New South Wales Government

RTA

F3 Freeway to Branxton link

Noise Assessment

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NOISE ASSESSMENT
NATIONAL NETWORK
F3 FREEWAY TO BRANXTON LINK

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1.0 INTRODUCTION

Atkins Acoustics was commissioned by Connell Wagner Pty Ltd on behalf of the Roads and Traffic Authority (*RTA*) in July 1994 to conduct an assessment of road traffic noise and provide advice on possible control measures for proposed the proposed F3 Freeway to Branxton Link (hereafter referred to as the Link). The findings of that assessment are documented in Report No. 24.2803.R1:GA49 "*Road Traffic Noise Assessment National Highway Extension, Seahampton to Branxton*" dated February 1995.

The noise assessment presented in Report No. 24.2803.R1:GA49 was prepared in accordance with procedures set out in the *RTA* Interim Traffic Noise Policy (September 1992).

In May 1999, the Department of Environment and Conservation *(DEC)* released the Environmental Criteria for Road Traffic Noise *(ECRTN)* which superseded the *RTA* Interim Traffic Noise Policy assessment guidelines.

Atkins Acoustics was commissioned by the *RTA* in June 2001 to review the February 1995 noise assessment as a result of the changes to the assessment guidelines. The findings of that assessment are presented in Report No. 30.5147.R2 Rev 01:DD18 "*Traffic Noise Assessment – National Highway Extension – F3 Freeway to Branxton*" dated June 2001.

This report presents a further review and update of the road traffic noise assessment and possible traffic noise control measures following changes and revisions to road alignments, forecast traffic volumes and road design speeds.

The findings reported in this study are based on information provided by the *RTA* and referenced in the report. The recommendations presented in the report have been prepared for the particular investigation and conditions described and no part should be used in any other context or for any other purpose.

2.0 DESCRIPTION OF THE PROPOSAL

The proposed F3 to Branxton Link is approximately 40km long and would connect the F3 Freeway at the Newcastle Interchange to the New England Highway at Branxton. There are four combined heavy and light vehicle rest areas proposed to the north-west of Branxton township and two (2) near Surveyors Creek at Buttai. *Appendix 1* identifies the location of the proposed Link.

The proposed road would pass mostly isolated and several built-up residential areas. The main built-up residential areas include the towns of Kurri Kurri.

Additionally, the road corridor is located to the west of a proposed tourist residential development '*Anvil Creek Development* 'north of Allandale Road. *The RTA advised Atkins Acoustics* that alterations to the proposed development have been proposed and are not finalised nor approved by Cessnock Council and the Department of Planning (DoP).

3.0 METHODOLOGY

The methodology adopted for the noise assessment included:

- measurement of ambient noise levels;
- establishment of operational noise assessment goals, in accordance with the guidelines in the *DEC,* Environmental Criteria for Road Traffic Noise *(ECRTN)* and the Environmental Noise Control Manual *(ENCM);*
- noise measurements to validate the noise prediction model;
- prediction of road traffic noise levels;
- prediction of noise from the rest areas/truck stops;
- where identified by noise modeling recommendation of possible control options to reduce the predicted noise impacts.

The traffic noise model for predicting operational traffic noise levels relied upon the UK Department of Environment's "*Calculation of Traffic Noise*" (CoRTN) prediction model. The CoRTN procedure predicts traffic noise in terms of $L_{A10,1hr}$ and $L_{A10,18hr}$ levels. With the input of relevant traffic data and application of correction factors, the *ECRTN* $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ road traffic noise levels are calculated.

From the CoRTN modeling sound power levels were established for input into the Environmental Noise Model *(ENM).* The *ENM* model is approved by the *DEC* and takes into account distance separation, attenuation due to intervening topography, atmospheric absorption and ground effects.

In accordance with recognised practices source heights of 0.5m, 1.5m and 3.6m above the road level were assigned to passenger cars, trucks and truck exhausts, respectively. For modeling purposes the correction factors applied to the overall noise levels were - 8dB for truck exhausts, - 4dB for trucks and - 3dB for cars. The outputs from the *ENM* modeling were used to develop noise contour plots and identify properties affected by road traffic noise

4.0 EXISTING AMBIENT NOISE LEVELS

To assist with understanding the existing noise environment, measurements were conducted from Friday 31 October 2003 to Wednesday 3 December 2003. Eighteen (18) reference measurement locations were selected to be representative of the areas within the study area (*Appendix 2*). Measurement instrumentation consisted of RTA Technology Environmental Noise Data Loggers. The loggers were set to A-weighting, fast response and programmed to calculate and record statistical noise levels at 15-minute intervals. The equipment was calibrated before and after the measurement periods using a Bruel & Kjaer sound level calibrator Type 4230. Drift in calibration was within the specification limits.

