction) provides opportunities for overtaking slow moving heavy vehicles travelling in either direction. The inclusion of additional lanes for heavy vehicles in addition to the proposal would increase the footprint of the project with greater property and environmental impacts. The proposal design is based on the forecast traffic volumes (about 42,000 vehicles per day by 2031) and the percentage of heavy vehicles using (about 10 percent) the Mona Vale Road corridor. A third lane in either direction is not warranted.
8) Planning for the upgrade of Mona Vale Road West is following the planning of Mona Vale Road East. In comparison with Mona Vale Road East, Mona Vale Road West has a number of more complex issues that need to be resolved prior to completion of planning work. These include the acquisition of small sections of Ku-ring-gai Chase National Park and the impacts on species that are listed under the *NSW Threatened Species Act 1995* and *Commonwealth Environment Protection and Biodiversity Conservation Act 1995*. The timing of construction of Mona Vale Road East and West has not yet been confirmed.

2.3.2 Design

Submission numbers

8, 15, 18, 19, 21, 29, 36, 56, 65, 83, 122, 134, 137, 138

Matter description

Submissions received addressed various aspects of the proposal including:

1) Provision of a truck arrester bed, about 150 metres long, for eastbound vehicles adjacent to Walana Crescent.
2) Mona Vale Road to be generally widened on the northern side of the current alignment due to the terrain of the area.

In summary, the respondents raised the following matters:

1) The proposed location of the truck arrester bed should be re-considered due to its proximity to the cemetery, residents, and pedestrians (including school children).
2) Widen Mona Vale Road to the south particularly between the Ponderosa Parade and Samuel Street intersection and Foley Street. There are considered to be greater property impacts, noise impacts and tree removal required with the current proposal to widen on the northern side of Mona Vale Road. It was noted that the southern side of Mona Vale Road has predominantly industrial and commercial properties, which may be less affected by partial property acquisition, tree removal and increased road traffic noise.

Response

1) Roads and Maritime has re-considered the location of the truck arrester bed and identified a suitable alternative location. Further details are provided in section 4 of this report.
2) Roads and Maritime has reviewed the proposed alignment and has made adjustments by moving the alignment in several places. Changes in the proposed alignment are shown on **Figures 1-1** to **1-6**.

2.3.3 Construction activities

Submission numbers

46, 58, 118

Issue description

The submissions received addressed construction impacts and timing of construction activities.

In summary, the respondents raised the following matters:
1) Concern regarding construction related impacts including, private property and business access, amenity and traffic diversions.
2) A detailed construction program is requested for the proposal

Response

1) Roads and Maritime would continue to consult with potentially affected businesses and property owners within the proposal area regarding measures to be implemented to minimise disruption to property access and businesses as well as, temporary impacts to amenity and traffic movements. In addition a Construction Environmental Management Plan (CEMP) will be prepared addressing management measures to be implemented during construction, including all safeguards identified in section 5 of this report. The CEMP will specifically include measures for the following construction related impacts:
    - Resource and waste management
    - Biodiversity management
    - Erosion and sedimentation control
    - Soil and water management
    - Air quality management
    - Traffic management
    - Noise and vibration management
2) To minimise impacts to traffic and to ensure safety risks to workers are minimised, it is expected that the proposal would be constructed in stages. The preliminary construction staging strategy involves four stages (and is subject to revision during detailed design and pre-construction planning). The scope of works for each stage is described in section 3.3.2 of the REF. The overall construction duration is expected to be a minimum of 30 months for completion of the four construction stages, subject to favourable weather conditions. Construction methodology and staging will be reviewed during detailed design. A commencement date for construction is yet to be decided.

2.3.4 Public utility adjustments

Submission numbers

99, 105

Issue description

Submissions received addressed the relocation of public utilities and requested that all utilities should be underground rather than overhead.

Response

As discussed in section 3.5 of the REF, there are two alignment options for relocation of utilities to Lane Cove Road. The final location (and whether the relocation will be over head or underground) would be determined in consultation with utility providers during detailed design.

2.3.5 Property acquisition

Submission numbers

40, Katandra Bushland Sanctuary Trust (75), 99, Pittwater Council (108), 137

Issue description

Several submissions were received in relation to property acquisitions required for the proposal. Section 3.6 (Table 3-8) of the REF provides a list of all properties within the proposal area that are expected to be subject to property acquisition (whole or in part).

A summary of the matters raised in submissions is provided below:

1) Concern about partial acquisition of properties. Acquisition seems to be more residential properties than commercial properties due to road widening to the north and associated works like retaining walls and the truck arrester bed.
2) Pittwater Council has raised specific concerns regarding the constraints around the future expansion of the Mona Vale Cemetery as a result of the land required for the proposal. Property on Walana Crescent and Walana Circuit near the cemetery is part of a land agreement between the Crown and Pittwater Council for the purposes of augmenting the cemetery grounds as part of a planned future expansion. The new road boundary identified in the proposal constrains the future use of this additional property and Council have asked if agreements could be reached regarding alternative sites for the required expansion of the cemetery.
3) Concern regarding proposed partial acquisition of the Blackmores property and impacts to staff and business operations.
4) Further details and clarification sought regarding the proposed new road boundary and impacts on properties particularly Katandra Bushland Sanctuary.

Response

1) Roads and Maritime acknowledge that uncertainty over the amount and timing of acquisition and construction can cause stress to property owners and tenants. Roads and Maritime has amended the design to minimise property acquisition impacts such as re-location of the truck arrester bed and widening to the south rather than the north (private properties) in some locations. Land required for the proposal would be acquired prior to construction. Acquisition would be carried out in accordance with the Roads and Maritime's Land Acquisition Information Guide (Roads and Maritime Services, 2014b) and the *Land Acquisition (Just Terms Compensation) Act 1991*. The majority of land to be acquired is strips of land for boundary and driveway adjustments.

   Table 2-1 provides a revised list of property acquisition requirements for the proposal. Final acquisitions would be confirmed through detailed design in consultation with landowners. Roads and Maritime will continue to work closely with Pittwater Council, Blackmores and other affected property owners as the detailed design and construction of the proposal progress.

Table 2-1 Revised property acquisition details*

Lot / DP	Ownership	Whole / Part	Original. approx. area (hectares)	Revised approx. area (hectares)
Lot 53 DP812289	Government	Part	0.056	0.056
Lot 21 DP114318	Government	Part	0.014	0.014
Lot 44 DP 114318	Private	Part	0.028	0.028
Lot 1 DP 549098	Private	Part	0.028	0.028
Lot 1 DP 114318	Government	Part	0.046	**0.028**
Lot 2 DP 114318	Government	Part	0.058	0.058
Lot 3 DP 114318	Government	Part	0.051	0.051
Lot 4 DP 114318	Government	Part	0.015	0.015
Lot 5 DP114318	Government	Part	0.127	0.127
Lot 1 DP 784516	Government	Whole	0.247	0.247
Lot 35 DP12297	Government	Part	0.090	0.090
Lot 1 DP502582	Government	Part	0.438	0.438
Lot 2 DP502582	Government	Part	0.214	0.214
Lot 3 DP502582	Private	Part	0.071	0.071
Lot 1 DP 519037	Government	Part	0.055	0.055
Lot 1 DP124602	Government	Whole	1.34	1.34
Lot 2 DP124602	Government	Whole	0.073	0.073
Lot A DP372094	Private	Part	0.214	**0.810 (whole)**
Lot 1 DP350940	Government	Part	0.111	**0.053**
Lot 2 DP350940	Government	Part	0.047	**0.032**
Lot 3 DP350940	Government	Part	0.043	**0.031**
Lot 4 DP350940	Government	Part	0.081	**0.051**
Lot 12 DP241313	Government	Part	0.035	**0.011**
Lot 9 DP241313	Private	Part	0.006	**0.001**
SP70187	Private	Part	0.021	**0.077**
Lot 1 DP270291	Private	Part	0.079	**0.057**
Lot 119 DP135512	Private	Part	0.045	**0.058**
Lot 101 DP749415	Government	Part	0.014	**0.008**
Lot 102 DP749415	Private	Part	0.005	**0.008**
Lot 26 DP654262	Private	Part	0.036	**0.048**
Lot 120 DP135512	**Private**	**Part**	**-**	**0.013**
Lot 16 DP651226	**Private**	**Part**	**-**	**0.007**
SP57385	**Private**	**Part**	**-**	**0.034**

Lot / DP	Ownership	Whole / Part	Original. approx. area (hectares)	Revised approx. area (hectares)
Lot 1 DP864322	**Private**	**Part**	**-**	**0.062**

**Indicative only subject to detailed design*

2) In response to submissions received regarding the location of the truck arrester bed, Roads and Maritime has relocated the truck arrester bed to a suitable site further west and away from the Mona Vale Public Cemetery. This proposed design change is considered to address Pittwater Council's concern regarding the future expansion of the cemetery. Roads and Maritime will continue to engage with Council as the project progresses to detailed design so the design is aligned where possible with any relevant Council plans for the area.
3) Roads and Maritime will engage directly with Blackmores on their specific matters raised in relation to potential property and operational impacts from the proposal.
4) Amendments have been made to the design (in particular the off road shared path) to avoid impacts to the Katandra Bushland Sanctuary estate. Refer Section 4.4 of this report for further details.

2.4 Stakeholder and community consultation

Submission numbers

30, 50, 65, 80, 126, 134

Issue description

Several submissions commented on aspects of the consultation process or requested further consultation around specific matters. Comments received are summarised below:

1) A lack of community awareness about the proposal until the public display of the REF
2) Limited interaction with Roads and Maritime representatives during the community information session

Response

1) Between 20 October and 14 November 2014, Roads and Maritime displayed the proposed preliminary concept designs for Mona Vale Road East and West for community comment and feedback. Two press ads were placed in the Manly Daily to raise awareness of the consultation for Mona Vale Road East and West and the community information sessions. Separate community updates for Mona Vale Road East and West were distributed to 8,500 residents and businesses. The updates were also published on the Roads and Maritime website. A video animation of the proposed road upgrades for Mona Vale Road East and West was developed and made available at the community information sessions to help the community to clearly visualise the proposed road upgrades. The video was also published on the project web page. Information sessions were held on 23 October, 25 October and 1 November 2014. Roads and Maritime also informed the community of the consultation period through door knocking, media releases, and the distribution of email updates to community members who have signed up to the project database.

The community and stakeholders were advised that the next steps would be the display of the REF in 2015 where they would have further opportunity to comment on the proposed road upgrades. Following the consultation, we received feedback from 94 people regarding the natural environment, safety and suggested changes to both proposals. Between 29 July and 28 August 2015, Roads and Maritime displayed the REF for Mona Vale Road East for community comment and feedback. Two press ads were placed in the Manly Daily to raise awareness of the consultation and community information sessions. A community update was distributed to 8,500 residents and businesses from 29 July 2015and also published on the Roads and Maritime website. A video animation of the proposed road upgrades was used at the community information sessions to help the community to clearly visualise the proposed road upgrades continues to be available on the project web page. Information sessions were held on 8 and 10 August 2015. Roads and Maritime also informed the community of the consultation period by door knocking, media releases, and the distribution of email updates to community members who have signed up to the project database. We apologise if any community member did not get a chance to have more detailed discussions with the project team. For further information of the proposal, the project can be contacted on 1800 633 332 or monavaleroad@rms.nsw.gov.au.

2) Refer above. Roads and Maritime would be happy to answer any further questions on the proposal and can be contacted on the number above.

2.5 Biodiversity

Submission numbers

11, 15, 34, 49, 52, 56, 59, 68, 72, 73, 74, Katandra Bushland Sanctuary Trust (75), 76, 77, 78, 79, 83, 86, 88, 90, 97, 100, 105, 106, 108, 110, 114, 115, 117, 118, 120, 121, 124, 125, 129, 137, 138

Issue description

Respondents commented on several aspects of the biodiversity assessment as follows:

- Provision of fauna connectivity between Katandra Bushland Sanctuary and Ingleside Chase as part of the proposal
- Water quality and aquatic ecology
- Weed management during construction and operational phases of the proposal
- Vegetation and tree removal required by the proposal
- Biodiversity offsets as part of the proposal
- Potential impacts to threatened species in particular Angus' onion orchid, within the proposal area.

A summary of the matters raised in submissions is provided below:

1) The current proposal to provide fauna fencing, a fauna underpass and a rope bridge is not considered sufficient in this area and alternative connectivity solutions are suggested including a vegetated fauna bridge (overpass) connecting Katandra Bushland Sanctuary and Ingleside Chase, and additional underpasses.
2) Measures should be implemented to appropriately protect waterways, including Narrabeen Creek, from nutrient rich runoff and weed infestation associated with

the construction and operation of the proposal. Of particular concern was the health of the giant burrowing frog.

3) Several respondents expressed concern regarding the removal of vegetation (important fauna habitat) as part of the proposal. Pittwater Council has requested a robust Vegetation Management Plan and CEMP be implemented as part of project delivery. All revegetation undertaken should use locally appropriate species and where possible be the same species as the vegetation removed.
4) An offer was received to assist Roads and Maritime with retrieval of plants removed during construction of the proposal.
5) Biodiversity offsets should be considered for this proposal, using a location in close proximity to the Mona Vale Road corridor.
6) Roads and Maritime to undertake a program of research into the relocation and/or propagation of Angus' onion orchid.

Response

1) Section 6.1 and Appendix C of the REF outline the findings of the biodiversity impact assessment for the proposal and the mitigation measures identified to minimise these impacts. Currently, there is one unfenced drainage culvert at Narrabeen Creek that potentially provides passage for fauna under the road. The upgrade of Mona Vale Road East represents an opportunity to improve this connectivity by upgrading this underpass and providing strategically placed fencing to encourage fauna to this area and reduce fauna mortality. Roads and Maritime has been working closely with the Department of Planning and Environment regarding a suitable location for connectivity structures in the area. This is aimed at protecting key fauna connectivity areas when land is developed in the future. Improved connectivity underneath Mona Vale Road at Narrabeen Creek, along with associated protection and improvement of native vegetation on either side of the road will improve safe fauna movement opportunities from Ingleside Chase Reserve in the south, through to Katandra Bushland in the north and into Ku-Ring-Gai Chase. For example Roads and Maritime will strategically select plant species to encourage fauna movement, targeting species such as the Eastern Pygmy Possum, at either end of the underpass.
   Fauna crossing structures will consist of one dedicated underpass and one rope bridge to enable animals to move between Ingleside Chase Reserve and Katandra Bushland Sanctuary. The potential for upgrading existing pipe culverts to provide additional fauna crossing zones within the vicinity of Ingleside Road would be investigated during detailed design. Monitoring of the current underpass and the new underpass as well as the rope crossing will be undertaken both pre and post construction.
2) A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP prior to the commencement of construction. The SWMP would address the following:

   - The Roads and Maritime Code of Practice for Water Management.
   - The Blue Book – Managing Urban Stormwater: Soils and Construction, Volume 1 and 2.
   - Roads and Maritime Technical Guidelines – Temporary Stormwater Drainage for Road Construction.

   The SWMP would outline measures to be implemented to protect local waterways including Narrabeen Creek.

The red-crowned toadlet (*Pseudophryne australis*) and giant burrowing frog (*Heleioporus australiacus*) were targeted during separate surveys in March 2015. These species are most active on warm wet nights from February – April. Surveys were conducted on 15th and 24th March 2015 after rain and both species were recorded to about seven kilometres west of the study area (Garigal National Park and surrounding areas) during that time. The survey area contains potentially suitable habitat for both species. Suitable measures to protect these species would be included in a Biodiversity Management Plan prepared as part of the Construction Environmental Management Plan (CEMP) for the project. Measures would include on-site quarantine protocols for plant, equipment and staff, which will likely include a wash down station for those coming from the construction site.

3) A Vegetation Management Plan would be prepared as part of the CEMP and will include a commitment to re-vegetate disturbed areas after construction. The choice of species will be decided during detailed design but it is Roads and Maritime's typical practice to choose locally appropriate species In the case of fauna crossing areas revegetation would be with species chosen to encourage targeted species to use the dedicated underpass (for example banksia would be planted at the outlets of the underpass to encourage Eastern Pygmy Possums to use the crossing.
4) Roads and Maritime has responded individually to this respondent and the suggestion has been in Roads and Maritime's consultation database for follow up prior to construction.
5) As outlined within the REF, a detailed survey of vegetation within the survey area comprising biometric plots (50 x 20 plots and transects) was used to collect site attribute data in accordance with the BioBanking Assessment Methodology (BBAM). Information relating to species richness, native over-storey, native mid-storey, native ground cover (grasses, shrubs and other) was collected using modified parameters using BBAM. This data was collected to confirm the vegetation communities found in previous surveys and for any offsetting requirements in the future. Roads and Maritime are working on an off-set strategy for this and other proposals in the locality. This strategy will be further developed in detailed design.
6) In 2013 Roads and Maritime contracted the services of the Royal Botanic Gardens and Domain Trust to undertake research on the distribution of the terrestrial orchid *Microtis angusii* (known as Angus' onion orchid), and to study its ecology and genetics. The research, which concluded in September 2015, was undertaken to inform appropriate management and recovery strategies. The Royal Botanic Gardens and Domain Trust found that successful propagation and translocation in the trial undertaken indicated that the establishment of populations of *M. angusii* at additional sites is feasible. Given potential future disturbances in the area, translocation to new sites in addition to in-situ conservation may be a reasonable action to consider for the long term protection of this species.

   In developing the design for the proposal, Roads and Maritime avoided the known locations of these species, where possible. Consequently the biodiversity assessment for the proposal found that the Mona Vale East upgrade is unlikely to impact the Angus' onion orchid and therefore relocation and / or propagation of Angus' onion orchid is not required as part of the this proposal. Potential impacts of future stages of the Mona Vale Road upgrade on the Angus' onion orchid would be assessed as part of future planning approvals.

2.6 Hydrology, hydraulics and water quality

Submission numbers

34, 58, 59, 72, 73, 77, 97, 108, 120, 121, 122

Issue description

Submissions received commented on the following aspects of the hydrology, hydraulics and water quality assessment for the proposal:

- Potential increase in runoff into Narrabeen Creek, and other nearby waterways including stormwater
- The design of the proposed drainage infrastructure and its capacity to drain the expected peak runoff volumes and manage runoff quality (weeds, sediment and nutrients)
- Potential for flood impacts at downstream properties including future urban areas such as Warriewood and North Narrabeen. Whether the predicted peak flows (volume and velocity) in the hydrological model for the proposal has taken into account future urbanisation not just the proposed works.

A summary of the matters raised in submissions is provided below:

1) Concerned about the increase in nutrient and sediment laden run off and the potential impacts to Narrabeen Creek and other waterways, such as scouring and erosion of creek banks and the spread of weed species. Suitable and effective controls, with a regular maintenance regime, are requested to manage run off volume, velocity and quality from the road. These controls need to be appropriately designed to also contain accidental spills and regularly be maintained to remove weeds and debris.
2) Replacement of the existing water quality basin requested given the predicted increase in runoff as a result of the proposal and the likely need for additional basin capacity.
3) Concerned about flooding impacts at downstream properties and the potential for new land release and future urban areas (such as Warriewood and North Narrabeen) to be impacted by an increase in pavement area as a result of the proposal. Future rainfall scenarios and future land developments such as Ingleside Release Area need to be taken into account in the calculation of runoff and flooding from the proposal.

Response

1) Measures will be implemented to protect local waterways, including Narrabeen Creek, during construction and operation of the proposal. As discussed in section 6.3.3 of the REF the proposal includes the installation of level spreaders at drainage outlets within the Mona Vale Road East upgrade. Level spreaders have the effect of dissipating the flow of run off from drainage channels thereby reducing the flow velocity and the potential for scouring of waterway banks as flow is discharged. Consideration will be given to planting the level spreaders with suitable species to provide nominal water quality treatment prior to discharge (mitigation measure WQ-5).
   Following completion of construction, rehabilitation of exposed areas where vegetation and/or impervious surfaces have been removed, would be undertaken to ensure there would be minimal risk of soil erosion and transport of eroded sediments and weeds to receiving waterways.

As is currently the case, during operation there would be a risk of accidental spillage of fuel, chemicals or other hazardous liquids as a result of vehicle leakage or road accidents on Mona Vale Road. The proposal would however reduce this risk by providing a higher standard of road and a truck arrester bed. While opportunities to install emergency spill basins are limited due to the steep site topography and the use of multiple drainage outlets, options for spill containment (and other spill management measures) will be further investigated during detailed design. Detailed design will consider the inclusion of spill basins and/or suitable block / bund structures to further protect waterways in the event of an accidental spill (mitigation measure WQ-6).

2) Section 6.3 of the REF provides an assessment of potential hydrological and water quality impacts from the proposal. A stormwater detention basin exists on the southern side of Mona Vale Road, between Boundary Street and Daydream Street. The basin provides stormwater management for an industrial development on the southern side of Mona Vale Road, west of Daydream Street. A second stormwater detention basin exists on the northern side of Mona Vale Road, on the western side of the Mona Vale Cemetery. This basin provides stormwater management for the Warriewood housing development currently under construction on the northern side of Mona Vale Road. Both of these basins are privately owned and operated. There are no current plans to discharge runoff from Mona Vale Road East upgrade into these basins or replace these basins as part of the proposal.
3) The proposal has been designed for a one in 100 year rain event which takes into account climate change scenarios for the region. It is very unlikely that the proposed road drainage design would result in increased flooding at surrounding properties. Future developments adjacent to Mona Vale Road (such as Ingleside Release Area) would be required to address potential flood impacts from that development as part of their planning approval. A proponent would also need to design their development taking into account stormwater runoff flow path, velocity and volumes within the surrounding catchments at the time of the development to ensure their development is designed with an appropriate level of flood protection.

2.7 Traffic and transport

2.7.1 Mona Vale Road and Emma Street intersection

Submission numbers

1, 2, 3, 4, 5, 6, 8, 12,13, 14, 16, 18, 19, 24, 25, 29, 39, 45, 47, 48, 50, 51, 57, 58, 61, 65, 66, 67, 69, 80, 81, 89, 107, Pittwater Council (108), 113, 119, 122, 123, 126, 128, 132, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156

Issue description

The current Mona Vale Road and Emma Street intersection arrangement allows all turning movements in and out of Emma Street. The proposal, as described in section 3 of the REF, includes treatments which will change the Emma Street intersection to left in and left out only. With the removal of right turn movements into and out of Emma Street, it was proposed that a number of alternate routes would need to be utilised, including Samuel Street, Bungan Street, Oliver Way, Maxwell Street, Parkland Road and Foley Street.

Respondents raised the following matters in regard to the proposed changes to the Mona Vale Road and Emma Street intersection:

1) As a result of the proposed changes to turning movements at Emma Street, traffic would need to use alternative routes to access Mona Vale Road travelling west or when accessing Emma Street from the east. Increased traffic on alternative access routes will result in safety issues for pedestrians and residents accessing their properties on these streets, congestion, increase in road traffic noise, difficulties parking on these streets, and queuing at intersections. The alternative route proposed is expected to increase travel times for local residents.
2) With the change in access arrangements for Emma Street there is concern that there will be increased traffic on the streets surrounding the Mona Vale Public School (Waratah Street, Wangara Street, Oliver Way and Bungan Street) where currently the traffic around the school is predominantly associated with local residents and with school drop offs and pick-ups. There is concern for school children safety. In addition the school bus currently travels Waratah Street to Maxwell Street and on to Emma Street in order to access onto Mona Vale Road. This route will need to be altered leading to additional travel time for the bus and exacerbating the anticipated congestion on the alternative routes.
3) Several respondents suggested that either a roundabout or traffic signals should be installed at Emma Street intersection which would enable the full range of turning movements.
4) Some respondents are concerned about the potential increase in traffic on Whitney Street as a result of the proposed change to turning movements at Emma Street (left in and left out only). It is considered likely that traffic will use Whitney Street as a shortcut between Parkland Road and Samuel Street causing congestion, safety concerns for pedestrians, increased road traffic noise and difficulties accessing properties. Some respondents requested that Whitney Street should be closed (by creating a cul-de-sac or similar) to through traffic to prevent this from occurring.
5) Concern about the potential increase in vehicle related air pollution with an increase in traffic volumes on alternative routes as a result of the proposed change to turning movements at Emma Street.

Response

In response to submissions and community concern, Roads and Maritime re-investigated intersection treatment options in order to provide a suitable right turn movements in and out of Emma Street. As a result a channelised right turn treatment is now proposed as a design refinement to the proposal, allowing the full range of turning movements at this intersection.

The proposed design refinement meets relevant safety, design and performance standards and removes the requirement for traffic to be re-directed to other local roads such as Samuel Street, Parkland Road, Oliver Way and Bungan Street. This design refinement addresses concerns raised in submissions in relation to the Mona Vale Road and Emma Street intersection.

Further details on this design refinement are provided in Section 4.1 of this report.

2.7.2 Ponderosa Parade and Samuel Street intersection

Submission number(s)

1, 4, 9, 18, 21, 29, 35, 40, 45, 50, 65, 66, 67, 123, 126, 128, 135, 136, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156

Issue description

The REF outlined the key elements of the proposed design changes at the Ponderosa Parade and Samuel Street intersection. These include:

- Traffic lights including pedestrian crossings for all intersection legs
- New concrete medians and kerb treatments
- Two through traffic lanes in each direction on Mona Vale Road
- Dedicated right-turn lanes on all intersection legs
- Left-turn lanes on all intersection legs
- Provision of bus priority for both directions on Mona Vale Road
- Provision of a bus bay (westbound) on the departure side of the intersection
- Relocation of a bus stop on the eastern side of Samuel Street, to a new location about 40 metres to the north.

Submissions received in relation to the proposed changes at the Ponderosa Parade and Samuel Street intersection, contain comments on the proposed changes at the Mona Vale Road and Samuel Street intersection in particular. The main matters raised relate to the left turn slip lane into Samuel Street with associated property impacts and the inclusion of a concrete median at the entrance to Samuel Street which was considered restrictive for property access and manoeuvrability particularly when towing a trailer. A few respondents commented that they did not support the proposed change from a roundabout to traffic signals at this intersection and some had a preference for a grade separated intersection rather than the current or proposed intersection arrangement.

In summary, the respondents raised the following matters:

1) Concern regarding restricted property access and manoeuvrability with addition of a concrete median barrier on Samuel Street.
2) Concern regarding the introduction of a left turn slip lane into Samuel Street due to the need to remove some mature trees at the corner of Mona Vale Road and Samuel Street and partially acquire property on Samuel Street to accommodate the slip lane. In addition there is concern that traffic turning left into Samuel Street using a left turn slip lane may not reduce speed to enter Samuel Street which has a posted speed of 50 km/h.
3) An increase in traffic numbers is anticipated on Samuel Street with the proposed changes to Emma Street (left in and left out only). Respondents raised concerns about congestion, increased queuing times, noise impacts, and safety on Samuel Street.

Response

The proposed intersection layout at Mona Vale Road and Samuel Street requires strip property acquisitions on the north-west and north-east corners of the intersection on Samuel Street. The proposed layout would impact access to a common driveway on the north-west corner of Samuel Street, and prohibit right turn property access for properties on the north-east corner of Samuel Street due to the proposed concrete median for the traffic lights.

In response to the submissions received on the proposed intersection layout, the following design changes have been made by Roads and Maritime:

- Removal of the left slip lane from Mona Vale Road to Samuel Street (north-west corner) to reduce property impacts
- Shortening of the concrete median on Samuel Street to enable right turning property access for properties on the north-east corner.

These design changes, in combination with the proposed changes to the design of the Emma Street intersection, address many of the matters raised in submissions with respect to Samuel Street.

Further details on this design refinement is provided in Section 4.2 of this report.

2.7.3 Powder Works Road

Submission numbers

Pittwater Council (108)

Issue description

Pittwater Council has identified an opportunity with the proposed upgrade of Mona Vale Road from two lanes to four lanes, for Mona Vale Road to become the main corridor between Pittwater Road at North Narrabeen and Mona Vale Road at Ingleside, rather than Powder Works Road. Powder Works Road currently experiences high traffic volumes and can become congested. Council would like the proposed upgrade of Mona Vale Road to relieve the pressure on Powder Works Road, particularly in light of the future development of the Ingleside Release Area.

Response

The proposal is stage two of a broader upgrade of Mona Vale Road between Terrey Hills and Mona Vale. Stage one involved improving the Mona Vale Road / Ponderosa Parade / Samuel Street intersection at Mona Vale and was completed in late 2014. Stage three is the Mona Vale Road West upgrade which involves upgrading 3.2 kilometres of Mona Vale Road from two lanes to four lanes between McCarrs Creek Road, Terrey Hills and Powder Works Road, Ingleside. The Mona Vale Road West upgrade will be the subject of a separate environmental impact assessment.

Mona Vale Road (which traverses the Ingleside Precinct) is expected to be the main access to the Ingleside Precinct and therefore additional trips on Mona Vale Road are expected as the precinct is progressively developed. The increased capacity the proposal provides would help accommodate this growth. The Mona Vale Road East Upgrade is anticipated to encourage traffic to use Mona Vale Road in preference to alternate routes such as Powder Works Road in the Ingleside Precinct.

2.8 Aboriginal heritage

Submission number

106

Issue description

A respondent is concerned about the protection of Aboriginal heritage sites within the Mona Vale Road East proposal area in particular undertaking further survey of the area during construction (ground disturbance) to protect Aboriginal objects that may be present within the corridor.

Response

Section 6.5.3 and Appendix H of the REF addresses potential impacts to Aboriginal heritage during construction (ground disturbance) of the proposal. The Aboriginal heritage assessment concluded that while three previously recorded sites are located within the Mona Vale Road upgrade study area and close to the work area, these sites would not be directly affected by the proposal. All three sites are of high cultural and archaeological significance and would be specifically protected during construction.

The locations of two unregistered sites plotted by the Department of Main Roads Mona Vale Road Strategic Design Plan could not be verified due to access constraints. Based on available information these sites are considered unlikely to be impacted by the proposal's construction. No other potential impacts on Aboriginal cultural heritage were identified.

Mitigation measures proposed within the REF to safeguard Aboriginal heritage sites include:

- Fencing and signage will be used to establish exclusion areas around nearby Aboriginal sites
- The *Standard Management Procedure: Unexpected Archaeological Finds Procedure* (Roads and Maritime Services, 2012) will be followed in the event of uncovering a potential Aboriginal heritage item.

2.9 Historic heritage

Submission numbers

Pittwater Council (108), 137

Issue description

Pittwater Council has commented on the presence of existing heritage items recommended for alternative management within or in close proximity to the proposal area.

1) Existing heritage items from Schedule 5 of the Pittwater Local Environment Plan 2014 are:

   - Baha'i House of Worship (SHI form no 2270338), Mona Vale Road, Ingleside
   - Group of Monterey Pines (Pinus radiate) (SHI form no 2270346), Mona Vale Road, Ingleside
   - Mona Vale Cemetery, (SHI form no 2270088), 107 Mona Vale Road, Mona Vale
   - Mona Vale Cemetery Gateposts (SHI form no 2270327), Mona Vale Road, Mona Vale
   - Trees (SHI form no 2270408), Mona Vale Road – North side between Emma & Samuel Streets.

   If the proposal is likely to impact any of these items a heritage impact assessment would be required.

2) One heritage item recommended for alternative management is remnant 1940s hand cut sandstone kerbing along Mona Vale Road (between Lane Cove Road and Boundary Road). This item has been subject to Planning Proposal

PP0001/15 to amend Schedule 5 and the Heritage Maps of the Pittwater Local Environmental Plan 2014 together with amendments to Pittwater 21 DCP B1 Heritage controls and has been on public exhibition until 18th July 2015. As such, any impact on the sandstone kerbing will need to be fully addressed in a heritage impact assessment for the proposal.

Council also identified new draft heritage items outside the Mona Vale East upgrade proposal area, and within the Mona Vale West upgrade proposal area.

3) One respondent has suggested that the sandstone kerbing (hand cut blocks) could be used as part of landscape treatments or a wall within the Mona Vale Cemetery.

Response

A Statement of Heritage Impact (refer section 6.6 and Appendix I of the REF) was prepared consistent with the principles of *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013* (Australia ICOMOS, 2013), and in accordance with current heritage best-practice guidelines as outlined in the *NSW Heritage Manual* (NSW Heritage Office, 1996).

Investigations identified two local heritage items (Mona Vale Cemetery and Mona Vale Cemetery gateposts) and one potential archaeological site (a well on Lot 26 DP 654262) near the proposal area. Roads and Maritime will work with Pittwater Council to determine any potential impacts to heritage items within and near the proposal area during detailed design.

2.10 Urban design and visual amenity

Submission numbers

2, 4, 15, 34, 36, 56, 66, 67, 99, 106, 137, 138

Issue description

Several submissions received addressed urban design and visual amenity aspects of the proposal, including:

- Removal of mature trees and impacts to visual amenity
- Impacts to existing landscaping and visual amenity
- Roadside furniture such as safety barriers and noise wall and urban design
- Public utilities and urban design

In summary, the respondents raised the following matters:

1) Concerned about the proposed removal of mature trees on Mona Vale Road and on Samuel Street (near its intersection with Mona Vale Road) and the loss of visual screening for residents and businesses. Request that only trees necessary for the construction of the work be removed and care be taken to not remove trees unnecessarily. Trees can form a 'green buffer' providing a physical and visual barrier from Mona Vale Road, therefore the removal of these trees should be mitigated.
2) Some asked if the trees marked with a metal tag within the proposal area were marked by Roads and Maritime for removal as part of the proposal upgrade.
3) Some respondents commented that when the area (between Mona Vale Road and Walana Crescent / Wallaby Circuit) was first developed, landscaping was

planted. Since then this landscaping has been subject to regular maintenance. If possible this landscaping should not be impacted by the proposal.
4) Protect views of Warriewood / Ingleside escarpment when viewed from the east.
5) The proposed noise wall should be landscaped with appropriate plants to protect local visual amenity.
6) The safety median barrier between Manor Road and Daydream Street is considered of low visual amenity and an alternative lane separation treatment is requested.
7) Query the re-location of utilities specifically power lines and whether it is proposed to re-locate these underground as part of the proposal.

Response

1) The design changes proposed for the Mona Vale Road and Samuel Street intersection (refer Section 4 of this report) reduces property impacts, including tree removal in the north-west corner of Samuel Street.
2) The trees marked with a metal tag, observed by some respondents, are not related to this proposal and the trees were not tagged by Roads and Maritime for removal.
3) Roads and Maritime has moved the proposed road design to the south in some locations, and re-located the truck arrester bed further west which has reduced property impacts on the northern side of Mona Vale Road near Walana Crescent/Wallaby Circuit. Notwithstanding, care will be taken during construction to protect any existing landscaping within the proposal area.
4) A Landscape Character, Visual Impact Assessment and Urban Design Study was undertaken for the proposal by HBO EMTB Urban and Landscape Design (refer Section 6.7 and Appendix J of the REF) which considered the proposal within the context of relevant viewpoints (east and west), including Warriewood and Ingleside escarpments. Potential impacts on views towards the escarpments to the west are considered moderate to moderate-high. However, with the implementation of safeguards and mitigation measures as outlined in Table 6-32 of the REF, these impacts would be reduced.
5) The design, height and extent of the noise wall indicated within the noise and vibration assessment (refer Section 6.8 and Appendix K of the REF) will be decided during detailed design. Detailed design of the proposal will incorporate the design vision, objectives and mitigation measures outlined in the Landscape Character, Visual Impact Assessment and Urban Design Report and the *Environmental Noise Management Manual* (RTA, 2001), where feasible.
6) The requirements for a median barrier will be further considered during detailed design. As above, detailed design of the proposal will incorporate the design vision, objectives and mitigation measures outlined in the Landscape Character, Visual Impact Assessment and Urban Design Report and the where feasible.
7) As discussed in Section 6.7 of the REF, there are two alignment options for relocation of utilities to Lane Cove Road. The final location (and whether the relocation will be over head or underground) would be determined in consultation with utility providers during detailed design.

2.11 Noise and vibration

Submission numbers

1, 3, 4, 8, 11, 15, 19, 36, 50, 56, 65, 66, 67, 83, Pittwater Council (108), 118, 123, 126, 134

Issue description

Submissions received commented on the following aspects of the noise and vibration assessment for the proposal:

- The predicted increase in noise levels as a result of the proposal. The extent to which the monitoring locations were representative of the potentially affected receivers within the study area
- The noise impacts from heavy vehicles using compression brakes as they descend the hill into Mona Vale
- The efficacy and extent of the proposed mitigation measures
- Consideration of the Mona Vale Cemetery as noise sensitive for the purposes of the noise assessment.

In summary, the respondents raised the following matters:

1) Noise data gathered does not represent the noise impacts for receivers set back from Mona Vale Road such as Whitney Street, Maxwell Street, Jeanette Avenue and Marie Crescent. Concern about the predicted increase in noise levels as a result of widening Mona Vale Road to the north and bringing traffic closer to residential receivers. The removal of street trees is also considered to exacerbate the noise impacts on Mona Vale Road and Samuel Street.
2) Existing noise from heavy vehicles using compression brakes to maintain a slow speed as they descend Mona Vale Road into Mona Vale is of concern to some residents. The proposal to change the posted speed for heavy vehicles to 60 km/h on that stretch of Mona Vale Road will require greater use of compression brakes to stay within the speed limit, thereby increasing the frequency of compression brake noise. Noise from compression brakes are worse in the evening and night time (sleep disturbance) when other background noise is low. Would like to see a sign advising that compression brakes are prohibited in this area and retain the sign advising the use of low gears.
3) A noise wall is requested at Walana Crescent and Samuel Street. Concern that mitigation measures need to be more extensive than currently proposed.
4) Pittwater Council suggests that the Mona Vale Cemetery should be considered as a place of worship for purposes of the noise assessment due to the fact that grave-side services are held regularly within the cemetery and these would be sensitive to surrounding noise levels. Council request that the same courtesy during construction could be extended to the cemetery as well as residents i.e. adopt management measures to minimise noise disruption within the cemetery.

Response

1) An investigation of potential changes in noise impacts as a result of road alignment and design changes for the Mona Vale Road East upgrade was carried out (refer Section 3 and Appendix B of this report). The proposed design changes were remodelled to determine likely changes in noise impact. The results indicate a reduction in noise impacts at some receivers, primarily at the eastern end of the proposal. In addition, trees on the corner of Mona Vale Road and Samuel Street no longer need to be removed with the removal of the left turn slip lane.
2) Heavy vehicles use compression brakes to slow their speed to safely descend steep grades, such as the eastbound descent down Mona Vale Road. When measured during noise monitoring programs, noise from compression brakes appears as a maximum noise event. The NSW Road Noise Policy and the RTA (now Roads and Maritime) Environmental Noise Management Manual 2001 provide guidance on the assessment of maximum noise levels in lieu of established criteria, based on the noise level of the event, number of events and the emergence of an event over the Leq (average) noise level. A maximum noise

level event is where the Lmax noise level exceeds the Leq,1hr level by more than 15 dB and exceeds 65 dB(A). The noise assessment in the REF concluded that across all receivers, the number of events would likely increase with the increase in traffic, given that both heavy and light vehicles numbers are expected to increase, as a result of the opening of both East and West projects. The increase in events would be due to an increase in overall traffic rather than due to the reduction in the posted speed limit for heavy vehicles, as it is recognised that heavy vehicles currently need to use compression brakes to safely descend the hill into Mona Vale. Post construction monitoring would be undertaken to confirm maximum noise levels within the proposal area. Roads and Maritime cannot install 'Limit Compression Braking' signs in this location for safety reasons.

3) With the proposed design changes, noise levels between Walana Crescent and Samuel Street are likely to reduce from those predicted in the REF (refer Appendix B). Noise mitigation is therefore not warranted at this location. However a further noise investigation would be completed as part of detailed design and mitigation measures confirmed at that stage.
4) The Noise and Vibration Management Plan to be included in CEMP for the proposal will address practical measures to accommodate construction around the cemetery. Roads and Maritime will work with Council on an appropriate approach.

2.12 Socio-economic

2.12.1 Property impacts

Submission number

3, 15, 19, 42, 99,118, 131, 134

Issue description

Several submissions received commented on the following potential property impacts:

- Decreased property values as a result of the proposal
- Encroachment into properties, including Blackmore's property, by effectively moving Mona Vale Road closer to properties, removing any set back or buffer.
- Property access impacts.

In summary, the respondents raised the following matters:

1) As a result of the proposal, and potential impacts from traffic and transport, road traffic noise, the truck arrester bed, and partial proper acquisition, property values will decrease. Some respondents have suggested that property owners should be compensated for this.
2) Due to the widening of Mona Vale Road and introduction of a truck arrester bed, retaining walls and other roadside furniture including safety barriers, and the removal of mature trees, respondents are concerned the road will now encroach into their properties more.
3) With the proposed widening of Mona Vale Road to the north, it appears that Roads and Maritime are protecting businesses (to the south) more than residential properties (to the north).

Response

1) With the proposed design changes (refer Section 4 of this report), the alignment of the widening will move away from residential properties on the northern side of Mona Vale Road, reducing impacts to properties. The location of the truck arrester bed has also been moved further west away from residential properties.

   Roads and Maritime do not offer financial compensation where property owners believe their property values may be adversely impacted by a project. If a property is potentially impacted by aspects of a proposal (such as road traffic noise or changes to access arrangements) mitigation measures are considered to minimise these impacts.

   Section 2.3.5 of this report provides a revised list of property acquisition required as part of the proposal. Roads and Maritime will negotiate with affected property owners during detailed design when the final acquisition requirements are confirmed.
2) As above, the design changes adopted by Roads and Maritime will reduce property impacts from the proposal.
3) Roads and Maritime have revised the road alignment and moved the widening further to the south, particularly around the Ponderosa Parade and Samuel Street intersection.