The measurements were conducted to describe the existing ambient noise environment at representative residential receivers along the study route, provide an update of the ambient noise environment measured in 1994 and provide the basis for establishing noise assessment goals.

Table 1 provides descriptions of the noise monitoring locations, dates of the monitoring periods and a description of the noise sources identified during site attended audits. The ambient noise environment at each location varied in level and character, and included noise from road traffic, rail traffic, industry (aluminum smelter), quarry, domestic activities, birds, insects and wind in trees.

Table 2 presents a summary of the measured $L_{Aeq,15hr}$ (daytime), ($L_{Aeq,9hr}$) night-time and rating background (RBL) day/evening/night L_{A90} noise levels for each monitoring location. Extraneous noise sources were discarded in the analysis. *Appendix 3* presents a summary of 15-minute statistical noise levels recorded for each location.

Results from the measurement at location R16 (263 John Renshaw Drive, Buchanan) were selected to validate the noise prediction model.

Table 1 Noise Monitoring Locations

Monitoring Location (*Appendix 2*)		Date of Monitoring	Noise Source
R1	2657 New England Highway, Branxton	10 Nov – 16 Nov 2003	Road traffic on New England Highway and the natural environment
R2	Lot 1, 2490 New England Highway, Branxton	31 Oct – 8 Nov 2003	Road traffic on New England Highway, domestic activities, dogs
R3	62 Fleet Street, Branxton	31 Oct – 10 Nov 2003	Distant traffic (New England Highway), birds, domestic activities, intermittent earthmoving equipment and trains
R4	10 Rail Street, Branxton	31 Oct – 10 Nov 2003	Distant road traffic from Cessnock Road, birds, dogs, domestic activities, trains
R5	6 Usher Street, Illalong	31 Oct – 10 Nov 2003	Local traffic, birds, domestic activities and occasional trains
R6	Lot 162 Allandale Road, Allandale	31 Oct – 10 Nov 2003	Traffic on Allandale Road, domestic activities, birds and distant quarry noise
R7	"Carinya Park" Sawyers Gully	10 Nov – 17 Nov 2003	Distant industrial noise (smelter to the south-east) and intermittent traffic
R8	14 Horton Street, Weston	10 Nov – 16 Nov 2003	Industrial noise 'Alcan Smelter', local traffic, landscape business
R9	Kurri Kurri TAFE – accommodation	10 Nov – 16 Nov 2003	Local traffic, wind in trees, birds and distant industries (Abattoir and smelter)
R10	Kurri Kurri TAFE – administration	10 Nov – 16 Nov 2003	Local traffic, wind in trees, birds and distant industries (Abattoir and smelter)
R11	18 Acacia Street, Kurri Kurri	17 Nov – 24 Nov 2003	Local traffic, wind in trees, abattoir and distant traffic from Lang Street
R12	"Frogella" 21 Brooks Street, Kurri Kurri	17 Nov – 24 Nov 2003	Distant traffic on Lang Street, domestic activities, birds and frogs
R13	77 Clift Street, Heddon Greta	17 Nov – 24 Nov 2003	Distant traffic from Stanford Road and Main Road, domestic activities and local traffic
R14	14 Anvil Street, Stanford Merthyr	17 Nov – 24 Nov 2003	Traffic on Stanford Road and domestic activities
R15	Lot 83 Averys Lane, Buchanan	24 Nov – 3 Dec 2003	Insects, domestic activities and distant traffic from John Renshaw Drive
R16	263 John Renshaw Drive, Buchanan	17 Nov – 3 Dec 2003	Traffic from John Renshaw Drive
R17	"Grandview" John Renshaw Drive, Buchanan	24 Nov – 3 Dec 2003	Traffic from John Renshaw Drive, cows
R18	48 Fifth Street, Seahampton	24 Nov – 3 Dec 2003	Distant traffic from F3 Freeway, birds, insects and domestic activities