2.12.2 Business impacts

Submission numbers

99, Pittwater Council (108)

Matter description

Respondents raised the following matters related to potential business impacts:
1) Concern regarding proposed partial acquisition of the Blackmores property and impacts to utilities and services (communications and sewerage), visual amenity, noise and the company's ability to comply with specific provisions of their planning approval for the site (such as setbacks and a black water treatment plant).
2) Loss of use-able land within the cemetery will reduce revenue potential for Council from the sale of burial sites at Mona Vale Cemetery.

Response

Roads and Maritime will work directly with Blackmores and Council on specific property (and business) impacts associated with the proposal.

2.12.3 Recreation

Submission number(s)

31, 37, 53, 54, 55, 60, 62, 63, 64, 70, 71, 82, 83, 84, 85, 87, 91, 92, 93, 94, 95, 96, 98, 101, 102, 103, 104, 109, 112, Shore Regional Organisations of Councils (116), 127, 130, 133, 137

Matter description

Several submissions were received about provision within the proposal for mountain bikers accessing Ingleside Reserve, horses crossing Mona Vale Road and on-road and off-road cyclists.

In summary, the respondents raised the following matters:

1) Downhill tracks may only be ridden in the downhill direction. The Ingleside track is used by locals training for State, National and World Cup events. It is visited by a number of world champions who ride professionally. The bike track runs in the descending direction only and riders are currently dropped off on Mona Vale Rd at the Laurel Road East firetrail. Trail Care referenced a site inspection in 2013 attended by representatives of Pittwater Council and Roads & Maritime at the strategic investigation stage of this project in regards to the potential locations for a bike track access point near Ingleside Road intersection on the southern side of Mona Vale Road. During the site inspection, a new drop off area was potentially identified subject to the removal of the bollards that are currently in place at Ingleside Road intersection. This was considered to resolve road safety issues at the time with the current drop off point at Laurel Road East firetrail. Riders could then use an existing but overgrown access track that runs on the southern side of Mona Vale Road to Laurel Road East in the existing road easement. Mountain bike riders are now concerned that the road widening near Ingleside Road brings the alignment slightly south and increases the vertical alignment. It appears that Mona Vale Road is now not at grade with Ingleside Road with little space for the planned drop off bay. Further to this, the existing access track on Mona Vale Road at the Laurel Rd East firetrail may be lost due to a proposed embankment. It appears that the existing westbound lane in the vicinity of Laurel Rd East firetrail is to be retained but not as a trafficable lane. An alternative formalised turning bay or drop off point for mountain bikers accessing the Ingleside Reserve is requested as part of the proposal.
2) Provision should be included in the proposal for horse riders as well as cyclists and pedestrians. A multi-use path should be considered for Mona Vale East upgrade, similar to the proposal for Mona Vale West, with connectivity between Mona Vale East and West. In particular the proposal should include facilities such as barriers with mounting blocks behind the barriers to allow safer and easier mounting/dismounting for horses and riders crossing Mona Vale Road. Dismounting horses when crossing Mona Vale Road should not be mandatory.
3) Request that the design for the proposed Mona Vale Road East upgrade take into account the safety of cyclists by providing wide turning lanes particularly at roundabouts, and avoiding the use of rumble strips and cats-eyes which can be hazardous for cyclists.
4) Long term planning should consider a dedicated cycle path, preferably an off road cycle path, connecting cyclists commuting from Mona Vale/Ingleside/Terrey Hills / St Ives with north shore transport hubs.
5) Walking and cycling should be a government priority across the region including the Mona Vale Road corridor.

Response

1) The location suggested for mountain bike drop off on Mona Vale Road westbound near Laurel Road East is located on a steep ascent and on the outside of a horizontal curve. Based on a road design and safety investigation, the location has been considered inappropriate as a drop off area at 80 km/h design speed requiring safe deceleration and acceleration merge on an uphill ascent. Due to the steep topography, design assessment did not identify other safe stopping opportunities along the project length. It should be noted that the closest vehicular parking facilities to access the mountain bike trials near Laurel Road East could be accessed near Daydream Street and mountain bike users can utilise the 3 metre wide westbound shoulder to access the track.
2) The proposal includes activities in the Lane Cove Road corridor for the purpose of establishing an off-road multi use path and utility corridor which could be used by pedestrians and cyclists. Horse riders can continue to use existing local roads

to access horse riding trails in the area. Improvements to horse riding facilities are beyond the scope of the Mona Vale Road East Upgrade proposal.

3) The proposal was designed to be consistent with Roads and Maritime design criteria and other specifications including the Guide to Road Design (Austroads, 2009). The design criteria for the proposal include those identified in Section 3.2.1 of the REF. The design has taken into account the safety of all road users including cyclists.
4) The proposal would result in improved road safety, reduced congestion and would provide for future population and employment growth. A dedicated off-road path and improved on-road facilities would be provided to improve safety for cyclists.
5) Several major strategic planning and policy documents provide direction and establish priorities that are relevant to the proposal (refer Section 2.1 of the REF). The *Mona Vale to Macquarie Park Corridor Strategy* (Roads and Traffic Authority, 2009) in particular provides an overview of the road transport system between Mona Vale and the De Burghs Bridge at Macquarie Park. The strategy identifies short-term and long-term priorities. In its list of longer term priorities (beyond 2014), it identified the need to:

    - With the Department of Planning and Pittwater Council, encourage public transport, walking and cycling in the development of Ingleside, and secure developer contributions to deliver this infrastructure (LT7).

2.13 Cumulative impacts

Submission numbers

83, Pittwater Council (108), Shore Regional Organisation of Councils (116), 138

Issue description

Respondents addressed the following potential cumulative impacts:

- The integration of the proposal with the development of the Ingleside Precinct
- Management of construction impacts from the proposal in combination with other local and regional developments.

In summary respondents raised the following matters for consideration:

1) Pittwater Council commented on the future development at Ingleside (Ingleside Precinct) and the need to integrate the upgrade of Mona Vale Road (East and West) with the development of the Ingleside Precinct to ensure both projects enhance environmental and community outcomes. Council also commented that the noise assessment and proposed mitigation measures should take into account the range of noise sensitive development planned within the Ingleside Precinct. Some respondents queried whether the traffic and transport assessment considered the traffic generation and increase in pedestrian movements from the future Ingleside Precinct.
2) Pittwater Council and Shore Regional Organisation of Councils suggest that there is likely to be other developments under construction at the same time as the proposed Mona Vale East upgrade, such as the road upgrades associated with the Northern Beaches Hospital development and the Northern Beaches bus rapid transit projects, compounded by the various infrastructure projects within the Sydney city centre. Consequently there is a need to adaptively manage traffic and public transport across the region during this time, not just locally, to minimise the cumulative impact on travel times and congestion. Alternative

arrangements such as increased express bus services, more direct bus services to the ferries, encouraging commuters to adapt their travel times and other opportunities should be explored in conjunction relevant councils.

Response

1) Section 6.4 and Appendix G of the REF describes how the traffic impact assessment considered estimated future traffic demand on Mona Vale Road as a result of expected future population and employment growth (including the currently planned Ingleside Precinct) as well as planned and committed road and public transport infrastructure improvements in the region.

   The *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State, including identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development (such as roads). As the Ingleside Precinct is developed it is required under the ISEPP provisions to consider the interim guideline D*evelopment near rail corridors and busy roads (2008.).* The guideline provides guidance for planning, design and assessment of development in or adjacent to busy roads. It provides advice to councils, state agencies, proponents and the community on ways to avoid and manage the impact of road operations on surrounding land uses and the impact of surrounding land uses on road infrastructure. Before determining a development application, a consent authority should, amongst other things, take into consideration these guidelines to minimise impacts of busy roads on residential and other sensitive development such as schools and child care centres. Further the consent authority should also consider if development proposals are likely to affect the structural integrity of road infrastructure, or limit the future development of road proposals. The development of Ingleside Release Area will need to consider both potential impacts on, and potential impacts from, Mona Vale Road Upgrade as part of the planning approval process.
2) A number of major developments and road upgrade projects are currently under investigation, proposed or approved for the Northern Beaches area. These include:

   - Mona Vale Road West Upgrade
   - Northern Beaches Hospital Road Connectivity and Network Enhancement Work Stage 1
   - Northern Beaches Hospital Connectivity and Network Enhancement Work Stage 2
   - Northern Beaches Hospital, Frenchs Forest Road, Frenchs Forest
   - Mona Vale Community Health Centre, Coronation Street, Mona Vale
   - Kimbriki Resource Recovery Project, Kimbriki Road, Terrey Hills
   - Future development at Ingleside (Ingleside Precinct Planning Project).

   Roads and Maritime is committed to working with councils, the Transport Management Centre and other developments to make traffic adjustments required during construction. This would need to be considered during the development of the Construction Traffic Management Plan for the proposal and may require communication and coordination between projects. Minimising

impacts attributable to the proposal is the best way to address any potential cumulative effects and various measures have been proposed throughout the REF and summarised in Section 7 of the REF.

3 Additional assessment

In light of changes to the proposal since the public display of the REF, additional assessments were undertaken for traffic and transport, and noise and vibration.

3.1 Traffic and transport

3.1.1 Summary

An addendum report was prepared to the original traffic and transport assessment (Mona Vale Road Upgrade East Traffic and Transport Assessment. AECOM, April 2015) for the proposal (refer Appendix G of the REF). The addendum report is included in Appendix A.

The addendum report considers alternate intersection layouts for the Mona Vale Road / Ponderosa Parade / Samuel Street intersection and the Mona Vale Road and Emma Street intersection. The revised intersection layouts are described in Section 4 of this report.

Table 3-1 summarises the morning (AM) and afternoon (PM) peak hour intersection delay, level of service and queuing (AM and PM) along Mona Vale Road in 2036 at the Mona Vale Road / Ponderosa Parade / Samuel Street intersection and the Mona Vale Road and Emma Street intersection.

Table 3-1 2036 AM / PM revised intersection performance

Intersection	Delay (s)		LoS		Queue Max (Worst leg)(m)	
	AM	PM	AM	PM	AM	PM
Mona Vale Road / Emma Street						
Do nothing	565.9	13.3	F	A	241 Est	8 Est
East and West upgrades	2.9	2.1	B	B	22 Est	13 Est
Mona Vale Road / Ponderosa Parade / Samuel Street						
Do nothing	108.4	36.4	F	C	254 Est	160 Est
East and West upgrades	36.3	46.7	C	D	187 Est	221 Est

Results above show that both intersections are expected to perform adequately with the proposed upgrades up to 2036.

3.2 Noise and vibration

3.2.1 Summary

A construction and operational noise assessment was prepared by Pacific Environment *Mona Vale Road Upgrade East – Noise and Vibration Assessment* (22 May 2015) and is detailed in Section 6.8 and Appendix K of the REF.

As a result of design changes to the proposal, a further assessment of potential construction and operational noise impacts was prepared (refer Appendix B of this report). To determine the potential change in operational noise levels the new alignment was remodelled and revised noise levels compared to the results from the REF. A review of the revised construction boundary was also undertaken to assess any changes in potential construction noise impacts.

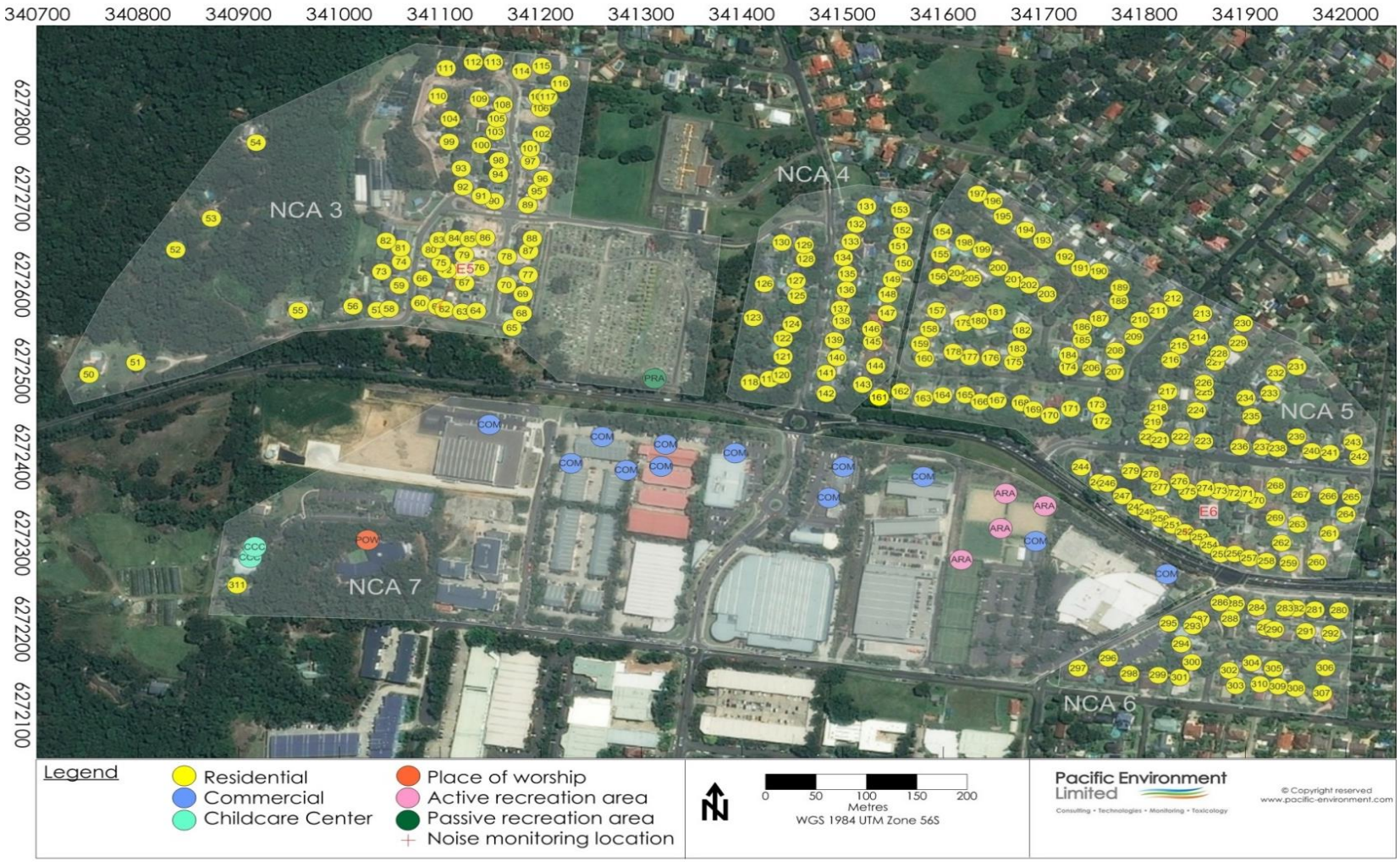


Figure 3-1 Project Layout, Receivers and NCAs – East *(source Pacific Environment, November 2015)*

Figure 3-1 provides noise catchment areas for the proposal (as shown in the REF). The revised assessment shows that with the change in the road alignment, there is a reduction in the number of receivers exceeding the noise criteria in noise catchment areas (NCA) 4 and 5. The total number of receivers exceeding the criteria is predicted to reduce by 11 for the Mona Vale Road East only scenario and by seven receivers for the Mona Vale Road East plus West scenario when compared with the previous design displayed in the REF. Fractional increases of 0.1- 0.4 dB(A) were reported at 11 receivers where changes in road geometry increased noise exposure. These increases did not result in any additional receivers requiring mitigation treatments.

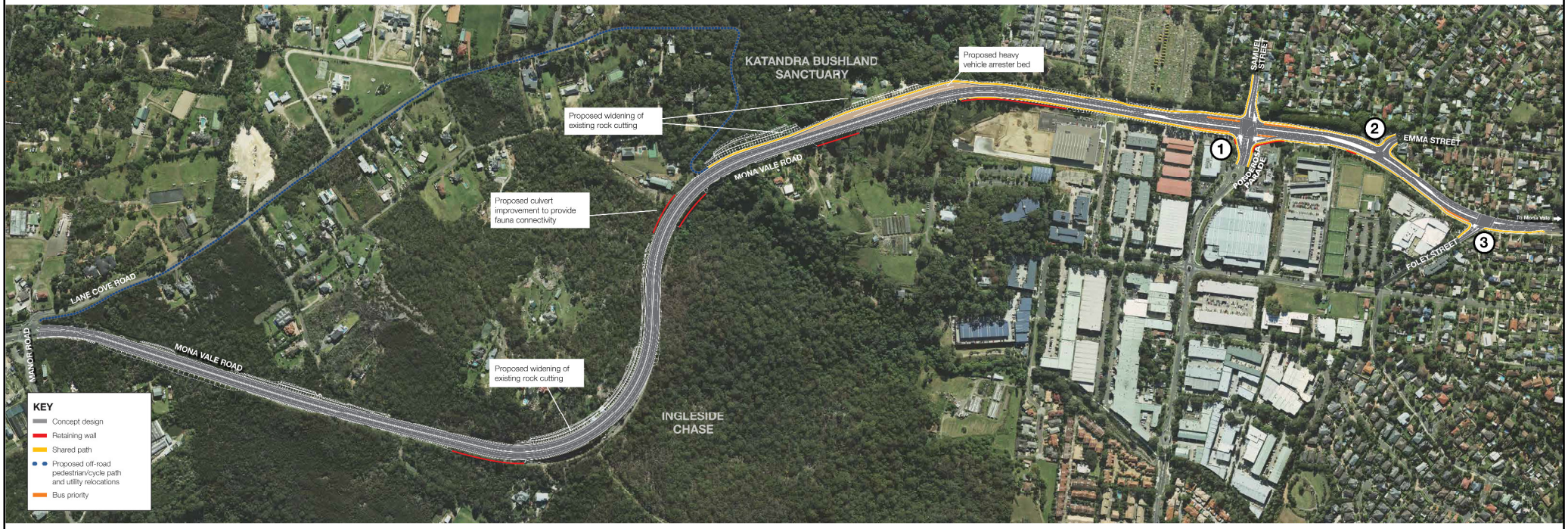
Further details are provided in Appendix B.

3.2.2 Additional management and mitigation measures

Following construction noise monitoring will be undertaken to confirm operational noise levels (including Lmax) for receivers within the nominated noise catchment areas.

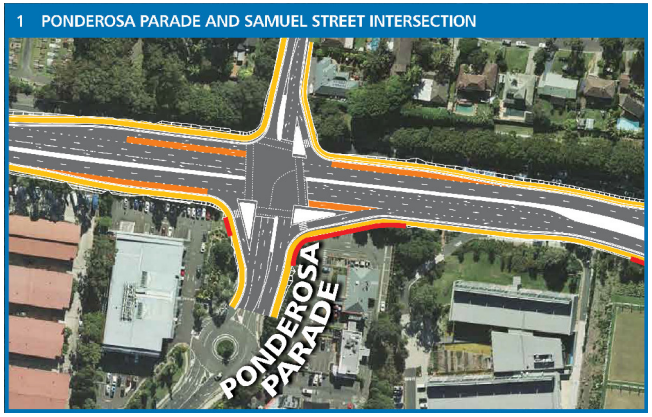
4 Changes to the proposal

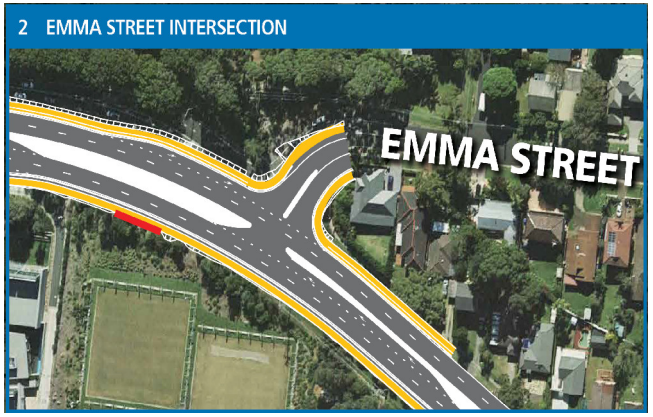
This section details the changes made to the proposal following public display of the REF and concept design. **Figures 4-1** and **4-2** show the proposed design changes. Only those environmental impacts relevant to the changes to the proposal are discussed.



Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale 30011633

Design changes to proposed Mona Vale Road East Upgrade **Fig. 4-1**





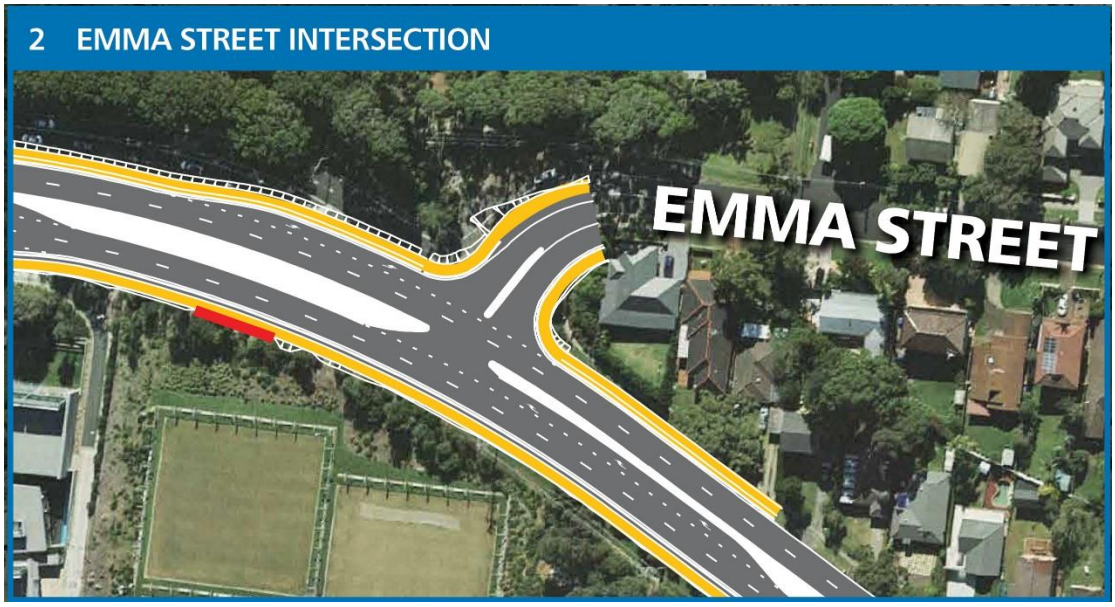
Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale 30011633

Intersection changes **Fig. 4-2**

4.1 Mona Vale Road and Emma Street intersection

4.1.1 Description

The revised layout of the Mona Vale Road and Emma Street intersection is shown in **Figure 4-2** and extracted below.



The revised intersection layout includes a channelised right turn layout with a sheltered right turn bay in the median of Mona Vale Road for right turning vehicles turning into Emma Street. The revised intersection layout retains all existing traffic movements and ensures that access is retained for local residents seeking to continue utilising the intersection.

4.1.2 Environmental assessment

Noise and vibration impacts

With the proposed change to the Emma Street intersection, the alternative routes identified in the REF would no longer be required for traffic accessing Mona Vale Road. This would therefore reduce the projected traffic increase on these alternative routes, including Oliver Way, Samuel Street, Parkland Way and Whitney Street. The result would also mean that there is unlikely to be an increase in road traffic noise for receivers living on these roads. This is a positive impact of the proposed design change.

Section 3.2 and Appendix B provides further details of the updated noise assessment including the design changes at Emma Street intersection.

Traffic and transport impacts

With the re-instatement of right turning movements at the Mona Vale Road and Emma Street intersection, alternative routes to access Mona Vale Road would no longer be required. This would decrease traffic projected to use these road as well as address other concerns such as safety around Mona Vale Public School, intersection queuing, congestion, kerbside parking, and property access. With the inclusion of the channelised right turn, the intersection is expected to perform to an acceptable level of service.

Section 3.1 and Appendix A provides further details of the updated traffic and transport assessment including the design changes at Emma Street intersection.

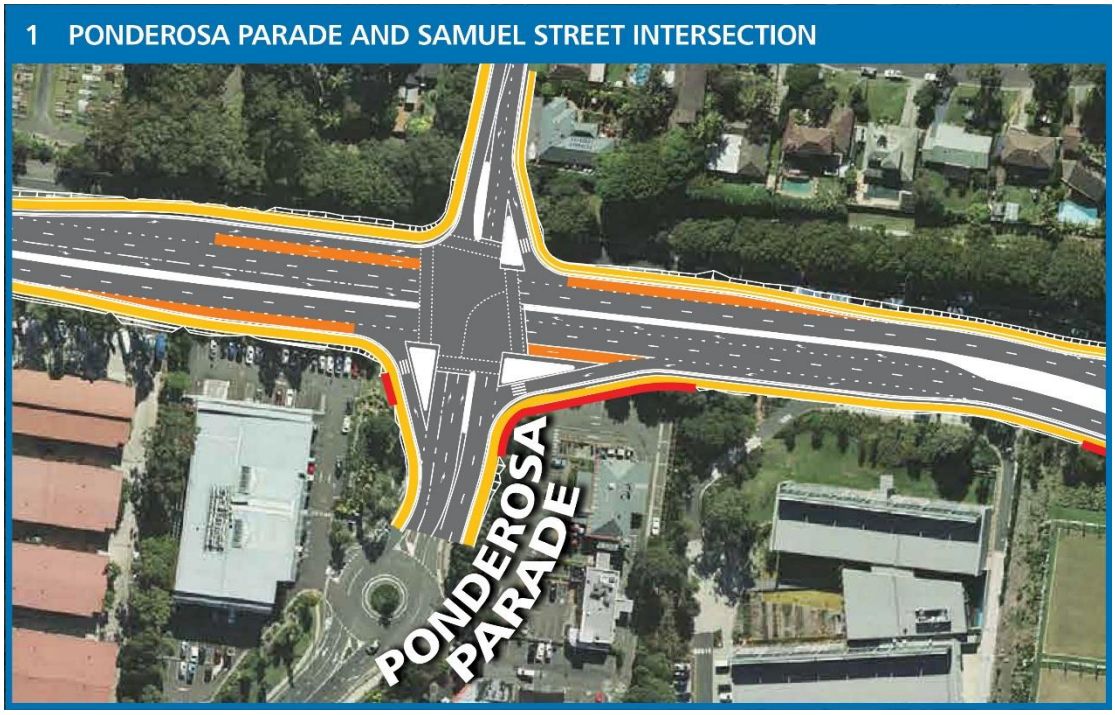
Socio-economic impacts

The proposed changes to the Emma Street intersection would improve access between Emma Street and Mona Vale Road. This is expected to reduce the amount of traffic using alternative routes to travel west or access Emma Street from Mona Vale Road. This could improve road safety at this intersection and on the alternative routes that would not be impacted by increased traffic 'rat running'. The roads around Mona Vale Public School would not be impacted by diverted traffic which will improve safety for school children during drop off and pick ups compared to the original proposal.

4.2 Mona Vale Road / Ponderosa Parade / Samuel Street intersection

4.2.1 Description

The revised lane configuration of the Mona Vale Road / Ponderosa Parade / Samuel Street intersection is shown in **Figure 4-2** and extracted below.



The layout of this intersection includes dedicated left turn lanes on all approaches, with left slip lanes provided on all but the east-bound approach of Mona Vale Road into Samuel Street. Short bus only lanes are provided in order to accommodate the higher volume of buses forecast as advised by Transport for NSW. It is estimated that this will include a bus service approximately every five minutes in the peak hour (peak direction) by 2021, with further enhancement to services by 2031. In the interim period (until bus numbers grow) it would be possible for general traffic to utilise this lane space without impacting the performance of the intersection. The concrete median at the entrance to Samuel Street has been shortened.

4.2.2 Environmental assessment

Socio-economic impacts

The left slip lane into Samuel Street from Mona Vale Road has been removed from the design of the proposal since the display of the REF. This means that property acquisition at the corner of the Mona Vale Road and Samuel Street intersection is no longer required. A revised table of property acquisition required for the proposal is provided in **Table 2-1**. In addition the concrete median at the entrance of Samuel Street has been shortened from the design displayed in the REF. This would improve access for properties near the intersection.

Noise and vibration impacts

The proposed change to Mona Vale Road and Samuel Street intersection, in particular the removal of the left slip lane, moves the road alignment to the south and away from residential properties on the northern side of Mona Vale Road. This is a positive impact of the proposed design change. The revised noise assessment for (refer Section 3.2 and Appendix B) shows that with the change in the road alignment, there is a reduction in the number of receivers exceeding the noise criteria in noise catchment areas (NCA) 4 and 5, which includes the residents at and around the Mona Vale Road and Samuel Street intersection.

Urban design and visual amenity

With the removal of the left slip lane from the design of the Mona Vale Road and Samuel Street intersection, street trees previously identified for removal are likely to remain in place. A survey will be undertaken of all street trees within the proposal area as part of detailed design to confirm this.

4.3 Truck arrester bed

4.3.1 Description

The original proposal presented in the REF, includes provision of a truck arrester bed next to the eastbound lane approaching Walana Crescent, near the bottom of the steep descent. Alternative locations were investigated by Roads and Maritime in response to community feedback. The revised location for the truck arrester bed is about 300 metres further west up Mona Vale Road next to the eastbound lane (refer to **Figure 4-1**). This moves the proposed truck arrester bed away from residential properties on Walana Crescent / Wallaby Circuit and the Mona Vale General Cemetery.

The purpose of the arrester bed is to provide a safe 'escape route' for heavy vehicles with braking problems. The heavy vehicle is safely decelerated and stopped by the drag caused by the vehicle as it sinks into the bed material. The proposed arrester bed would be five metres wide and about 150 metres long. The bed material would be washed pea gravel to a depth varying between 50 millimetres and 450 millimetres. A 4.5 metre wide shoulder would be constructed adjacent to the arrester bed to facilitate maintenance. **Figure 4-1** shows the truck arrester bed as part of the broader proposal, while **Figure 4-3** shows the proposed arrester bed profile.

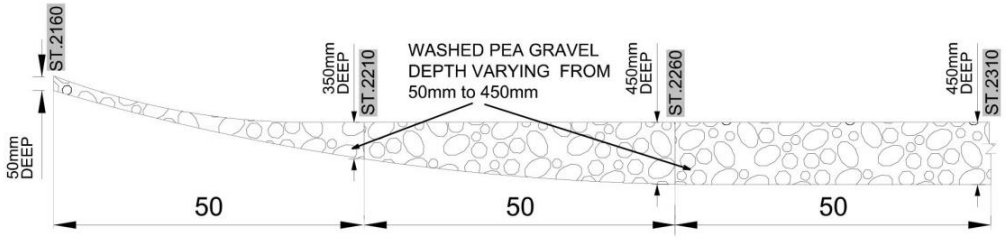


Figure 4-3 Truck arrester bed profile

4.3.2 Environmental assessment

Socio-economic impact

The re-location of the truck arrester bed away from properties near Walana Crescent / Wallaby Circuit would result in positive impacts for the Mona Vale General Cemetery. In particular the proposal no longer impacts properties identified as part of the future expansion of the cemetery.

Respondents concern regarding the proximity of the truck arrester bed to residential properties is also addressed with the re-location of the arrester bed further west away from more dense residential development.

The new location proposed for the truck arrester bed is adjacent to a property that will now require full property acquisition (revised property acquisition for the proposal is provided in **Table 2-1**). Land required for the proposal would be acquired prior to construction. Acquisition would be undertaken in accordance with the Roads and Maritime Services Land Acquisition Information Guide (Roads and Maritime Services, 2014b) and the *Land Acquisition (Just Terms Compensation) Act 1991*. Roads and Maritime will consult directly with all landowners where property is identified for partial or whole acquisition.

Biodiversity

The new proposed site for the truck arrester bed may require vegetation to be cleared during construction. The Biodiversity Assessment displayed as part of the REF included this area in the survey for the proposal. Whilst it is not expected that the overall clearing limits for the proposal has increased from the original proposal, the final clearing limits for the proposal will be determined during detailed design.

4.4 Utilities and off road shared path relocation

4.4.1 Description

The proposal includes the relocation of utilities via a utility corridor primarily along Lane Cove Road. Due to the proposed construction works within the Mona Vale Road corridor existing utilities would need to be relocated in order to protect them from construction impacts and to enable ongoing access to utilities for maintenance purposes. The Mona Vale Road corridor contains Ausgrid, Jemena, Sydney Water, Telstra and Optus assets. The existing Ausgrid network on Mona Vale Road is a mix of underground and overhead services with distribution mains consisting of street lighting, low voltage, high voltage 11 kV and transmission mains (33 kV) which will need to be relocated under the direction of Ausgrid and their appointed Accredited Service Provider. It is Roads and Maritime's preference to relocate utilities away from Mona Vale Road into a combined utility corridor. However details of the proposed

relocation are subject to further discussion and input from utility providers, such as Ausgrid, and would be confirmed during detailed design.

The relocation of the utilities away from Mona Vale Road and into a combined corridor within Lane Cove Road provides an opportunity to develop an additional multi-use shared path away from the Mona Vale Road corridor. This would be in the form of a concrete path along the proposed utility corridor within the existing road reserve of Lane Cove Road, either to the north or south of the existing road reserve (refer to **Figure 4-1** for location of proposed utility corridor).

The path was originally proposed to connect with Mona Vale Road near Walana Crescent. Recent consultation with property owners and stakeholders, including Katandra Bushland Sanctuary Trust, indicate that the proposed alignment for the multi-use shared path link to Mona Vale Road crosses through a parcel of land within the Katandra Bushland Sanctuary estate. Roads and Maritime has therefore revised the proposed location of the off road shared path so that it now follows Lane Cove Road to connect into Mona Vale Road further west of Walana Crescent. **Figure 4-1** shows the new alignment for the off road shared path connecting to Mona Vale Road.

The design of the utility corridor and off road shared path is yet to be confirmed therefore further environmental assessment is required for this component of the proposal prior to construction.

5 Environmental management

The REF for the Mona Vale Road East Upgrade identified the framework for environmental management, including management and mitigation measures that would be adopted to avoid or reduce environmental impacts (Section 7.2 of the REF).

After consideration of the matters raised in the public submissions and changes to the proposal, the management and mitigation measures have been revised to include some additional measures. Additional management measures are shown in red in **Table 5-1**.

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

5.1 Environmental management plans (or system)

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

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

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

5.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed work on the surrounding environment. The safeguards and management measures are summarised in **Table 5-1**.

Table 5-1: Summary of site specific environmental safeguards

No.	Impact	Environmental safeguards	Responsibility	Timing
1	General	• All environmental safeguards must be incorporated within the following: ○ Project Environmental Management Plan ○ Detailed design ○ Contract specifications for the proposal ○ Contractor's Environmental Management Plan	Roads and Maritime Project manager	Pre-construction
2	General	• A risk assessment must be carried out on the proposal in accordance with the Roads and Maritime Project Pack and PMS risk assessment procedures to determine an audit and inspection program for the work. The recommendations of the risk assessment are to be implemented. • A review of the risk assessment must be undertaken after the initial audit or inspection to evaluate is the level of risk chosen for the project is appropriate. • Any work resulting from the proposal and as covered by the REF may be subject to environmental audit(s) and/or inspection(s) at any time during their duration.	Project manager and regional environmental staff	Pre-construction After first audit
3	General	• The environmental contract specification G36 – Environmental Protection (Management System) must be forwarded to the Roads and Maritime Senior Environmental Officer for review at least 10 working days prior to the tender stage. • A contractual hold point must be maintained until the CEMP is reviewed by the Roads and Maritime Senior Environmental Officer.	Roads and Maritime Project manager	Pre-construction
4	General	• The Roads and Maritime Project Manager must notify the Roads and Maritime Environment Officer (Sydney Region) at least five days prior to work commencing.	Roads and Maritime Project manager	Pre-construction
5	General	• All businesses and residences likely to be affected by the proposed	Project manager	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		work must be notified at least five working days prior to the commencement of the proposed activities.		
6	General	• Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.	Construction contractor	Pre-construction and during construction as required.
Biodiversity				
B-1	Impact to biodiversity	A Biodiversity Management Plan (BMP) is to be prepared and included within the CEMP. The BMP is to include (but not be limited to) the following: • A site walk with appropriate site personnel including Roads and Maritime representatives to confirm clearing boundaries and sensitive location prior to commencement of work. • Identification (marking) of the clearing boundary and identification (marking) of habitat features to be protected. Eg. – use of flagging tape. • A map which clearly shows vegetation clearing boundaries and sensitive areas/no go zones. • Incorporation of management measures identified as a result of the pre-clearing survey report, completed by an ecologist, (G40, Section 2.4) and nomination of actions to respond to the recommendations made. This should include details of measures to be implemented to protect clearing limits and no go areas • A detailed clearing process in accordance with Roads and Maritime's Biodiversity Guidelines (2011) including requirements of Guide 1,2, 4 & 9. • Identify in toolbox talks where biodiversity would be included such as vegetation clearing or work in or adjacent to sensitive locations • Identify control/mitigations measures to prevent impacts on sensitive locations or no go zones	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		A stop work procedure in the event of identification of unidentified species, habitats or populations		
B-2	Removal or modification of native vegetation	On-site measures; clearing limits will be enforced and cordoned off and signposted.	Construction contractor	Pre-clearing and construction
B-3	Removal of individuals of a threatened species	Pre-clearing surveys, including trapping and relocation for fauna will be undertaken in accordance with the Roads and Maritime Biodiversity Guidelines.	Roads and Maritime	Pre-clearing
B-4	Predation by domestic and/or feral animals	Fauna crossing structures to be designed and approaches re-vegetated to reduce predation of animals using the crossings.	Roads and Maritime	Design stage
B-5	Loss of native vegetation and fauna habitats adjacent to approved construction zone.	The establishment of exclusion zones and clearing limits will be implemented. A suitably qualified ecologist would be engaged to survey and handle any fauna.	Construction contractor	Pre-clearing and construction
B-6	Increase in fauna fatality and injury	Fauna fencing is proposed at strategic locations across the footprint to reduce the occurrence of fauna accessing the road.	Roads and Maritime	Detailed design
B-7	Loss of habitat connectivity	Installation of fauna connectivity structures. A connectivity plan would be prepared for detailed design. The plan would be developed in consultation with a suitably qualified and experienced ecologist and would include: • Identification of connectivity objectives for the proposal. • Identification of species for which connectivity is to be provided at the culvert. • Consideration of the specific connectivity requirements for each	Roads and Maritime	All stages

No.	Impact	Environmental safeguards	Responsibility	Timing
		identified species. A monitoring plan would be prepared for operation of the conductivity structures implemented. The plan would be developed in consultation with a suitably qualified and experienced ecologist and would include: • Identification of monitoring objectives for the proposal • Identification of species to be monitored and suitable monitoring methods to be implemented to detect usage of the culvert by those species. A monitoring program for a period of up to three years following opening of the project.		
B-8	Hydrological changes	Robust erosion and sediment control measures within CEMP, need to consider potential impacts to Angus' onion orchid of changes to run off management	Construction contractor	Pre-clearing and construction
B-9	Weed invasion	Declared noxious weeds are to be managed according to requirements under the *Noxious Weeds Act 1993* and Guide 6 (Weed Management) of the RTA Biodiversity Guidelines 2011.	Construction contractor	Construction
B-13	Potential impact on eastern pygmy-possum	Fauna fencing at strategic locations along the road to assist fauna in reaching fauna underpasses. Fauna crossing structures will consist of one underpass and one rope bridge to enable animals to move between Ingleside Chase Reserve and Katandra Bushland Sanctuary. Monitoring of current underpass pre and post construction and new underpass as well as rope crossing. In areas that could contain pygmy-possums (woodland and sandstone heath) vegetation clearing should occur outside of the main breeding season (December – July). Vegetation planting should provide connectivity to the underpass at	Construction contractor	Pre-construction and Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		Narrabeen Creek to encourage crossing and reduce risk of predation. Installation and monitoring of nest boxes in accordance with a monitoring plan to be prepared in consultation with Council.		
SO-1	Erosion and sedimentation	A Soil and Water Management Plan (SWMP) would be prepared as part of the Construction Environmental Management Plan (CEMP) prior to the commencement of construction. The SWMP would address the following: • The Roads and Maritime Code of Practice for Water Management. • The Blue Book - Managing Urban Stormwater: Soils and Construction, Volume 1 and 2. • Roads and Maritime Technical Guidelines – Temporary Stormwater Drainage for Road Construction. The SWMP would include: • Stockpile management plan • Identification of catchment and sub-catchment area high risk areas and sensitive areas. • Sizing of each of the above areas and catchment. • The likely run-off from each road sub-catchment. • Direction of flow of on-site and off-site water. • Separation of on-site and off-site water. • Stockpiles will be designed, established, operated and decommissioned in accordance with the RTA Stockpile Site Management Guideline. • Direction of run-off and drainage points during each stage of construction. • Dewatering plan which includes process for monitoring flocculating and dewatering water from site (i.e any sediment basins and sumps).	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		• Progressive site specific Erosion and Sedimentation Control Plans (ESCPs). The ESCP is to be updated at least fortnightly. • A process to routinely monitor the Bureau of Meteorology weather forecasts. • Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. • An inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls.		
SO-2	Erosion and sedimentation	A Principal Erosion and Sedimentation Control Plan would be prepared during detailed design. The Principal Erosion and Sedimentation Control Plan would include: • Identify site catchment and sub-catchments, high risk areas and sensitive areas • Sizing of each of the above areas and catchments • Proposed staging plans for the project to ensure appropriate erosion and sediment controls measures are possible • The likely volume of run-off from each catchment and sub-catchment in accordance with the Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 (Landcom, 2004). • Direction of water flow, both off and on site • Diversion of off-site water around or through the site or details of separation of on-site and off-site water • The direction of runoff and drainage points during each stage of construction. • The locations and sizing of sediment basins / sumps as well as associated drainage to direct site water to the basin or sumps. • A mapped plan identifying the above at all major construction stages	Roads and Maritime	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
		A review process by a soil conservationist and a process for updating the report to address any recommendations.		
SO-3	Erosion and sedimentation	A soil conservationist from the Roads and Maritime Erosion, Sedimentation and Soil Conservation Consultancy Services Register is to be engaged to review the proposed erosion and sedimentation controls and conduct routine inspections of the construction work	Construction contractor	Construction
SO-4	Erosion and sedimentation	All stockpiles would be designed, established, operated and decommissioned in accordance with the Roads and Maritime Stockpile Management Procedures.	Construction contractor	Construction
SO-5	Erosion and sedimentation	Controls would be implemented at construction zone exit points to minimise the tracking of soil and particulates onto pavement surfaces.	Construction contractor	Construction
SO-6	Disturbance of contaminated land	Prior to the start of construction, additional environmental investigations will be undertaken to assess the current status of the TPH impacted soils at the truck incident site and assess if recent lane adjustment work have affected this location. Additional testing would be carried out to assess if contaminated soils have been removed or if migration of impacted areas has occurred, impacting previously unaffected areas.	Construction contractor	Pre-construction
SO-7	Disturbance of contaminated land	A Contaminated Land Management Plan will be prepared for the proposal and will include procedures to: • Identify potentially contaminated land through monitoring: □ for discolouration or staining of soil □ bare soil patches both on-site, and off-site adjacent to site boundary □ visible signs of plant stress □ presence of drums or other waste material □ presence of stockpiles or fill material □ odours. • Undertake further contamination assessment where necessary and	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		advise on the need for remediation or other action. This includes further investigation of the truck roll over area and any unexpected contamination finds. • Divert surface runoff away from the contaminated land. • Manage any surface runoff contaminated by exposure to the contaminated land. • Assess any requirement to notify relevant Authorities, including the EPA. • Manage any remediation and subsequent validation, including any certification required. • Review and update the plan. • The Contaminated Land Management Plan will contain the following: • Contaminated land legislation and guidelines including any relevant licences and approvals to be obtained. • Identification of locations of known or potential contamination and preparation of a map showing these locations. • Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint. • Contamination management measures including waste classification and reuse procedures and unexpected finds procedures.		
SO-8	Disturbance of asbestos containing materials	A classification system will be used to control the excavation, stockpiling and disposal of all potentially contaminated materials. Soils should be classified (where possible) in-situ prior to excavation or when stockpiled during excavation, depending on available time and room for stockpile areas. The same procedures will be followed for any unexpected finds.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
SO-9	Disturbance of asbestos containing materials	An Asbestos Management Plan will be prepared and implemented. Work in any area where asbestos is newly identified will cease immediately. An investigation will be then be undertaken and report prepared to determine the nature, extent and degree of the asbestos contamination. The level of reporting will be in accordance with *Guidelines for Consultants Reporting on Contaminated Sites* (Office of Environment and Heritage, 2011), any relevant WorkCover Guidelines and will include the proposed methodology for the remediation of the asbestos contamination. Remediation activities will not take place until receipt of the investigation report by occupational health professional. Work will only recommence upon receipt of a validation report from a suitably qualified contamination specialist that the remediation activities have been undertaken in accordance with the investigation report and remediation methodology.	Construction contractor	Pre-construction
Hydrology, hydraulics and water quality				
WQ-1	Concrete and other materials from construction vehicles entering waterways	Vehicle wash down will occur in a location that is bunded.	Construction contractor	Construction
WQ-2	Spills during construction	All fuels, chemicals and liquids will be stored in an impervious bunded area and at least 50 metres from creek and other waterways and slopes with a gradient above 10 per cent.	Construction contractor	Construction
WQ-3	Spills during construction	Refuelling of plant and equipment will occur either off-site or on relatively level ground at least 50 metres from waterways, drainage lines and sensitive areas. The refuelling machinery will have spill management equipment and there will be a person attending during the refuelling process.	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
WQ-4	Spills during construction	A Spill Management Plan would be prepared for the proposal. If a spill or incident occurs, the Roads and Maritime *Environmental Incident Classification and Management Procedure* (Roads and Maritime Services, 2014) will be followed and the Roads and Maritime Contract Manager notified immediately.	Construction contractor Roads and Maritime	Construction
WQ-5	Pollution from the road during operation	Consideration will be given to planting the level spreaders with suitable species to provide nominal water quality treatment prior to discharge.	Design contractor	Detailed design
WQ-6	Spills during operation	Opportunities to improve the management of spills (such as spill basins and/or suitable block / bund locations) for the truck arrester bed and Ponderosa Parade will be investigated during detailed design.	Design contractor Roads and Maritime	Detailed design
Traffic and transport				
TT-1	Construction traffic impacts	A traffic management plan (TMP) will be prepared prior to construction and would be included in the Construction Environmental Management Plan. The TMP would: • Identify the traffic management requirements during construction. • Describe the general approach and procedures to be adopted when producing specific traffic control plans. • Determine temporary speed restrictions to ensure safe driving environment around work zones. • Provide for access to local roads and properties, including the use of temporary turn-around bays where appropriate. • Include methods for implementing the traffic management plan and minimising road user delays. • Provide for appropriate warning and advisory signposting. Consider other developments in the wider area that may also be under construction, to minimise traffic conflict and congestion that may occur	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		due to the cumulative increase in construction vehicle traffic.		
TT-2	Construction traffic impacts	Consultation on construction activities will occur with emergency service authorities including NSW Rural Fire Service and NSW Fire and Rescue.	Roads and Maritime	Detailed design
TT-3	Construction traffic impacts	A detailed construction staging plan will be developed to maintain existing peak flow capacity.	Construction contractor	Pre-construction
TT-4	Access to bus services	Access to appropriate bus stop locations will be maintained during construction in consultation with bus operators. Any changes will be appropriately communicated to bus users.	Construction contractor	Construction
Aboriginal heritage				
AH-1	Damage to known Aboriginal sites	Fencing and signage will be used to establish exclusion areas around nearby Aboriginal sites.	Construction contractor	Pre-construction
AH-2	Damage to known Aboriginal sites	During site inductions and toolbox talks, all site staff will be made aware of the location of known Aboriginal sites and associated responsibilities under the *National Parks and Wildlife Act 1974*.	Construction contractor	Construction
AH-3	Damage to known Aboriginal sites	Potential impacts of construction vibration on nearby Aboriginal sites will be investigated prior to the commencement of construction. Construction methods would be selected and safeguards would be prescribed. Monitoring would occur where necessary.	Construction contractor	Pre-construction and Construction
AH-4	Unexpected impacts on Aboriginal heritage	The Standard Management Procedure: Unexpected Archaeological Finds Procedure (Roads and Maritime Services, 2012) will be followed in the event of uncovering a potential Aboriginal heritage item.	Construction contractor Roads and Maritime	Construction
Historic heritage				
HH-1	Impacts on known heritage values	Potential impacts of construction vibration on the Mona Vale Cemetery and the gateposts will be investigated prior to the commencement of construction. Construction methods will be selected and safeguards will be	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		prescribed (including vibration monitoring) to ensure there are no impacts on these items.		
HH-2	Impacts on known heritage values	The location and heritage significance of the Mona Vale Road Cemetery and gateposts and the potential presence of the well at Lot 26 DP 654262 will be discussed with staff during site inductions and tool box talks.	Construction contractor	Construction
HH-3	Unexpected finds	The Standard Management Procedure: Unexpected Archaeological Finds Procedure (Roads and Maritime Services, 2012) is to be followed in the event of uncovering a potential historic heritage item not considered by REF.	Construction contractor	Construction
Urban design and visual amenity				
VA-1	Landscape character and visual impacts	Detailed design of the proposal will incorporate the design vision, objectives and mitigation measures outlined in the Landscape Character, Visual Impact Assessment and Urban Design Report where feasible. This will include consideration of screen plantings, feature plantings and design refinements for each of assessed viewpoints.	Roads and Maritime Design Contractor	Detailed design
VA-2	Landscape character and visual impacts	An urban design contractor from the Roads and Maritime panel will be engaged for the detailed design phase to ensure adequate consideration of urban design principles and objectives, and to ensure appropriate mitigation of identified impacts.	Roads and Maritime Design Contractor	Detailed design
VA-3	Landscape character and visual impacts	The footprint for construction work will be kept to a minimum to ensure existing stands of vegetation remain intact wherever possible and to screen adjoining sensitive receivers.	Construction contractor	Construction
VA-4	Construction related visual impacts	The work site will be maintained so as to minimise construction related visual clutter.	Construction contractor	Construction
Noise and vibration				
NV-1	Construction noise	Construction noise would be managed by a detailed Construction Noise and Vibration Management Plan (CNVMP) prepared prior to	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		commencement of work. The management plan would consider the following as a minimum: • Identify nearby residences and other sensitive land uses. • Develop noise management levels consistent with the ICNG. • Assess the potential impact from the proposed construction methods. • Where management levels are exceeded examine feasible and reasonable noise mitigation. • Develop reactive and proactive strategies for dealing with any noise complaints. • Identify a site contact person to follow up complaints. • Noise monitoring.		
NV-2	Operational noise	During the detailed design stage of the proposal, further investigations of all feasible and reasonable mitigation options would be undertaken for affected receivers in accordance with the Road Noise Policy (DECCW 2011) and Roads and Maritime's Environmental Noise Management Manual Practice Note 4 (RTA 2001).	Roads and Maritime	Detailed design
NV-3	Construction noise	Consider construction compound layout so that primary noise sources are at a maximum distance from sensitive receivers (primarily residential receivers), with solid structures (sheds and containers) placed between sensitive receivers and noise sources (and as close to the noise sources as is practical)	Construction contractor	Pre-construction Construction
NV-4	Construction noise	Vehicle delivery times will be scheduled where feasible to the recommended construction hours to minimise noise impacts from heavy vehicle movements and deliveries.	Construction contractor	Construction
NV-5	Construction noise	Any out of hours work would comply with G36 community notification requirements and the mitigation measures specified within the Roads and Maritime's Noise Management Manual – Practice Note VII.	Construction contractor	Construction
NV-6	Construction	The environmental induction program will include specific noise and	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
	noise	vibration issues awareness training including, but not limited to, the following: • Avoiding use of radios during work outside normal hours. • Avoiding shouting and slamming doors. • Where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods. • Minimising reversing. • Avoiding dropping materials from height and avoiding metal to metal contact on material.		
NV-7	Construction noise	Building condition surveys will be undertaken for buildings within identified in the NVMP. A copy of the report will be sent to the landholder.	Construction contractor	Pre-construction
NV-8	Construction noise	In the case that exceedances are detected for noise and vibration monitoring, the situation would be reviewed in order to identify means to minimise impacts to residents and the appropriate changes made and the NVMP updated accordingly.	Construction contractor	Construction
NV-9	Operational noise	A post-construction noise monitoring program (including simultaneous traffic counts) will be undertaken in accordance with the Roads and Maritime's Environmental Noise Management Manual within 6 to 12 months of opening once traffic flows have stabilised in order to verify the noise assessment. This will include monitoring of maximum noise events (Lmax).	Roads and Maritime	Post-construction
Air quality				
AQ-1	Dust and emissions	An Air Quality Management plan (AQMP) would be prepared as part of the CEMP. The plan would include but not be limited to: A map identifying locations of sensitive receivers Identification of potential risks / impacts due to the work / activities as dust generation activities	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		Management measures to minimise risk including a progressive stabilisation plan A process for monitoring dust on site and weather conditions A process for altering management measures as required.		
AQ-2	Dust and emissions	The management measures within the AQMP would include but not limited to the following: • Vehicles transporting waste or other materials that have a potential to produce odours or dust are to be covered during transportation. • Dust will be suppressed on stockpiles and unsealed or exposed areas using methods such as water trucks, temporary stabilisation methods, soil binders or other appropriate practices. • Disturbed areas will be minimised in extent and rehabilitated progressively. • Speed limits will be imposed on unsealed surfaces. • Stockpiles will be located as far away from residences and other sensitive receivers. • Work (including the spraying of paint and other materials) will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely. • Plant, vehicles and equipment will be maintained in good condition and in accordance with manufacturer's specifications. • Plant and machinery will be turned off when not in use. • No burning of any timbers or other combustible materials will occur on site. • Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention • Work activities will be reprogrammed if the management measures are not adequately restricting dust generation.	Construction contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
Climate change and greenhouse gases				
GG-1	Greenhouse gas emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Construction contractor	Construction
GG-2	Greenhouse gas emissions	The energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.	Construction contractor	Construction
GG-3	Greenhouse gas emissions	Materials will be delivered as full loads and local suppliers would be used where possible to reduce construction transport emissions	Construction contractor	Construction
GG-4	Greenhouse gas emissions	Equipment will be properly maintained to ensure they are operating efficiently.	Construction contractor	Construction
Socio-economic				
SE-1	Property acquisition	All property valuations and acquisitions will be carried out in accordance with the Roads and Maritime Services Land Acquisition Information Guide (Roads and Maritime Services, 2014b) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	Roads and Maritime	Detailed design
SE-2	Property acquisition	A complaint handling procedure and register will be included in the Contractor's Environmental Management Plan.	Roads and Maritime	Detailed design
SE-3	Construction related disruption	Affected people will be notified of all aspects of the proposal prior to commencement of construction. This will include notification of time and duration of the proposal provision of a contact name and number.	Construction contractor	Pre-construction
SE-4	Construction related disruption	Potentially affected residents and businesses will be notified of the progress of the work and advised in advance (e.g. by letterbox drop, meetings with individuals, etc.) of any anticipated changes in noise emissions prior to critical stages of the work, and to explain complaint procedures and response mechanisms.	Construction contractor	Construction
SE-5	Construction related disruption	Potentially affected residents and businesses will be notified of the progress of the work and advised in advance (e.g. by letterbox drop, meetings with individuals, etc.) of any anticipated changes in noise	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		emissions prior to critical stages of the work, and to explain complaint procedures and response mechanisms.		
SE-6	Construction related disruption	Access to residences and business will be maintained during construction. Where temporary changes to access arrangements are necessary, the contractor will advise owners and tenants and consult with them in advance with regard to alternative access arrangements.	Construction contractor	Construction
SE-7	Relocation costs	Roads and Maritime will cover the costs of relocating specific items on the Pittwater RSL Club site, in consultation with club management.	Roads and Maritime	Construction
Hazards and risks				
HR-1	Construction hazards and risks	Emergency response plans will be incorporated into the construction environmental management plan. This will include a bushfire risk and response plan.	Construction contractor	Construction
HR-2	Debris build up on road shoulder during operation	Roads and Maritime maintenance contractors will be required to maintain the road including the road shoulders.	Roads and Maritime	Operation
HR-3	Bushfire hazard during operation	*Planning for Bush Fire Protection* (NSW Rural Fire Service, 2006) will be considered in finalising the landscape plan for the proposal.	Roads and Maritime	Detailed design
Waste management and resource use				
WR-1	Construction waste management	The following resource management hierarchy principles will be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance will be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). • Disposal will be undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001).	Construction contractor	Construction
WR-2		A Resource and Waste Management Plan (RWMP) would be prepared,	Construction contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		which will include the following (as a minimum): • The type, classification and volume of all materials to be generated and used on site including identification of recyclable and non-recyclable waste in accordance with the EPA's Waste Classification Guides 2014 • Quantity and classification of excavated material generated as a result of the proposal (Refer to Roads and Maritime's Waste Management Fact sheets 1-6, 2012) • Interface strategies for cut and fill on site to ensure re-use where possible • Strategies to 'avoid', 'reduce', 'reuse' and 'recycle' materials • Classification and disposal strategies for each type of material • Destinations for each resource / waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility • Details of how material would be stored and treated on-site • Identification of available recycling facilities on and off site • Identification of suitable methods and routes to transport waste • Procedures and disposal arrangements for unsuitable excavated material or contaminated material • Site clean-up for each construction stage.		
WR-3		Housekeeping at construction sites will be addressed regularly. This will include collection and sorting of recycling, general waste and green waste. Waste will be disposed regularly at a licensed waste facility or recycling where available.	Construction contractor	Construction
WR-4		Prepare and implement a design resource plan. As a minimum, the plan is to include the following information: • Outline the quantities and type of material that will be produced by	Detailed design contractor	Detailed design

No.	Impact	Environmental safeguards	Responsibility	Timing
		the project. • Outline the quantities and type of material that can be used during the detailed design. • Steps taken during detailed design to minimise the generation of materials such as excavated material. • How the design maximises the on-site re-use of any excavated materials. • How the design maximises the opportunities for the use of recycled materials (ensuring that the materials are fit for purpose and meet engineering performance standards). • Detail the quantities and type that cannot be re-used on site.		
WR-5	Resource use	Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.	Construction contractor	Construction
WR-6	Resource use	Excavated material will be reused onsite for fill where feasible to reduce demand on resources.	Construction contractor	Construction
Cumulative impacts				
CU-1	Cumulative construction impacts	The Construction Environmental Management Plan will be revised to consider potential cumulative impacts from surrounding development activities as they become known.	Construction contractor	Pre-construction and construction

5.3 Licensing and approvals

Table 5-2 lists the licences and approvals which are needed to construct and operate the proposal.

Table 5-2: Summary of licensing and approval required.

Requirement	Timing
An applicable road occupancy licence would be required. A road occupancy licence allows the proponent to use a specified road space at approved times, provided certain conditions are met. The licence applies to the occupation of the "road space" only and does not imply permission or approval for the actual (physical) work being undertaken.	An applicable road occupancy licence would need to be in place prior to the commencement of construction.
If groundwater extraction is required, an aquifer interference approval would be required for the work under Section 91F of the *Water Management Act 2000.*	Prior to construction commencement or during construction as required.
The proposal would be a scheduled activity under the Protection of the Environment Operations Act 1997. An environment protection licence (EPL) would be required under Section 48 of this act to authorise the carrying out of scheduled development	An EPL would be required prior to undertaking the scheduled work. Each period of 12 months (commencing from the issue of a licence) is a licence fee period for a licence. The administrative fee for any licence fee period of a licence must be paid not later than 60 days after the beginning of that licence fee period.

6 References

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Appendix A

Traffic and Transport Assessment: Addendum Report

Mona Vale (suburb) Access to Mona Vale Road

Addendum Report

December 2015

Prepared by AECOM

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Roads and Maritime Services

Mona Vale (suburb) Access to Mona Vale Road

December 2015

Prepared for

Roads and Maritime Services

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, Australia

Document controls

Title	Project title Document type

Approval and authorisation	
Prepared by:	AECOM
Accepted on behalf of the RMS by:	
	Signed:
	Date

Location	File name
P:\60319844_Mona_Vale Rd\6. Draft docs\6.1 Reports\Addendum	Mona Vale (suburb) Access to Mona Vale Road Addendum Report.pdf

Document status	Date
Final	December 2015

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1 Introduction

1.1 Study objectives

This study forms an addendum to the Mona Vale Road (East) Upgrade Traffic and Transport Assessment and is part of the Mona Vale Road Upgrade East Review of Environmental Factors (REF). The purpose of this traffic and transport addendum report is to:

- Review access between the suburb of Mona Vale and Mona Vale Road
- Assess the traffic and transport impacts of the proposed intersection upgrades (in isolation) at the following locations as a result of public submissions:
    - The intersection of Mona Vale Road / Ponderosa Parade / Samuel Street
    - The intersection of Mona Vale Road and Emma Street

1.2 Report structure

This report has been structured into the following sections:

- ***Section 2*** *of this report provides an overview of vehicle access to the Mona Vale suburb and identifies the changes to the REF as part of this Addendum Report.*
- ***Section 3*** *documents the traffic modelling methodology which has been adopted to predict future traffic volumes and performance of the Mona Vale Road Upgrade East. It then summarises the changes proposed to key intersections and provides an assessment of these changes.*
- ***Section 4*** *summarises the key outcomes of the Addendum Report*

1.3 Project Background

Roads and Maritime Services published the Mona Vale Road (East) Upgrade REF Traffic Assessment for consultation in July 2015. The report assessed the proposal to upgrade 3.2km of Mona Vale Road from two lanes to four lanes between Manor Road in Ingleside and Foley Street in Mona Vale - the Mona Vale Road Upgrade East ('the proposal'). Mona Vale Road is a 20km arterial road corridor running east-west between the Pacific Highway to the west and Pittwater Road to the east. The proposal location is shown in **Figure 1-1**.