Table 2 Measured Ambient Noise Environment

dB(A) re 20 $\times 10^{-6}$ Pa

Monitoring Location (*Appendix 2*)	Measured L_{Aeq} Noise Level		Rating Background L_{A90} Noise Level		
	$L_{Aeq,15hr}$ [Day]	$L_{Aeq,9hr}$ [Night]	Day	Evening	Night
R1	53	53	43	43	29
R2	61	59	44	44	33
R3	53	53	41	40	37
R4	50	50	35	36	32
R5	49	47	33	37	31
R6	49	46	32	33	28
R7	44	43	32	32	31
R8	45	44	40	40	39
R9	47	43	36	32	31
R10	47	42	37	34	34
R11	53	47	36	36	32
R12	48	48	37	39	32
R13	48	47	36	34	30
R14	49	42	36	39	31
R15	50	43	43	39	33
R16	66	63	45	44	33
R17	54	51	44	39	30
R18	51	45	38	39	37

Notes
1. *$L_{Aeq,15hr}$ (day) is the energy average noise level from 7:00am – 10:00pm.*
2. *$L_{Aeq,9hr}$ (night) is the energy average noise level from 10:00pm – 7:00am.*
3. *Daytime L_{A90} is the background noise level from 7:00am – 6:00pm.*
4. *Evening L_{A90} is the background noise level from 6:00pm – 10:00pm.*
5. *Night-time L_{A90} is the background noise level from 10:00pm – 7:00am.*

5.0 ROAD TRAFFIC NOISE ASSESSMENT GOALS

5.1 Operational Traffic Noise

Goals for the assessment of road traffic noise are provided in the *DEC, ECRTN.*
For new freeway developments, the following goals are recommended and referenced to apply at 1m from the residential building facades and traffic conditions projected for road opening and ten (10) years post opening:

- 55dB(A) $L_{Aeq,15hr}$ (daytime). Daytime is the period from 7:00am to 10:00pm; and
- 50dB(A) $L_{Aeq,9hr}$ (night-time). Night-time is the period from 10:00pm to 7:00am.

5.2 Intermittent Traffic Noise

The *ECRTN* reports that it is not possible to establish absolute noise level criteria for assessing sleep disturbance that would have the equivalent level of confidence as the noise criteria used for assessing annoyance reactions.

For assessment purposes the *RTA* addresses maximum noise level assessment in the "*Practice Note III – protocol for assessing maximum noise levels*" of the Environmental Noise Management Manual *(ENMM).* Reference to the *ENMM,*

- internal noise levels below 50-55dB(A) L_{Amax} are unlikely to cause awakening reactions. The internal levels equate to external levels of 60-65dB(A) L_{Amax} with bedroom windows open to normal extent for adequate ventilation;
- one (1) or two (2) noise events per night with internal noise levels of 65-70dB(A) L_{Amax} or equivalent external levels of 75-80dB(A) are unlikely to affect health and well-being significantly;
- for continuous traffic flow, the $L_{Aeq,9hr}$ noise goal sufficiently accounts for sleep disturbance impacts. However, where the L_{Amax} exceed the $L_{Aeq,1hr}$ noise level by 15dB(A) or higher for intermittent traffic flow, sleep disturbance impacts may occur.

The *ENMM* recommends that the maximum noise level assessment should not be applied as a decisive criterion. Albeit, it may be used to rank and prioritise design options and mitigation strategies where mitigation measures are considered to be feasible and reasonable in accordance with the *ECRTN* and *ENMM*.

6.0 VALIDATION OF ROAD TRAFFIC NOISE PREDICTION MODEL

6.1 Classified Traffic Counts

For the purpose of validating the traffic noise model vehicle and classified counts were conducted on John Renshaw Drive by Northern Transport Planning from Wednesday 26 November 2003 to Thursday 4 December 2004 (during noise monitoring at reference location R16).

6.2 Comparison of Predicted and Measured Noise Levels

Road traffic noise levels at reference location R16 were predicted and compared with the measured levels (*Table 3*) to validate the prediction procedures. The predictions were based on traffic volumes, heavy vehicle counts and traffic speeds presented in *Table 4*.

The results (*Table 3*) show that the predicted noise levels are 1-2dB(A) higher than the measured levels and that no corrections should be applied to the noise prediction model given the small differences. From the noise validation assessment, it is considered that the *CoRTN* model provides reliable prediction of road traffic noise levels for the Link.