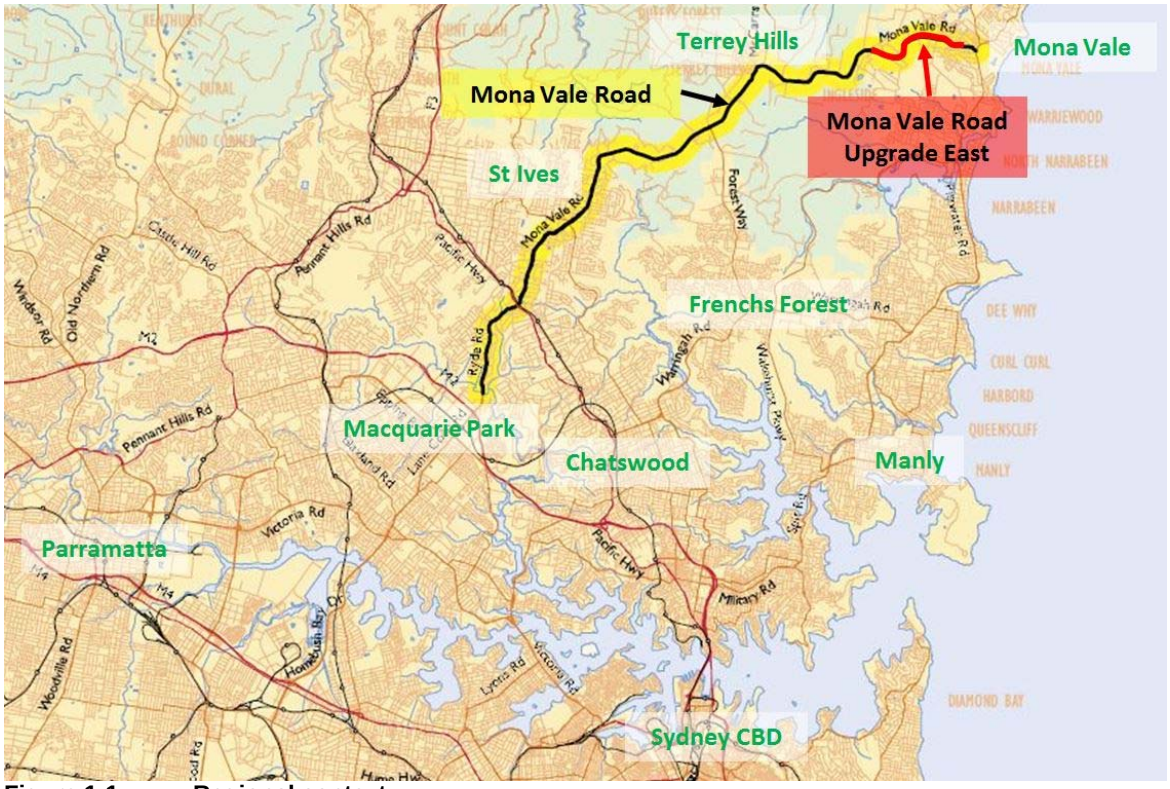

Figure 1-1 Regional context

The extent of Mona Vale Road Upgrade East is shown in **Figure 1-2**. As part of the proposal, Roads and Maritime plans to improve the Ponderosa Parade / Samuel Street intersection with traffic signals.

Figure 1-2 Mona Vale Road Upgrade East

2 Mona Vale (suburb) Access Review

2.1 Existing Land Use and Access

Land use in Mona Vale is predominantly low density residential (mostly to the north of Mona Vale Road). Other land uses include a business park on the southern side of Mona Vale Road, Mona Vale General Cemetery and Mona Vale Village Centre (located about 700m east of Foley Street).

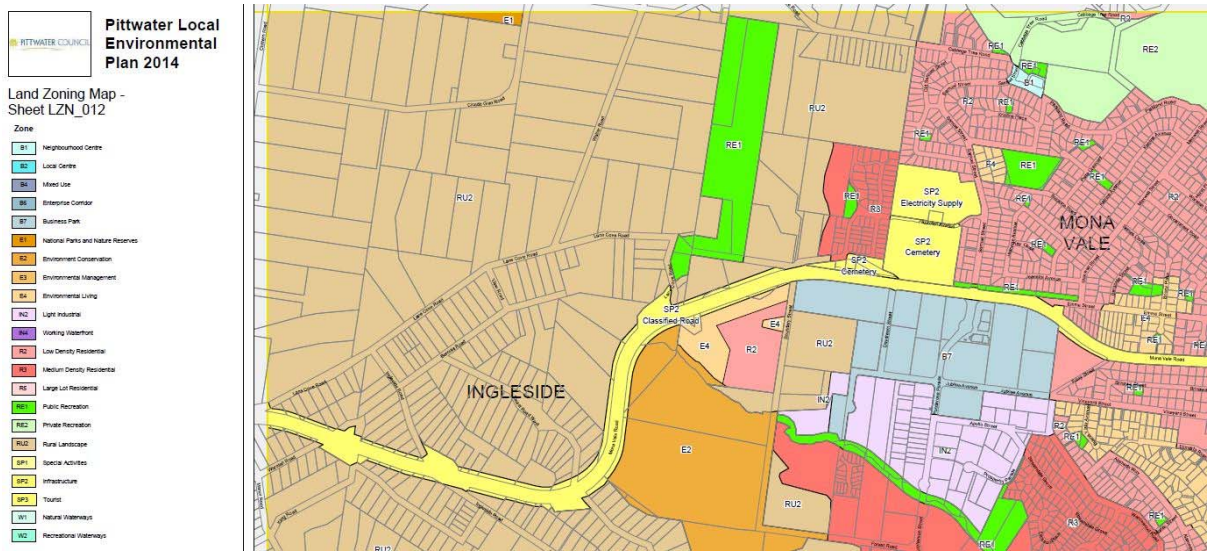

Figure 2-1 Land use surrounding Mona Vale Road East

Source: Pittwater Council, 2014

In order to access Mona Vale Road, the residents of Mona Vale (north of Mona Vale Road) rely on four access points:

- Samuel Street (proposed signals)
- Emma Street (priority intersection)
- Oliver Way (priority intersection)
- Bungan Street (signals)

It should be noted that there are other accesses between Mona Vale and the wider road network via intersections along Pittwater Road and Cabbage Tree Road.

Approximately 800m to the eastern end of the Mona Vale Road Upgrade East, the corridor terminates at a major signalised intersection with A8-Pittwater Road, the major north-south road corridor in the region. This is located adjacent to the Mona Vale town centre, accessed via Bungan Street. Access to Mona Vale Road between the town centre and Warriewood Escarpment is restricted to minor residential access roads (Oliver Way, Emma Street) and north-south connections to Warriewood and Mona Vale via Foley Street and Ponderosa Parade / Samuel Street.

2.1.2 REF Mona Vale Access Proposal

The Mona Vale Road (East) Upgrade Traffic and Transport Assessment proposed the following changes to the existing access arrangement:

- *Ponderosa Parade / Samuel Street – upgraded from a roundabout to a signalised intersection.*
- *Emma Street – removal of right turn movements (operating as left-in and left-out access).*
- *Foley Street – upgraded to include a longer eastbound right turn bay and a new dedicated westbound left turn bay to cater for turning movements from Mona Vale Road into Foley Street. In additional, a new left turn slip lane will be provided for westbound vehicles exiting Foley Street onto Mona Vale Road.*

With the removal of right turn movements into and out of Emma Street, a number of alternate routes were identified for vehicles to utilise. These routes are shown in **Figure 2-2** and include:

- Vehicles utilising alternate Mona Vale Road connections at Oliver Way, Samuel Street and Bungan Street. This would add up to 2.2km to the journey for some residential dwellings should they not wish to use the Oliver Way access or Foley / Ponderosa route.
- Vehicles currently accessing Emma Street from the east would need to use Oliver Way, Samuel Street, Bungan Street or Foley Street / Ponderosa Parade. This would add up to 2.2km to the journey for some residential dwellings should they not wish to use the Oliver Way access or Foley / Ponderosa route.

The REF justified these changes through the following:

> *"Although there may be additional journey time for some residents as a result of the Emma Street access operating as a left-in / left-out, the overall time taken to travel to their destinations is likely to be shorter than if signals were provided to retain all movements. This is because the traffic flow on Mona Vale Road would be significantly impacted with an additional set of signals"."*

Figure 2-2 Alternate routes (identified in the REF) with Emma street operating as left-in / left-out

2.1.3 Revised Mona Vale Access Proposal

The key change to access to Mona Vale considered as part of this Addendum Report is the re-instatement of right turning movements at the Mona Vale Road / Emma Street intersection. This intersection was identified by many respondents (in response to the access arrangement identified in **Figure 2-2**) as having an impact on their ability to drive between Mona Vale and Mona Vale Road in a timely manner. As such, existing vehicle movements will be retained and the alternate vehicle access arrangements discussed in **Section 2.1.2** are not proposed to be implemented.

2.2 Proposed Intersection Layout

As a result of the revised access arrangement at Emma Street, the proposed layout of the Mona Vale Road / Emma Street intersection is shown in **Figure 2-3.**

Figure 2-3 Mona Vale Road / Emma Street concept intersection layout

A channelised right turn access treatment is proposed at the Mona Vale Road / Emma Street intersection with the retention of all traffic movements. It is advised that in order for this layout to operate effectively, the median storage bay on Mona Vale Road for vehicles turning right out of Emma Street must be capable of accommodating a minimum of two standard vehicles or one large vehicle (e.g. a 12.5 rigid). This layout ensures that access is retained for local residents seeking to continue utilising the intersection.

The layout of the Mona Vale Road / Ponderosa Parade / Samuel Street intersection has also been identified for adjustments as a result of a review of impacts on property and access and the need for property acquisition. The footprint of the northern approach of the intersection has been reviewed. The revised layout of the intersection includes the removal of the left slip lane from Mona Vale Road (west) onto Samuel Street. The proposed lane configuration of the Mona Vale Road / Ponderosa Parade / Samuel Street intersection is shown in **Figure 2-4.**

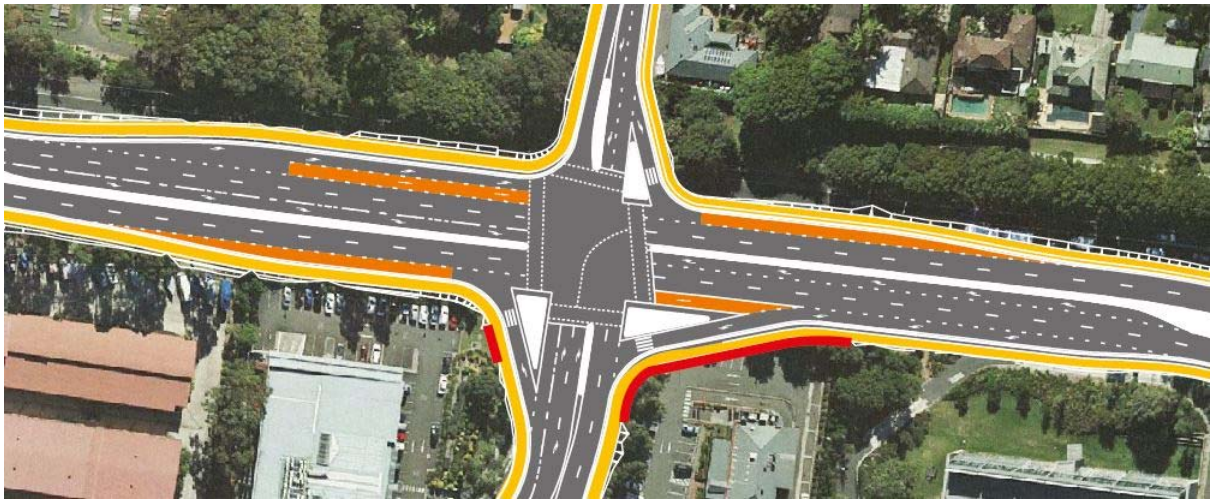

Figure 2-4 Mona Vale Road / Ponderosa Parade / Samuel Street concept intersection layout

The layout of this intersection includes dedicated left turn lanes on all approaches, with left slip lanes provided on all but the western approach of Mona Vale Road. Short bus only lanes are provided in order to accommodate the higher volume of buses forecast to be provided by Transport for NSW. It is estimated that this will include a bus service approximately every 5 minutes in the peak hour (peak direction) by 2021, with further enhancement to services by 2031. In the interim period (until bus numbers grow) it would be possible for general traffic to utilise this lane space without impacting the performance of the intersection.

3 Intersection Assessment

3.1 Methodology

This section summarises the modelling approach undertaken as part of the Mona Vale Road (East) Upgrade REF Traffic Assessment and this Addendum Report. A two-staged traffic modelling approach was adopted for the Traffic Assessment in order to determine the impacts of the road upgrade, including intersection performance and recommended sizing and lane configuration as well as any opportunities to improve active and public transport infrastructure such as pedestrian crossings and bus priority measures.

- Stage 1 - Strategic traffic demand modelling (using CUBE) to estimate future traffic demand on Mona Vale Road as a result of expected future population and employment growth estimated by the State Government (including the currently planned Ingleside Release Area) as well as planned and committed road and public transport infrastructure improvements in the region.
- Stage 2 – Micro-simulation modelling for the Mona Vale Road study area to quantify the performance of the corridor and its intersections as well as the benefits of the proposal such as travel time improvements.

3.1.1 Strategic Model (CUBE)

The strategic modelling methodology used for this study takes a three tiered approach which takes advantage of the various datasets available. The three tiers are defined as follows:

1 *Strategic level – At the strategic level AECOM's SSTM provides high level demand into and out of the Northern Beaches region. SSTM uses the standard 2006 BTS travel zone definitions.*

2 *Subarea level – In order to provide a more detailed focus on the Mona Vale study area, a subarea model is generated from the strategic network for the AM peak. This network is then refined to incorporate additional land use and network detail. The traffic demand for the subarea model uses the strategic level demand as a starting point with local area trips then overlayed on top of this.*

3 *Corridor level – For the AM and PM peaks the subarea model is further refined to the corridor level, with the coverage at this stage aligning with the coverage of the microsimulation model.*

3.1.2 Intersection Modelling (VISSIM / SIDRA)

To support the traffic assessment as part of the REF, it was agreed with Roads and Maritime that a VISSIM microsimulation model would be developed to quantify the performance of the corridor and its intersections. The strategic modelling results were used to inform the generation of a corridor microsimulation model. VISSIM Version 5.40-09 was used in the development of the micro-simulation models for the Mona Vale Road study area.

For the purposes of this Addendum Report, it was agreed that SIDRA (version 6.1) modelling (using the outputs from the VISSIM models) would be the most effective method for reviewing intersection designs in isolation at the following locations:

- Mona Vale Road / Ponderosa Parade / Samuel Street
- Mona Vale Road / Emma Street

As such, this Addendum Report does not re-run the VISSIM model used as part of the REF assessment. Initial testing indicated that both models provided comparable results at Mona Vale Road / Ponderosa Parade / Samuel Street. The 2036 Full Mona Vale Road Upgrade Scenario has been assessed during both the AM and PM peak hours.

3.2 Level of Service

This section summarises the results of the SIDRA modelling assessments undertaken for the two intersections assessed as a result of the changes identified in **Section 2.1.3** and illustrated in **Section 2.2**. The assessment of intersection performance is typically based on the Level of Service as defined in the *Guide to Traffic Generation Developments, NSW, RTA 2002*. **Table 3-1** outlines the six levels of service for intersections, with LoS A representing optimum operating conditions and LoS F the poorest.

Table 3-1 Level of Service criteria

Level of service	Average delay per vehicle	Traffic signals / Roundabouts	Give way / Stop signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delay	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays	At capacity; requires other control mode
F	> 70	Extra capacity required	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, Roads and Maritime, 2002

3.2.2 Intersection Assessment

The following assessment results have been obtained using SIDRA and are based on estimated 2036 traffic volumes. Each intersection has been assessed in isolation, and reflects modified layouts compared to those assessed as part of the Mona Vale Road (East) Upgrade REF Traffic Assessment. **Table 3-2** summarises the morning peak hour intersection delay and queuing along the Mona Vale Road study area in 2036 (under the Full Mona Vale Road Upgrade scenario), with the proposed changes described in **Section 2.2**.

Table 3-2 2036 AM intersection performances (SIDRA)

Intersection	Control Delay (s)	Level of Service	Queue Max Worst Leg (m)
Mona Vale / Emma			
Full MVR Upgrade	2.9	B	22 East
Mona Vale / Ponderosa / Samuel			
Full MVR Upgrade	36.3	C	187 East

Source: AECOM, 2014

Table 3-3 summarises the evening peak hour intersection delay and queuing along the Mona Vale Road study area in 2036 (under the Full Mona Vale Road Upgrade scenario) with the proposed changes described in **Section 2.2**.

Table 3-3 2036 PM intersection performance

Intersection	Control Delay (s)	Level of Service	Queue Max Worst Leg (m)
Mona Vale / Emma			
Full MVR Upgrade	2.1	B	13 East
Mona Vale / Ponderosa / Samuel			
Full MVR Upgrade	46.7	D	221 East

Source: AECOM, 2014

The results above show that the intersections are expected to perform adequately up to 2036 with the proposed changes. The following should be noted when reviewing intersection performance results:

- Strategic modelling indicates that under all modelled scenarios, some vehicles are unable to gain access to this sections of road being modelled (both Mona Vale Road Upgrade East and Mona Vale Road Upgrade West), due to constraints on the road network external to the Mona Vale Road study area, such as the intersection of Mona Vale Road / Pittwater Road.
- These results do not reflect signal coordination between adjacent intersections.
- Delay at Emma Street is likely to be highly variable in practice, depending on signal coordination at adjacent signalised intersections, however overall level of service is likely to remain acceptable.
- Queuing on Mona Vale Road (in 2036) east of the Mona Vale Road / Ponderosa Parade / Samuel Street signalised intersection almost reaches back to the Mona Vale Road / Emma Street intersection. If this queue becomes any longer than forecast, it may be difficult for vehicles to enter or exit Emma Street.

4 Summary and recommendations

This report is an addendum to the Mona Vale Road (East) Upgrade Traffic and Transport Assessment and the Mona Vale Road Upgrade East Review of Environmental Factors (REF).

The key change to access to Mona Vale considered by this Addendum Report is the re-instatement of right turning movements at the Mona Vale Road / Emma Street intersection. The original design in the REF was for a left-in / left-out arrangement.

In addition to the proposed changes at Emma Street, the intersection of Mona Vale Road / Ponderosa Parade / Samuel Street has also been modified and re-assessed as part of this addendum report. The layout of the Mona Vale Road / Ponderosa Parade / Samuel Street intersection includes dedicated left turn lanes on all approaches, with left slip lanes provided on all but the western approach of Mona Vale Road. Short bus only lanes are provided in order to accommodate the higher forecast volume of buses advised to be operating in 2036 (Transport for NSW).

The Mona Vale Road / Emma Street intersection is proposed retain all traffic movements with a channelised right turn access and provision of a median storage bay. This layout ensures that access is retained for local residents seeking to continue utilising the intersection.

Results above show that both intersections are expected to perform adequately with the proposed upgrades up to 2036.

Appendix B

Noise and Vibration Assessment: Addendum Report

Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

30 November 2015

Carolyn McCallig
Senior Associate - Environment
SMEC

Carolyn.McCallig@smec.com

Dear Carolyn

Re: Mona Vale Road Upgrade East, Revised Alignment - Noise Assessment

This letter details an assessment of changes in noise as a result of road alignment changes for the Mona Vale Road Upgrade East Project.

A construction and operational noise assessment was previously prepared by Pacific Environment *'Mona Vale Road Upgrade East – Noise and Vibration Assessment'* (ref. no. 9137-003 dated 22 May 2015) as part of the project Review of Environmental Factors (REF).

To determine the potential change in operational noise levels for the new alignment, Pacific Environment has remodelled with the updated road alignment and compared the resulting exceedances with those reported in the REF. A review of the construction boundary has also been provided to determine whether significant changes in construction impacts would be expected.

1 ALIGNMENT DESCRIPTION

Design changes include adjustments to the road alignment, and a shift in location of the arrestor bed to the west. The change in alignment has primarily shifted Mona Vale Road towards the south. The alignment shift varies along the project corridor from nil to 4.5 metres off the design modelled for the REF. The most significant changes in alignment with potential to change noise levels at residences are between Foley Street and Boundary Street.

Figures showing the location of noise catchment areas (NCAs), individual sensitive receivers and the road design and construction boundary are shown in **Appendix A**. Detailed figures presenting the updated alignment are presented in **Figures 1-1** to **1-6** of the Submissions Report.

2 OPERATIONAL NOISE MODELLING

Modelling to determine the change in operational noise impact was undertaken utilising components of the original acoustic model prepared for the REF. The updated design was input into the model leaving all other modelling parameters unchanged, including surrounding terrain, buildings, ground absorption, traffic volumes and model parameters.

A summary of the noise receivers where mitigation investigation would be required is presented in **Table B-1 Appendix B**. Results for place of worship and the childcare centre are also presented in **Appendix B.**

Pacific Environment Operations Pty Ltd
Lvl 1, 146 Arthur Street
North Sydney, NSW, 2060

(ASX: PEH) ABN: 86 127 101 642
www.pacific-environment.com
Ph: +61 2 9870 0900

A brief summary of the number of receivers exceeding all criteria are detailed in **Table 2-1**. This table identifies the number of receivers in each NCA that should be considered for mitigation, the number that experience noise levels above the cumulative noise limit, and the changes in cumulative limit exceedances compared to the REF.

Table 2-1: Summary of Exceedances – Revised Alignment

Noise Catchment Area	Number of Receivers					
	2031 East Only			2031 East and West		
	Consideration for Mitigation	Exceed Cumulative Limit	Change in Cumulative Limit Exceedances[1]	Consideration for Mitigation	Exceed Cumulative Limit	Change in Cumulative Limit Exceedances[1]
1	2	1	-1	6	2	0
2	0	0	0	4	0	-1
3	0	0	-5	10	0	-4
4	2	1	0	2	2	0
5	19	12	-5	22	19	-2
6	7	7	0	7	7	0
7	2	0	0	4	0	0
8	0	0	0	3	1	0
Total	32	21	-11	58	31	-7

Note 1: Change compared to number of exceedances reported in REF (Pacific Environment 2015, 9137-003).

2.1 Discussion

Where the road alignment has been moved further away from receivers in NCA 4 and NCA 5 the number of receivers requiring mitigation has decreased. The total number of receivers exceeding the cumulative limit is predicted to reduce by 11 for the East-only scenario and by 7 receivers for the East plus West scenario when compared with the previous design. Fractional increases of 0.1- 0.4 dB(A) were reported at 11 receivers where changes in road geometry increased noise exposure. These increases did not result in any additional receivers requiring mitigation.

Noise levels at the Bowling Club were predicted to increase by 1 dB at the closest point to Mona Vale Road. Predicted noise levels at commercial receivers, the child care centre and place of worship all increased from 0.1-0.5 dB(A).

2.2 Maximum Noise Events

The change in alignment will not significantly affect the number of maximum noise events. Where the alignment shifts further from noise sensitive receivers the magnitude of maximum noise events will reduce. The most significant changes will be apparent for receivers in NCA 4 and NCA 5 where maximum noise levels are expected to reduce by 1 dB.

As described in the REF overall the number of events would likely increase with traffic growth over time. However, there is potential for features of the upgrade such as straightening of corners and improved gradients to assist in reducing heavy vehicle engine compression braking.

3 MITIGATION

Overall noise mitigation requirements are expected to be similar to the REF Noise and Vibration Assessment (Pacific Environment 2015).

Where predicted noise levels have exceeded noise criteria, mitigation should be investigated for the project. The Noise Management Guideline (RMS, 2015) states that mitigation measures should be considered in the following order of priority:

1. Integrated design measures such as road design and traffic management.
2. Quieter pavement surfaces.
3. In corridor barriers.
4. At-property treatments.

For this project, a receiver may qualify for consideration of additional noise mitigation (beyond the integrated design measures such as road design and traffic management) when the following triggers are met:

- Exceeds the NCG criteria and experience an increase in the total noise level of more than 2 dB as a result of the project; or
- Exceeds the cumulative limit (i.e. total noise level in the build year is 5 dB or more above the criteria at the design year). Receivers are only eligible for mitigation as part of the project if the project road contributes more than 2 dB(A) to the total noise level and are equal to or above the cumulative level; or
- Receivers where the project contribution is equal to or exceeds $L_{Aeq,15hr}$ 65 dB(A) and $L_{Aeq,9hr}$ 60 dB(A).

Noise mitigation measures should be considered reasonable and feasible as defined within the RNP. Further guidance on the investigation of mitigation measures is provided in the NMG.

3.1 Road Design and Traffic Management

Alterations to the road design to reduce road traffic noise levels includes changes to gradients, alignments, road design and administrative controls. Design controls and traffic management have already been considered as part of the options study and have not been included in this assessment.

3.2 Quieter Pavement Surfaces

Stone Mastic Asphalt (SMA) was presented as an option for consideration as part of the REF assessment. The implementation of SMA was previously predicted to result in approximately 2 dB(A) reduction where implemented.

3.3 In Corridor Measures

In corridor noise barriers have also been considered for the project, provided that they meet the requirements specified in the NMG.

Noise barriers for affected sensitive land uses are not considered where receivers are:

- In groups of 3 or less; or
- Are accessed via Mona Vale Road.

A noise barrier could be considered for receivers 55-65. The barrier would run from the east end of the arrester bed to the start of the cemetery on Mona Vale Road as indicated in **Appendix B**. Initial modelling indicates that a barrier of height 3 m would result in all the affected properties reduced to meet the NCG criteria.

3.4 At Property Treatment

Architectural treatment is considered for residential dwellings after road design, traffic management, quieter pavement surfaces and in corridor measures have been explored.

At property treatments typically consist of architectural treatments. Architectural treatments are aimed at preserving internal amenity at potentially impacted residences and are an option that may be considered where it is not cost-effective or feasible to implement other forms of mitigation. In some cases, a combination of at-road, path control and at-property treatment can provide the most reasonable overall noise reduction for an affected community. At-property treatment may also need to be considered when levels are still above the criteria upon implementation of other treatment measures.

Typically the following levels of treatment are offered:

- Up to 10 dB exceedance – offer fresh air ventilation, sealing of wall vents and check window and door seals and replace where necessary.
- Greater than 10 dB exceedance – offer fresh air ventilation, sealing of wall vents and check window and door seals and replace where necessary. Offer (residences in suitable condition) to upgrade glazing and doors (if required) that are exposed to road traffic noise.

A residence may qualify for treatment if, during an inspection, it can be confirmed that there are 'habitable zones' as defined by the Building Code of Australia along noise affected facades. Other factors that may also be considered are the building and façade condition, construction and if the habitable zones can receive fresh air ventilation from an unaffected region without additional treatment.

3.5 Mitigation for Non-Residential Receivers

Non-residential sensitive receivers include the childcare centre, the place of worship and the bowling club located in NCA 7. The predicted noise levels indicated that the external area of the place of worship and the two closest bowling greens to Mona Vale Road in NCA 7 would be eligible for the investigation of mitigation.

4 CONSTRUCTION NOISE

The revised design has resulted in an updated construction boundary. To determine changes in potential noise impact the separation distance between nearest receivers and the construction boundary have been reviewed. **Table 4-1** presents the predicted construction noise levels for receivers closest to and furthest from the road in each NCA based on the proposed design. Bridgework is limited to certain areas and therefore is most relevant to NCA 2. Rock breaking equipment was not assumed to operate at the closest point to NCAs 4, 5, 6 and 7.

Table 4-1: Predicted Construction Noise Levels

NCA	Approx. distance to works (m)	Criteria D/E/N	Predicted Scenario Noise Level LAeq,15min								
			Clearing	Utility Adjustment	Asphalt pavement demolition	Bridgework	Bulk earthworks	Drainage	Pavement construction	Street Lighting	Signposting and line marking
1	45-500	52/46/35	29-77	20-72	25-70	-	24-84	24-77	22-70	20-59	22-66
2	109-350	53./46/37	33-69	24-64	29-62	26-67	28-76	28-69	26-62	24-51	26-58
3	60-380	59/45/35	32-75	22-69	28-67	-	26-81	26-75	25-67	22-57	25-63
4	20-220	59/45/35	37-84	28-79	33-77	-	31-81	31-84	30-77	27-66	30-73
5	15-230	55/44/35	42-87	32-81	37-79	-	36-83	36-87	34-80	32-69	34-75
6	15-220	55/44/35	42-87	33-81	38-79	-	36-83	36-87	35-80	32-69	35-75
7	20-250	59/45/35	36-84	26-79	32-77	-	30-81	30-84	29-77	26-66	29-73
8	40-400	56/46/40	36-78	27-73	32-71	-	31-85	31-78	29-71	27-60	29-67

Note: No rock breaking equipment assumed to operate closest to NCAs 4, 5, 6 and 7.

Noise impacts were predicted to increase by 1 - 2 dB(A) where works are undertaken on the southern boundary of the project in NCA 6. Greater separation between nearest receivers in NCA 3 reduced worse case noise levels by 10 – 12 dB(A). Results similar to the REF are expected for the other NCA's.

Noise management and mitigation measures are detailed in the REF Noise Assessment. The selection and implementation of mitigation measures should be confirmed in the project construction noise and vibration management plan (CNVMP) taking into consideration project staging, construction methods selected and any out of hours works.

5 CONCLUSION

An investigation of potential changes in noise impacts as a result of road alignment changes for the Mona Vale Road Upgrade East Project has been undertaken.

The proposed design changes were remodelled to determine likely changes in noise impact. The results indicate a reduction in noise impacts at some receivers, primarily at the eastern end of the project between Fowley Street and Boundary Street. This resulted in a reduction in the number of dwellings exceeding the cumulative noise limit.

A noise mitigation strategy should be considered following a similar process to that detailed in the REF noise assessment. Results included in this assessment and preliminary modelling for a noise barrier on the northern side of Mona Vale Road between the Mona Vale Cemetery and Walana Crescent should also be considered.

Review of the construction boundary indicated a slight reduction in separation between receivers south of Mona Vale Road adjacent the Foley Street intersection. This resulted in a 1 – 2 dB(A) potential increase in construction noise impacts at these receivers. Reductions in construction noise impacts are expected at receivers on Wallaby Circuit with a greater separation from construction.

Please do not hesitate to contact the undersigned to discuss the results of this assessment.

Yours sincerely

Aaron McKenzie
Practice Lead - Acoustics

Pacific Environment Limited

Enclosure
Appendix A – Figures.
Appendix B – Noise modelling results.

APPENDIX A. FIGURES

Figure A-1: Alignment and Construction Boundary

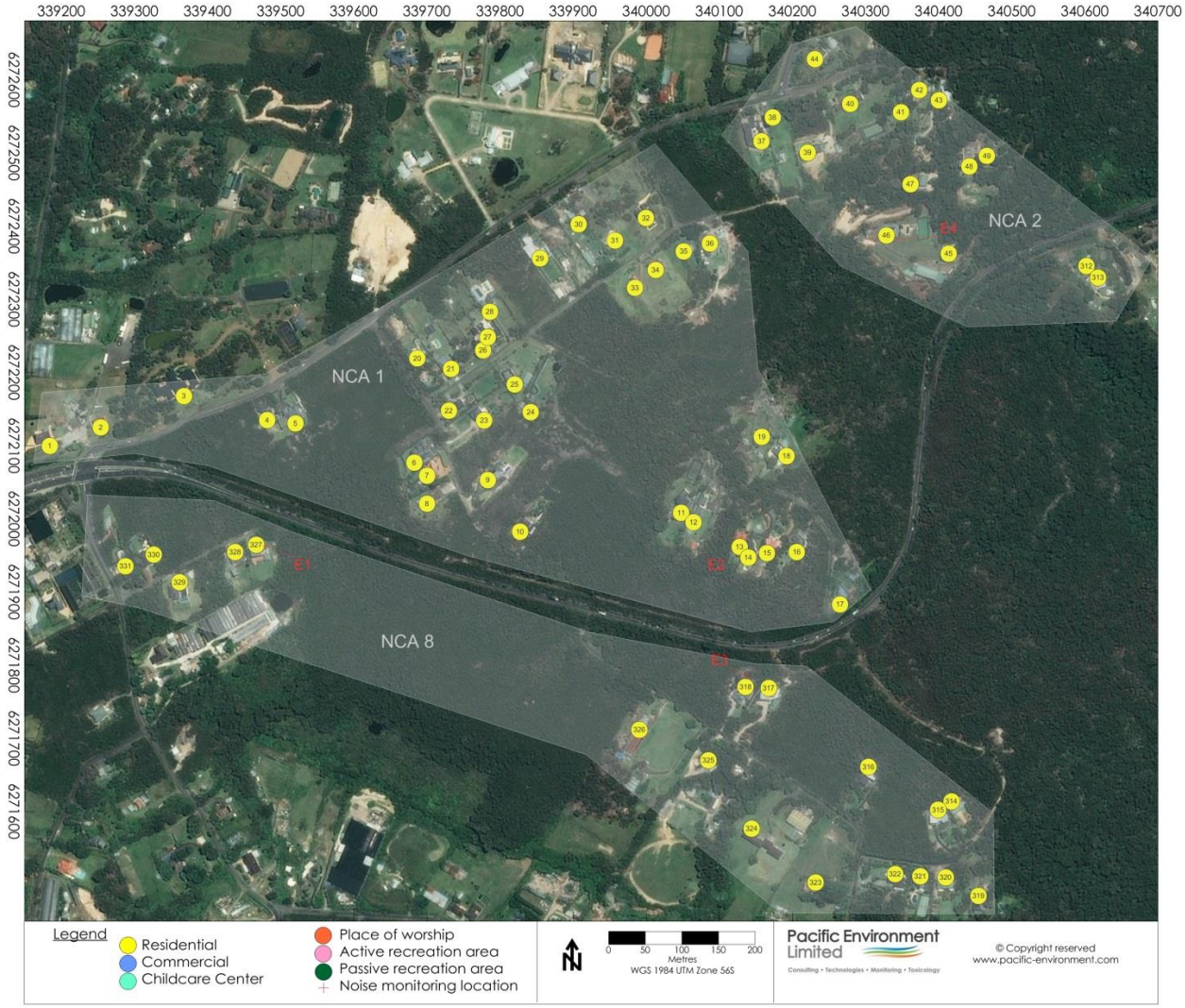

Figure A-2: Project Layout, Receivers and NCAs - West

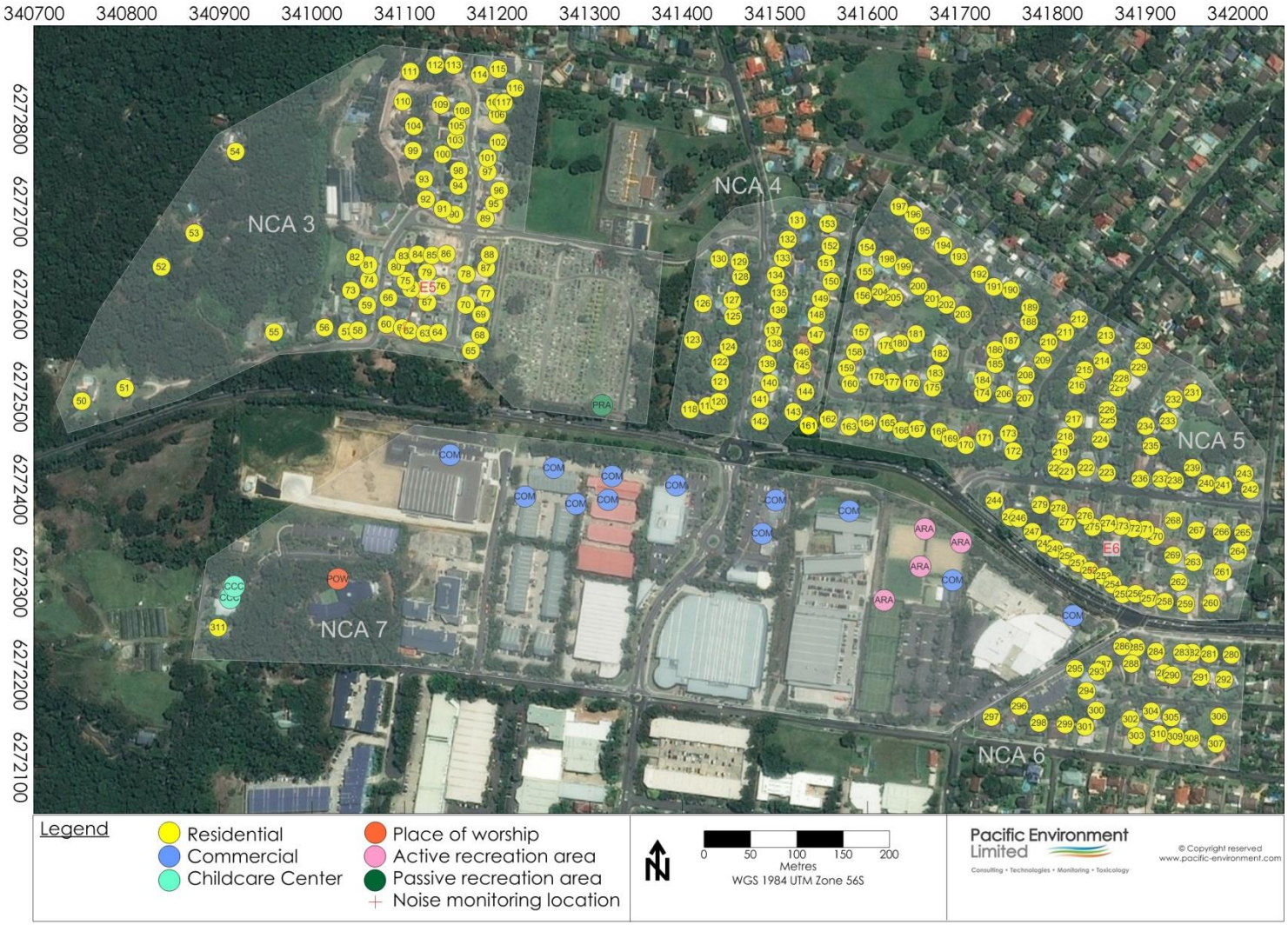

Figure A-3: Project Layout, Receivers and NCAs - East

Figure A-4: Indicative Noise Barrier Location

APPENDIX B. OPERATIONAL NOISE PREDICTIONS – RECEIVERS WHERE MITIGATION IS REQUIRED

Table B-1: Operational 15 hour and 9 hour Noise Predictions where Mitigation Investigation is Required – East Only Upgrade

ID	Year of Opening 2019				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East		Consider further additional mitigation
	No build		Build East Only		No Build		Build East Only						Year Opening 2019 East Only		Design Year 2031 East Only				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
001_A	63	57	64	58	63	57	65	59	60	55	YES	YES	0.9	1.1	1.3	1.3	NO	NO	YES
002_A	64	58	65	58	65	58	65	59	60	55	YES	YES	0.4	0.7	0.7	0.8	YES	NO	YES
050_A	62	56	68	62	63	57	69	63	60	55	YES	YES	5.8	6.1	6.2	6.0	YES	YES	YES
051	58	51	67	61	58	52	68	62	60	55	YES	YES	9.3	9.8	9.9	9.6	YES	YES	YES
118_A	63	57	63	57	63	57	64	58	60	55	YES	YES	0.1	0.5	0.7	0.7	NO	NO	YES
119_A	65	58	65	59	65	59	66	59	60	55	YES	YES	0.1	0.3	0.7	0.6	YES	NO	YES
161_A	66	59	65	59	66	60	66	60	60	55	YES	YES	-0.7	-0.6	0.1	0.1	YES	NO	YES
163_A	65	59	64	58	66	59	66	59	60	55	YES	YES	-0.9	-0.9	-0.1	-0.1	YES	NO	YES
166_A	64	58	63	57	65	58	65	58	60	55	YES	YES	-1.0	-1.0	-0.2	-0.2	NO	NO	YES
244_A	63	57	64	57	65	59	66	59	60	55	YES	YES	0.2	0.3	0.2	0.3	YES	NO	YES
245_A	64	57	64	57	65	58	65	59	60	55	YES	YES	0.1	0.1	0.1	0.1	NO	NO	YES
246	64	57	64	57	65	58	65	58	60	55	YES	YES	0.1	0.1	0.1	0.1	NO	NO	YES
247_A	69	63	69	62	70	64	70	64	60	55	YES	YES	-0.2	-0.3	-0.2	-0.3	YES	YES	YES
247_B	68	62	68	62	69	63	69	63	60	55	YES	YES	-0.2	-0.1	-0.2	-0.1	YES	YES	YES
248_A	66	60	66	60	68	61	67	61	60	55	YES	YES	-0.2	-0.2	-0.2	-0.2	YES	YES	YES
248_B	64	57	64	57	65	58	65	58	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	NO	NO	YES
249	65	59	65	59	66	60	66	60	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	NO	YES
250_A	65	58	65	58	66	59	66	59	60	55	YES	YES	0.0	0.0	0.0	0.0	YES	NO	YES
250_B	63	57	63	57	65	58	65	58	60	55	YES	YES	0.0	0.1	0.0	0.1	NO	NO	YES