Table 3 Predicted and Measured Road Traffic Noise Levels
dB(A) re 20 $\times 10^{-6}$ Pa

Reference Location	Measurement		Prediction	
	$L_{Aeq,15hr}$	$L_{Aeq,9hr}$	$L_{Aeq,15hr}$	$L_{Aeq,9hr}$
R16. 28m from John Renshaw Drive	66	63	68	64

Table 4 Classified Traffic Counts – John Renshaw Drive

Date	North Bound			South Bound			Total		
	Traffic Volume	**%Heavy**	**Mean Speed**	**Traffic Volume**	**%Heavy**	**Mean Speed**	**Traffic Volume**	**%Heavy**	**Mean Speed**
Daytime (7:00am – 10:00pm)									
Wed. 26 Nov. 03	6,621	6.2%	85.4	6,698	6.4%	84.7	13,319	6.3%	85.1
Thu. 27 Nov. 03	6,928	6.0%	84.7	7,122	6.2%	84.7	14,050	6.1%	84.7
Fri. 28 Nov. 03	6,955	6.0%	84.8	6,890	6.3%	85.0	13,845	6.2%	84.9
Sat. 29 Nov. 03	5,274	2.7%	85.6	5,373	2.6%	86.7	10,647	2.6%	86.2
Sun. 30 Nov. 03	4,487	1.9%	85.8	4,743	1.9%	86.6	9,230	1.9%	86.2
Mon. 1 Nov. 03									
Tue. 2 Nov. 03	6,503	7.3%	83.9	6,725	8.1%	87.5	13,228	7.7%	85.7
Wed. 3 Nov. 03	6,765	7.1%	82.8	6,896	7.4%	87.3	13,661	7.3%	85.1
Thu. 4 Nov. 03	6,829	6.6%	84.5	6,946	7.2%	87.2	13,775	6.9%	85.9
Weekly Average	*6,295*	*5.7%*	*84.7*	*6,424*	*6.0%*	*86.2*	*12,719*	*5.9%*	*85.5*
Weekday Average	*6,767*	*6.5%*	*84.4*	*6,880*	*6.9%*	*86.1*	*13,646*	*6.7%*	*85.2*
Night-time (10:00pm – 7:00am)									
Wed. 26 Nov. 03	1,219	6.2%	91.9	1,086	7.2%	91.1	2,305	6.6%	91.5
Thu. 27 Nov. 03	1,243	6.7%	90.8	1,117	8.3%	92.0	2,360	7.5%	91.4
Fri. 28 Nov. 03	1,213	7.6%	91.1	1,150	6.8%	91.4	2,363	7.2%	91.3
Sat. 29 Nov. 03	709	5.9%	89.4	861	6.5%	91.4	1,570	6.2%	90.4
Sun. 30 Nov. 03	503	15.3%	86.2	571	3.2%	90.1	1,074	8.8%	88.2
Mon. 1 Nov. 03									
Tue. 2 Nov. 03	1,193	6.5%	89.8	988	8.0%	93.6	2,181	7.2%	91.7
Wed. 3 Nov. 03	1,268	6.5%	90.5	1,061	8.6%	94.2	2,329	7.4%	92.4
Thu. 4 Nov. 03	1,245	6.7%	89.9	1,172	8.5%	91.1	2,417	7.6%	90.5
Weekly Average	*1,074*	*7.1%*	*90.0*	*1,001*	*7.4%*	*91.9*	*2,075*	*7.3%*	*90.9*
Weekday Average	*1,230*	*6.7%*	*90.7*	*1,096*	*7.9%*	*92.2*	*2,326*	*7.3%*	*91.5*

7.0 TRAFFIC NOISE MODELING ASSUMPTIONS

7.1 Traffic Speed

Table 5 presents a summary of traffic speeds adopted for noise modeling. It is understood that the posted road traffic speed would be 110km/hr, however, as advised by the RTA traffic speeds of 115km/hr (daytime) and 120km/hr (night-time) were adopted for noise modeling.

Table 5 Assessment Traffic Speeds

Road Name	Traffic Speed (km/hr)
F3 to Branxton Link	115 (daytime) 120 (night-time)
Branxton Interchange	80
New England Highway Junction	80
Cessnock Road Junction	80
Allandale Road Interchange	80
Loxford Interchange	60
Kurri Kurri Interchange	60
Buchanan Interchange	80
Buchanan Road Junction	80
George Booth Drive Junction	80
Newcastle Interchange	90
Underpasses/Overpasses	60

7.2 Forecast Traffic Data

Projected daytime and night-time traffic volumes and heavy vehicle percentages for the proposed Link and interchanges were provided by the *RTA*. *Tables 6* and *7* provide a summary of the forecast traffic data for years 2010 and 2020 (road opening and ten (10) years post opening).

Table 6 Forecast Traffic Data – F3 to Branxton Link

Road Section	North Bound		South Bound		Total	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Year 2010 – Daytime (7:00am – 10:00pm)						
New England Highway - Bridge Street	5,226	13.1%	4,221	13.5%	9,447	13.3%
Bridge Street - Allandale Road	5,425	12.7%	4,682	14.5%	10,107	13.5%
Allandale Road - Hart Road	6,184	12.4%	5,424	11.8%	11,608	12.1%
Hart Road - Lang Street	7,828	10.7%	7,120	11.7%	14,948	11.2%
Lang Street - John Renshaw Drive	12,027	9.7%	11,102	9.9%	23,129	9.8%
John Renshaw Drive - F3 Freeway	14,365	9.0%	12,762	8.8%	27,127	8.9%
Year 2010 – Night-time (10:00pm – 7:00am)						
New England Highway - Bridge Street	1,194	19.6%	739	25.8%	1,933	22.0%
Bridge Street - Allandale Road	1,235	18.7%	838	28.9%	2,073	22.8%
Allandale Road - Hart Road	1,416	18.0%	916	24.1%	2,332	20.4%
Hart Road - Lang Street	1,772	15.7%	1,220	23.6%	2,992	19.0%
Lang Street - John Renshaw Drive	2,753	14.1%	1,978	18.3%	4,731	15.9%
John Renshaw Drive - F3 Freeway	3,215	13.3%	2,218	15.2%	5,433	14.1%
Year 2020 – Daytime (7:00am – 10:00pm)						
New England Highway - Bridge Street	7,880	16.3%	6,633	18.6%	14,513	17.4%
Bridge Street - Allandale Road	8,159	15.8%	7,030	18.2%	15,189	16.9%
Allandale Road - Hart Road	8,999	15.1%	8,023	16.3%	17,022	15.7%
Hart Road - Lang Street	10,644	13.5%	9,738	14.7%	20,382	14.1%
Lang Street - John Renshaw Drive	15,020	12.3%	13,856	12.8%	28,876	12.5%
John Renshaw Drive - F3 Freeway	17,335	10.9%	15,861	11.2%	33,196	11.0%

Table 6 Forecast Traffic Data – F3 to Branxton Link (contd.)

Road Section	North Bound		South Bound		Total	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Year 2020 – Night-time (10:00pm – 7:00am)						
New England Highway - Bridge Street	1,840	23.6%	1,227	34.6%	3,067	28.0%
Bridge Street - Allandale Road	1,901	22.7%	1,290	34.2%	3,191	27.3%
Allandale Road - Hart Road	2,101	21.8%	1,417	31.8%	3,518	25.8%
Hart Road - Lang Street	2,456	19.5%	1,702	28.6%	4,158	23.2%
Lang Street - John Renshaw Drive	3,460	17.7%	2,424	24.2%	5,884	20.3%
John Renshaw Drive - F3 Freeway	3,945	16.0%	2,819	20.8%	6,764	18.0%

Table 7 Forecast Traffic Data – Road Interchanges

Approach Name	Year 2010				Year 2020			
	Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)		Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Branxton Interchange								
WB Offramp	329	5.8%	62	9.7%	350	5.7%	65	10.8%
WB Onramp	1,450	11.0%	284	19.0%	2,270	16.3%	470	27.7%
EB Offramp	2,590	8.1%	502	14.3%	4,020	12.4%	800	21.3%
EB Onramp	329	5.8%	61	9.8%	350	5.7%	66	10.6%
To New England Highway NB	2,820	8.5%	539	14.7%	4,190	12.6%	840	21.4%
From New England Highway SB	1,790	10.1%	351	17.4%	2,630	15.2%	530	24.5%
To Cessnock Road SB	204	2.0%	37	2.7%	275	1.8%	51	3.9%
From Cessnock Road NB	73	6.8%	14	14.3%	88	8.0%	17	11.8%

Table 7 Forecast Traffic Data – Road Interchanges (contd.)