ID	Year of Opening 2019				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East		Consider further additional mitigation
	No build		Build East Only		No Build		Build East Only						Year Opening 2019 East Only		Design Year 2031 East Only				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
251_A	68	62	68	61	69	63	69	63	60	55	YES	YES	-0.2	-0.1	-0.2	-0.1	YES	YES	YES
251_B	68	61	68	61	69	62	69	62	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	YES	YES
252_A	65	58	65	58	66	59	66	59	60	55	YES	YES	0.0	-0.1	0.0	-0.1	YES	NO	YES
254	65	58	65	58	66	59	66	59	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	NO	YES
255_A	69	62	68	61	70	63	69	63	60	55	YES	YES	-0.7	-0.6	-0.7	-0.6	YES	YES	YES
255_B	66	59	65	59	67	60	66	60	60	55	YES	YES	-0.2	-0.3	-0.2	-0.3	YES	NO	YES
256_A	69	62	68	62	70	63	69	63	60	55	YES	YES	-0.3	-0.2	-0.3	-0.2	YES	YES	YES
256_B	66	60	66	59	67	61	67	61	60	55	YES	YES	-0.2	-0.3	-0.2	-0.3	YES	YES	YES
257_A	67	60	66	60	68	61	67	61	60	55	YES	YES	-0.2	-0.1	-0.2	-0.1	YES	YES	YES
258_A	69	62	69	62	70	63	70	63	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	YES	YES
258_B	66	59	66	59	67	60	67	60	60	55	YES	YES	0.0	0.0	0.0	0.0	YES	NO	YES
259	69	62	69	62	70	63	70	63	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	YES	YES
260	66	60	66	60	67	61	67	61	60	55	YES	YES	0.0	0.0	0.0	0.0	YES	YES	YES
280_A	68	61	68	61	69	62	69	62	60	55	YES	YES	0.0	-0.1	0.0	-0.1	YES	YES	YES
281_A	68	61	68	61	68	62	68	62	60	55	YES	YES	0.0	-0.1	0.0	-0.1	YES	YES	YES
282_A	67	61	67	61	68	62	68	62	60	55	YES	YES	-0.1	0.0	-0.1	0.0	YES	YES	YES
283_A	67	60	67	60	68	61	68	61	60	55	YES	YES	0.0	0.0	0.0	0.0	YES	YES	YES
284_A	66	59	66	59	67	60	67	60	60	55	YES	YES	0.1	0.1	0.1	0.1	YES	YES	YES
285_A	67	60	67	60	68	61	68	61	60	55	YES	YES	0.0	0.0	0.0	0.0	YES	YES	YES
286_A	66	60	66	60	67	61	67	61	60	55	YES	YES	-0.1	-0.1	-0.1	-0.1	YES	YES	YES

ID	Year of Opening 2019				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East		Consider further additional mitigation
	No build		Build East Only		No Build		Build East Only						Year Opening 2019 East Only		Design Year 2031 East Only				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Bowling Club	63	57	62	55	64	58	63	56	60	60	YES	NO	-1.6	-1.7	-1.6	-1.7	NO	NO	YES
Bowling Club	63	56	61	54	64	57	62	55	60	60	YES	NO	-2.0	-2.0	-2.0	-2.0	NO	NO	YES

Notes: 1. Receiver ID: Black = meets NCG Criteria, Blue = exceeds NCG Criteria, Red = Equal to or exceeds NCG cumulative limit.
2. Investigation into noise treatment in accordance with NMG.
3. Change in noise level between 'build and 'no build' scenarios for each modelled year.
4. Cumulative noise limit is 5 dB(A) above the NCG criteria. Receivers that are at or above $L_{Aeq,15hr}$ 65 dB(A) and $L_{Aeq,9hr}$ 60 dB(A) may be referred to as acute.
5. Where either predicted design year levels: (1) exceed NCG criterion and change in noise levels exceed 2 dB(A); or (2) are equal to or above the cumulative limit, consideration of additional mitigation is required.
6. Day (D) = 7.00am to 10.00pm (15hrs); Night (N) = 10.00pm to 7.00am (9hrs).
7. Area of active recreation, free-field prediction.
8. Facades labelled clockwise A to D with A facing Mona Vale Road.

Table B-2: Operational 15 hour and 9 hour Noise Predictions where Mitigation Investigation is Required – East and West Upgrade

ID	Year of Opening 2021	Design Year 2031	NCG Criteria	Are the criteria	Change in Noise Level (Build cf No Build)	Equal to or greater than cumulative	Consider further

	No build		Build East and West		No Build		Build East and West				Exceeded?		Year Opening 2019 East and West		Design Year 2031 East and West				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
1_A	63	57	66	60	63	57	67	61	60	55	YES	YES	2.8	2.8	3.2	3.2	YES	YES	YES
1_B	58	52	61	55	58	52	62	56	60	55	YES	YES	3.0	3.0	3.4	3.4	NO	NO	YES
2_A	64	58	66	60	65	58	67	61	60	55	YES	YES	2.0	2.0	2.2	2.4	YES	YES	YES
2_B	61	54	63	57	61	55	64	58	60	55	YES	YES	2.4	2.5	2.6	2.8	NO	NO	YES
4_A	60	54	62	56	61	55	63	57	60	55	YES	YES	1.7	1.7	1.8	2.0	NO	NO	YES
4_D	58	52	60	54	58	52	61	55	60	55	YES	NO	2.1	2.0	2.5	2.4	NO	NO	YES
5_A	59	53	61	55	59	53	62	56	60	55	YES	YES	2.1	2.0	2.5	2.4	NO	NO	YES
8_A	60	54	62	56	61	55	63	57	60	55	YES	YES	1.9	1.8	2.2	2.1	NO	NO	YES
8_D	59	53	61	55	59	53	61	56	60	55	YES	YES	1.8	1.9	2.2	2.2	NO	NO	YES
10_A	60	54	61	55	60	54	61	55	60	55	YES	NO	1.3	1.2	1.7	1.4	NO	NO	YES
10_D	59	53	61	54	59	53	61	55	60	55	YES	NO	1.5	1.2	1.9	1.5	NO	NO	YES
45_A	61	56	64	58	62	56	64	58	60	55	YES	YES	2.3	2.1	2.7	2.5	NO	NO	YES
45_B	59	53	62	55	59	53	62	56	60	55	YES	YES	2.8	2.6	3.2	3.0	NO	NO	YES
48_A	58	52	60	54	58	52	61	55	60	55	YES	NO	2.6	2.7	3.0	3.1	NO	NO	YES
50_A	62	56	70	64	63	57	71	65	60	55	YES	YES	7.7	7.5	8.1	7.9	YES	YES	YES
50_B	60	54	64	58	60	54	64	58	60	55	YES	YES	4.0	3.9	4.5	4.3	NO	NO	YES
50_D	55	49	67	61	55	49	67	61	60	55	YES	YES	12.0	11.9	12.3	12.3	YES	YES	YES
51_	58	52	69	63	58	52	70	64	60	55	YES	YES	11.2	11.1	11.7	11.5	YES	YES	YES
55_A	59	53	61	55	59	53	62	56	60	55	YES	YES	2.6	2.7	3.1	3.1	NO	NO	YES
56_A	62	56	64	58	62	56	64	58	60	55	YES	YES	1.7	1.6	2.1	2.1	NO	NO	YES
57_	62	57	64	58	63	57	64	58	60	55	YES	YES	1.4	1.2	1.7	1.6	NO	NO	YES

ID	Year of Opening 2021				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East and West		Consider further additional mitigation
	No build		Build East and West		No Build		Build East and West						Year Opening 2019 East and West		Design Year 2031 East and West				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
58_A	62	56	63	57	62	56	64	58	60	55	YES	YES	1.2	1.1	1.6	1.5	NO	NO	YES
58_D	59	53	60	54	59	53	61	55	60	55	YES	NO	1.2	1.2	1.7	1.6	NO	NO	YES
60_A	61	55	63	57	62	56	63	57	60	55	YES	YES	1.3	1.2	1.6	1.7	NO	NO	YES
60_B	58	52	59	53	58	52	59	53	60	55	NO	NO	0.7	0.6	1.1	1.0	NO	NO	YES
61_A	61	55	63	56	61	56	63	57	60	55	YES	YES	1.3	1.1	1.7	1.5	NO	NO	YES
61_B	59	53	60	54	59	53	61	55	60	55	YES	NO	1.2	1.0	1.5	1.4	NO	NO	YES
62_A	61	56	63	57	62	56	63	57	60	55	YES	YES	1.1	1.0	1.5	1.5	NO	NO	YES
62_B	59	53	60	54	59	53	60	54	60	55	NO	NO	0.8	0.7	1.2	1.1	NO	NO	YES
63_A	61	55	62	56	61	56	63	57	60	55	YES	YES	1.1	1.0	1.5	1.3	NO	NO	YES
63_B	59	53	60	54	59	53	61	55	60	55	YES	NO	0.8	0.8	1.2	1.2	NO	NO	YES
64_A	61	55	62	56	61	55	62	57	60	55	YES	YES	1.2	1.2	1.6	1.6	NO	NO	YES
65_A	62	56	64	58	63	57	64	58	60	55	YES	YES	1.3	1.2	1.7	1.7	NO	NO	YES
65_B	60	54	61	55	60	54	62	56	60	55	YES	YES	1.2	1.1	1.6	1.5	NO	NO	YES
65_D	59	52	60	54	59	53	61	55	60	55	YES	NO	1.6	1.6	2.0	2.0	NO	NO	YES
118_A	63	57	64	58	63	57	65	59	60	55	YES	YES	1.2	1.2	1.6	1.6	YES	NO	YES
119_A	65	58	66	60	65	59	67	60	60	55	YES	YES	1.2	1.2	1.5	1.5	YES	YES	YES
119_B	60	54	61	55	60	54	62	56	60	55	YES	YES	1.6	1.6	2.0	1.9	NO	NO	YES
119_D	63	56	64	58	63	57	65	58	60	55	YES	YES	1.2	1.3	1.2	1.4	NO	NO	YES
161_A	66	59	67	60	66	60	67	61	60	55	YES	YES	0.6	0.6	1.0	1.0	YES	YES	YES

ID	Year of Opening 2021				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East and West		Consider further additional mitigation
	No build		Build East and West		No Build		Build East and West						Year Opening 2019 East and West		Design Year 2031 East and West				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
162_A	64	57	64	58	64	57	65	58	60	55	YES	YES	0.5	0.6	0.9	1.0	NO	NO	YES
163_A	65	59	66	59	66	59	66	60	60	55	YES	YES	0.5	0.5	0.8	0.8	YES	NO	YES
165_A	64	57	64	57	64	57	65	58	60	55	YES	YES	0.5	0.5	0.9	0.8	NO	NO	YES
166_A	65	58	65	58	65	58	65	59	60	55	YES	YES	0.3	0.4	0.7	0.7	YES	NO	YES
244_A	63	56	65	59	63	57	66	59	60	55	YES	YES	2.3	2.5	2.7	2.9	YES	NO	YES
244_B	60	53	62	55	60	54	62	56	60	55	YES	YES	1.8	1.8	2.2	2.3	NO	NO	YES
245_A	63	56	65	59	63	57	66	59	60	55	YES	YES	2.5	2.6	2.8	2.9	YES	NO	YES
245_B	63	56	65	59	63	57	66	59	60	55	YES	YES	2.4	2.4	2.7	2.8	YES	NO	YES
246__	62	56	65	59	63	56	66	59	60	55	YES	YES	2.6	2.7	2.9	3.0	YES	NO	YES
247_A	68	62	71	64	68	62	71	64	60	55	YES	YES	2.3	2.2	2.7	2.6	YES	YES	YES
247_B	68	61	69	63	68	61	70	64	60	55	YES	YES	1.9	2.2	2.4	2.5	YES	YES	YES
248_A	65	59	68	61	66	59	68	62	60	55	YES	YES	2.4	2.4	2.7	2.9	YES	YES	YES
248_B	63	56	65	59	63	56	66	59	60	55	YES	YES	2.4	2.4	2.8	2.8	YES	NO	YES
249__	64	58	66	60	64	58	67	61	60	55	YES	YES	2.2	2.3	2.6	2.7	YES	YES	YES
250_A	64	57	66	60	64	58	67	60	60	55	YES	YES	2.2	2.2	2.6	2.7	YES	YES	YES
250_B	63	56	65	58	63	56	65	59	60	55	YES	YES	2.1	2.4	2.5	2.7	YES	NO	YES
251_A	68	61	69	63	68	61	70	63	60	55	YES	YES	1.8	2.0	2.2	2.3	YES	YES	YES
251_B	67	60	69	62	67	61	70	63	60	55	YES	YES	2.0	2.1	2.4	2.4	YES	YES	YES
252_A	64	57	66	59	64	57	67	60	60	55	YES	YES	2.0	2.0	2.5	2.5	YES	NO	YES

ID	Year of Opening 2021				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East and West		Consider further additional mitigation
	No build		Build East and West		No Build		Build East and West						Year Opening 2019 East and West		Design Year 2031 East and West				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
252_B	62	56	64	58	62	56	65	58	60	55	YES	YES	2.1	2.1	2.5	2.5	NO	NO	YES
253_A	60	53	62	55	60	54	63	56	60	55	YES	YES	1.8	2.0	2.3	2.3	NO	NO	YES
254__	64	58	66	60	64	58	67	60	60	55	YES	YES	1.8	1.9	2.2	2.2	YES	YES	YES
255_A	67	61	69	63	68	61	70	63	60	55	YES	YES	1.8	1.9	2.1	2.3	YES	YES	YES
255_B	65	58	67	60	65	59	67	61	60	55	YES	YES	1.7	1.7	2.0	2.1	YES	YES	YES
256_A	68	61	70	63	68	61	70	64	60	55	YES	YES	1.8	1.9	2.1	2.2	YES	YES	YES
256_B	66	59	67	61	66	59	68	61	60	55	YES	YES	1.6	1.6	1.9	2.0	YES	YES	YES
257_A	66	59	68	61	66	60	68	62	60	55	YES	YES	1.6	1.9	2.1	2.2	YES	YES	YES
257_B	61	54	63	56	61	55	63	57	60	55	YES	YES	1.6	1.8	2.0	2.1	NO	NO	YES
258_A	68	61	70	63	68	61	71	64	60	55	YES	YES	2.2	2.2	2.6	2.7	YES	YES	YES
258_B	65	58	67	60	65	58	67	61	60	55	YES	YES	2.0	2.1	2.4	2.4	YES	YES	YES
259__	68	61	70	63	68	61	71	64	60	55	YES	YES	2.4	2.4	2.7	2.7	YES	YES	YES
260__	66	59	67	61	66	59	68	61	60	55	YES	YES	1.8	1.9	2.2	2.3	YES	YES	YES
278_9	58	51	60	54	58	51	61	54	60	55	YES	NO	2.5	2.7	2.9	3.0	NO	NO	YES
280_A	67	60	69	62	67	60	70	63	60	55	YES	YES	2.3	2.2	2.7	2.5	YES	YES	YES
280_B	58	52	60	54	58	52	61	54	60	55	YES	NO	2.0	2.2	2.4	2.5	NO	NO	YES
280_D	60	53	62	55	60	53	62	56	60	55	YES	YES	2.3	2.3	2.7	2.7	NO	NO	YES
281_A	67	60	69	62	67	60	69	63	60	55	YES	YES	2.0	2.0	2.3	2.3	YES	YES	YES
281_D	58	51	60	54	58	52	61	54	60	55	YES	NO	2.2	2.2	2.5	2.6	NO	NO	YES

ID	Year of Opening 2021				Design Year 2031				NCG Criteria		Are the criteria Exceeded?		Change in Noise Level (Build cf No Build)				Equal to or greater than cumulative level at design year East and West		Consider further additional mitigation
	No build		Build East and West		No Build		Build East and West						Year Opening 2019 East and West		Design Year 2031 East and West				
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
282_A	66	60	68	62	67	60	69	62	60	55	YES	YES	2.0	2.1	2.4	2.5	YES	YES	YES
283_A	66	60	68	62	66	60	69	62	60	55	YES	YES	2.1	2.0	2.4	2.5	YES	YES	YES
284_A	65	58	67	60	65	59	68	61	60	55	YES	YES	1.8	1.8	2.2	2.1	YES	YES	YES
285_A	66	60	68	61	67	60	69	62	60	55	YES	YES	1.9	1.9	2.2	2.3	YES	YES	YES
286_A	66	59	67	61	66	59	68	61	60	55	YES	YES	1.5	1.6	1.8	1.9	YES	YES	YES
312_A	62	56	64	58	62	56	64	59	60	55	YES	YES	2.3	2.5	2.8	3.0	NO	NO	YES
312_B	61	55	63	57	61	55	63	57	60	55	YES	YES	1.9	2.1	2.3	2.6	NO	NO	YES
312_D	58	52	61	55	58	52	61	56	60	55	YES	YES	3.2	3.3	3.6	3.7	NO	NO	YES
313_A	60	55	62	57	61	55	63	57	60	55	YES	YES	2.0	2.2	2.4	2.6	NO	NO	YES
313_B	59	53	61	56	60	54	62	56	60	55	YES	YES	1.8	2.1	2.3	2.5	NO	NO	YES
327_A	63	57	65	59	63	57	66	60	60	55	YES	YES	2.4	2.7	2.8	3.0	YES	YES	YES
327_B	61	55	63	57	61	55	64	58	60	55	YES	YES	2.1	2.3	2.4	2.7	NO	NO	YES
328_A	61	55	63	58	61	55	64	58	60	55	YES	YES	2.4	2.8	2.8	3.2	NO	NO	YES
328_B	59	53	62	56	60	54	62	56	60	55	YES	YES	2.2	2.6	2.5	2.8	NO	NO	YES
330_A	59	53	61	55	59	53	62	56	60	55	YES	YES	2.5	2.6	2.8	3.0	NO	NO	YES
330_D	58	52	61	55	59	53	62	56	60	55	YES	YES	2.8	2.8	3.0	3.2	NO	NO	YES
Bowling Club	59	53	63	56	59	53	64	57	60	60	YES	NO	3.8	3.7	4.2	4.1	NO	NO	YES
Bowling Club	59	52	62	56	59	52	63	56	60	60	YES	NO	3.4	3.4	3.8	3.7	NO	NO	YES

Notes: 1. Receiver ID: Black = meets NCG Criteria, Blue = exceeds NCG Criteria, Red = Equal to or exceeds NCG cumulative limit.
2. Investigation into noise treatment in accordance with NMG.

3. Change in noise level between 'build and 'no build' scenarios for each modelled year.
4. Cumulative noise limit is 5 dB(A) above the NCG criteria. Receivers that are at or above $L_{Aeq,15hr}$ 65 dB(A) and $L_{Aeq,9hr}$ 60 dB(A) may be referred to as acute.
5. Where either predicted design year levels: (1) exceed NCG criterion and change in noise levels exceed 2 dB(A); or (2) are equal to or above the cumulative limit, consideration of additional mitigation is required.
6. Day (D) = 7.00am to 10.00pm (15hrs); Night (N) = 10.00pm to 7.00am (9hrs).
7. Area of active recreation, free-field prediction.
8. Facades labelled clockwise A to D with A facing Mona Vale Road.

Table B-3: Operational 1 Hour Noise Predictions where Mitigation Investigation is Required

Receiver[1]	Year of Opening 2019		Design Year 2021		Design Year 2031			NCG Criteria	Are Criteria Exceeded ?	Change in Noise Level (Build cf No Build)[3]				Consider further additional noise mitigation[2, 4,5]
	No Build	Build East Only	No Build	Build East and West	No Build	Build East Only	Build East and West			Year Opening 2019 East Only	Design Year 2021 East and West	Design Year 2031 East Only	Design Year East and West	
	D[6,8]	D	D	D	D	D	D	D/N	D/N	D/N	D/N	D/N	D/N	
Place of Worship	40	40	40	42	40	41	43	40	YES	0.6	2.6	0.8	2.6	YES
CCC External[7]	54	54	54	57	54	55	57	55	YES	0.7	2.7	1.1	2.8	YES
CCC Internal	38	38	38	40	38	39	40	40	NO	0.4	2.3	0.8	2.6	NO

Notes: 1. Receiver ID: Black = meets NCG Criteria, Blue = exceeds NCG Criteria, Red = Equal to or exceeds NCG cumulative limit.
2. Investigation into noise treatment in accordance with NMG.
3. Change in noise level between 'build and 'no build' scenarios for each modelled year.
4. Cumulative noise limit is 5 dB(A) above the NCG criteria. Receivers that are at or above $L_{Aeq,15hr}$ 65 dB(A) and $L_{Aeq,9hr}$ 60 dB(A) may be referred to as acute.
5. Where either predicted design year levels: (1) exceed NCG criterion and change in noise levels exceed 2 dB(A); or (2) are equal to or above the cumulative limit, consideration of additional mitigation is required.
6. Day (D) = 7.00am to 10.00pm (15hrs); Night (N) = 10.00pm to 7.00am (9hrs).
7. External area, free-field prediction.
8. Assessment period is when is use day or night. As the day has higher noise levels, it is the limiting scenario.
9. External noise levels are assessed against the internal noise criteria +15 dB for both the Church and Childcare Centre. Assuming that the outside to inside correction is 15 dB assuming windows are closed.
9. Child care centre (CCC) noise criteria set for internal play areas and is predicted as an internal noise level.

December 2015
RMS 15.647
ISBN: 978-1-925421-53-8