Approach Name	Year 2010				Year 2020			
	Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)		Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
New England Highway Junction								
Southern Approach NB	2,820	8.5%	539	14.7%	4,190	12.6%	840	21.4%
Southern Approach SB	1,790	10.1%	351	17.4%	2,630	15.2%	530	24.5%
Northern Approach SB	2,100	7.6%	405	13.6%	2,820	9.9%	545	17.4%
Northern Approach NB	3,200	8.8%	616	15.6%	4,570	12.7%	910	20.9%
Western Approach EB	1,150	13.9%	234	23.1%	1,280	20.3%	269	33.1%
Western Approach WB	1,063	8.7%	201	15.4%	1,090	9.2%	214	15.9%
Cessnock Road Junction								
Southern Approach NB	536	4.9%	100	9.0%	548	5.1%	103	9.7%
Southern Approach SB	665	3.8%	119	7.6%	736	3.5%	139	6.5%
Northern Approach SB	204	2.0%	37	2.7%	275	1.8%	51	3.9%
Northern Approach NB	73	6.8%	14	14.3%	88	8.0%	17	11.8%
Western Approach EB	461	4.6%	86	8.1%	461	4.6%	86	8.1%
Western Approach WB	461	4.6%	86	8.1%	461	4.6%	86	8.1%
Allandale Road Interchange								
WB Offramp	842	5.0%	154	9.1%	955	4.7%	175	8.6%
EB Onramp	842	5.0%	154	9.1%	987	4.8%	186	8.6%
Southern Approach NB	502	6.4%	95	11.6%	544	6.3%	103	10.7%
Southern Approach SB	501	6.2%	95	11.6%	544	6.3%	102	10.8%
Northern Approach SB	1,033	5.1%	188	9.6%	1,210	5.0%	230	8.7%
Northern Approach NB	1,034	5.2%	198	9.1%	1,168	5.0%	219	8.7%

Table 7 Forecast Traffic Data – Road Interchanges (contd.)

Approach Name	Year 2010				Year 2020			
	Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)		Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Loxford Interchange								
WB Offramp	1,470	17.0%	303	10.9%	1,530	17.0%	317	11.7%
EB Onramp	1,370	17.5%	290	10.3%	1,570	16.6%	326	11.0%
Southern Approach NB	1,220	7.4%	290	10.3%	1,420	7.7%	326	11.0%
Southern Approach SB	1,319	7.5%	303	10.9%	1,380	8.0%	317	11.7%
Northern Approach SB	750	20.0%	0	0.0%	750	20.0%	0	0.0%
Northern Approach NB	750	20.0%	0	0.0%	750	20.0%	0	0.0%
Kurri Kurri Interchange								
WB Offramp	5,790	8.6%	1,120	15.2%	6,120	9.2%	1,190	16.0%
WB Onramp	444	7.7%	85	12.9%	612	8.5%	118	15.3%
EB Offramp	592	5.4%	110	10.0%	818	5.9%	156	10.3%
EB Onramp	4,790	7.9%	920	14.1%	4,960	8.1%	960	14.6%
Northern Approach NB	2,440	7.4%	472	13.1%	2,920	7.2%	562	12.8%
Northern Approach SB	2,380	7.6%	451	13.5%	2,820	7.4%	542	13.3%
Southern Approach SB	7,280	8.7%	1,400	15.0%	8,070	9.0%	1,570	15.9%
Southern Approach NB	6,210	8.2%	1,190	14.3%	6,810	8.4%	1,310	14.5%

Table 7 Forecast Traffic Data – Road Interchanges (contd.)

Approach Name	Year 2010				Year 2020			
	Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)		Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Buchanan Interchange								
WB Offramp	3,080	6.2%	583	10.8%	3,120	6.7%	589	11.7%
WB Onramp	3,990	7.8%	770	14.3%	4,720	8.1%	910	14.3%
EB Offramp	3,740	8.0%	720	13.9%	4,740	9.9%	930	17.2%
EB Onramp	2,660	6.4%	507	11.2%	2,940	6.8%	557	12.0%
Northern Approach NB	7,430	7.9%	1,430	14.0%	8,900	8.9%	1,720	15.7%
Northern Approach SB	6,730	7.9%	1,290	14.0%	7,900	8.2%	1,520	14.5%
Southern Approach SB	5,630	6.9%	1,070	12.1%	6,070	7.6%	1,160	12.9%
Southern Approach NB	6,170	7.1%	1,180	12.7%	6,880	7.3%	1,310	13.0%
Buchanan Road Junction								
Southern Approach NB	7,430	7.9%	1,430	14.0%	8,900	8.9%	1,720	15.7%
Southern Approach SB	6,730	7.9%	1,290	14.0%	7,900	8.2%	1,520	14.5%
Northern Approach SB	5,110	8.6%	990	15.2%	5,950	9.4%	1,160	16.4%
Northern Approach NB	5,400	8.1%	1,040	14.4%	6,320	9.0%	1,220	15.6%
Western Approach EB	1,715	5.5%	322	9.9%	2,060	4.9%	385	9.1%
Western Approach WB	2,120	7.1%	401	12.7%	2,690	8.6%	518	15.1%
George Booth Drive Junction								
Western Approach EB	5,900	7.1%	1,120	12.5%	6,560	7.3%	1,250	12.8%
Western Approach WB	5,350	6.9%	1,010	11.9%	5,740	7.5%	1,100	13.6%
Southern Approach NB	291	7.2%	55	12.7%	345	7.2%	66	13.6%
Southern Approach SB	304	7.9%	58	13.8%	349	8.3%	68	14.7%
Eastern Approach WB	5,630	6.9%	1,070	12.1%	6,070	7.6%	1,160	12.9%
Eastern Approach EB	6,170	7.1%	1,180	12.7%	6,880	7.3%	1,310	13.0%

Table 7 Forecast Traffic Data – Road Interchanges (contd.)

Approach Name	Year 2010				Year 2020			
	Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)		Daytime (7:00am – 10:00pm)		Night-time (7:00am – 10:00pm)	
	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy	Traffic Volume	%Heavy
Newcastle Interchange								
F3 South to F3-Branxton Freeway	3,470	15.6%	700	25.7%	5,080	17.7%	1,050	28.6%
F3 South to Newcastle Link Road	4,360	14.4%	880	23.9%	5,600	20.9%	1,190	33.6%
F3-Branxton Freeway to F3 South	1,990	17.1%	410	26.8%	2,910	19.6%	610	31.1%
Newcastle Link Road to F3 North	8,020	4.6%	1,500	8.7%	9,420	4.6%	1,750	8.0%
Newcastle Link Road to F3 South	4,100	30.5%	930	45.2%	6,320	40.7%	1,540	56.5%
F3 North to Newcastle Link Road	7,970	4.6%	1,490	8.7%	9,950	4.6%	1,860	8.6%
Underpasses and Overpasses								
Tuckers Lane – EB	361	8.6%	69	15.9%	372	8.6%	71	15.5%
Tuckers Lane – WB	364	9.3%	70	17.1%	378	10.1%	73	17.8%
Camp Road – NB	424	10.4%	84	17.9%	453	11.7%	89	20.2%
Camp Road – SB	462	9.1%	90	15.6%	498	9.6%	97	16.5%
Old Maitland Road – NB	2,230	7.2%	424	12.7%	2,420	7.0%	458	12.7%
Old Maitland Road – SB	2,300	7.8%	441	13.8%	2,520	8.3%	482	14.9%

7.3 Road Surface

Traffic noise depends on a number of factors including road surface construction methods, surface textures, types of vehicles and traffic speeds. For the purpose of noise modeling, it was assumed that the proposed Link and road interchanges would be surfaced with dense graded asphalt or an equivalent noise rated surface.

7.4 Road Alignment

Coordinates of the road alignment, cutting, embankment and ground topography were supplied by the RTA.

7.5 Representative Receiver Locations

Approximately ninety (90) representative receptor locations were identified along the study corridor and surveyed by the *RTA* for noise assessment purposes.

7.6 Facade Reflection

To account for facade noise reflection a correction factor of 2.5dB(A) has been added to the predicted noise levels.

8.0 PREDICTED ROAD TRAFFIC NOISE LEVELS

8.1 Continuous Traffic Noise

Ninety (90) residential reference locations were selected for the noise modeling and assessment purposes. The locations are generally located within approximately 600m from the road alignment and were selected to represent the receiver locations where traffic noise from the proposed Link would be experienced.

Table 8 presents a summary of the predicted $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ road traffic noise levels for calm weather condition and identifies noise exceedances at the representative receiver locations referenced to the *ECRTN* assessment goals.

Factors considered for noise modeling included atmospheric absorption, ground effect, distance separation, shielding from cuttings, exposure from embankments, local topography and the existing noise barrier in Branxton as constructed by Rail Services Australia for the control of rail traffic noise.

Appendix 4 identifies the reference noise assessment locations. The noise modeling results (*Table 8*) have shown that:

- road traffic noise levels exceed the daytime 55dB(A) $L_{Aeq,15hr}$ assessment goal by up to 5dB(A) in Year 2010 (road opening) and up to 7dB(A) in the Year 2020 (ten (10) years post opening) at a number of locations;

- road traffic noise levels exceed the night-time 50dB(A) $L_{Aeq,9hr}$ assessment goal by up to 7dB(A) in Year 2010 and up to 9dB(A) in Year 2020 at a number of residences;

- the daytime $L_{Aeq,15hr}$ noise levels are approximately 3dB(A) higher than night-time $L_{Aeq,9hr}$ levels; and

- the predicted road traffic noise levels in Year 2020 (ten (10) years post opening) are approximately 2dB(A) higher those predicted for the opening year.

From the above results the night-time $L_{Aeq,9hr}$ traffic noise for Year 2020 has been adopted for assessing noise mitigation options for the project. For future planning purposes, *Appendices 5* and *6* present the $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ road traffic noise catchment areas for the Year 2020.

Table 8 Predicted Traffic Noise Levels and Exceedances
dB(A) re 20×10^{-6} Pa

Representative Receiver Number	Distance from Road m	Predicted Traffic Noise Level				Exceedance			
		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$	
		2010	2020	2010	2020	2010	2020	2010	2020
N100	223	57	59	54	56	2	4	4	6
N003	120	57	59	54	56	2	4	4	6
N004	364	54	56	51	53	-	1	1	3
N005	295	56	58	53	55	1	3	3	5
N006	222	58	60	55	57	3	5	5	7
N007	286	56	58	53	55	1	3	3	5
N008	447	51	53	48	51	-	-	-	1
N009	212	56	58	53	55	1	3	3	5
N010	338	56	58	53	55	1	3	3	5
N011	244	58	60	55	57	3	5	5	7
N012	203	53	55	50	52	-	-	-	2
N016	254	53	56	50	52	-	1	-	2
N017	356	49	51	46	48	-	-	-	-
N018	597	<50	<50	<45	45	-	-	-	-
N019	379	52	54	49	51	-	-	-	1
N020	189	58	60	55	57	3	5	5	7
N021	574	<50	<50	<45	45	-	-	-	-
N022	206	57	59	54	56	2	4	4	6
N023	198	57	59	54	56	2	4	4	6
N024	284	51	53	48	50	-	-	-	-
N025	172	58	60	56	58	3	5	6	8
N026	180	58	60	55	57	3	5	5	7
N027	400	<50	<50	<45	45	-	-	-	-
N028	475	51	53	48	50	-	-	-	-

Table 8 Predicted Traffic Noise Levels and Exceedances (contd.)

dB(A) re 20×10^{-6} Pa

Representative Receiver Number	Distance from Road m	Predicted Traffic Noise Level				Exceedance			
		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$	
		2010	2020	2010	2020	2010	2020	2010	2020
N029	490	54	55	50	51	-	-	-	1
N030	529	<50	<50	<45	45	-	-	-	-
N031	235	56	58	52	54	1	3	2	4
N032	396	51	53	48	50	-	-	-	-
N033	401	51	53	48	50	-	-	-	-
N034	184	56	58	52	54	1	3	2	4
N036	201	58	59	55	56	3	4	5	6
N037	512	54	55	50	51	-	-	-	1
N038	351	60	62	57	59	5	7	7	9
N039	343	54	55	50	52	-	-	-	2
N040	467	52	54	49	51	-	-	-	1
N041	338	53	55	50	52	-	-	-	2
N042	170	60	62	56	58	5	7	6	8
N043	251	57	58	54	56	2	3	4	6
N044	280	57	59	54	56	2	4	4	6
N046	92	>60	>60	>55	>55	-	-	-	-
N047	277	53	55	49	51	-	-	-	1
N048	366	52	54	49	51	-	-	-	1
N049	415	54	56	50	52	-	1	-	2
N050	282	52	54	48	51	-	-	-	1
N051	200	54	56	51	53	-	1	1	3
N052	77	60	62	56	58	5	7	6	8
N053	81	59	61	55	57	4	6	5	7
N054	95	58	60	54	56	3	5	4	6
N055	295	53	55	49	52	-	-	-	2
N056	236	56	57	53	54	1	2	3	4
N057	274	56	57	53	54	1	2	3	4
N058	270	54	56	51	54	-	1	1	4
N059	292	51	54	48	50	-	-	-	-
N060	671	<50	<50	<45	46	-	-	-	-
N061	246	54	56	51	54	-	1	1	4
N062	433	50	53	48	50	-	-	-	-
N063	462	<50	<50	45	47	-	-	-	-
N064	286	56	58	53	55	1	3	3	5
N065	359	54	56	51	53	-	1	1	3
N066	327	51	54	48	50	-	-	-	-
N067	509	<50	<50	<45	45	-	-	-	-
N068	564	<50	<50	<45	45	-	-	-	-
N069	486	<50	<50	<45	46	-	-	-	-

Table 8 Predicted Traffic Noise Levels and Exceedances (contd.)
dB(A) re 20×10^{-6} Pa

Representative Receiver Number	Distance from Road m	Predicted Traffic Noise Level				Exceedance			
		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$		$L_{Aeq,15hr}$		$L_{Aeq,9hr}$	
		2010	2020	2010	2020	2010	2020	2010	2020
N070	588	<50	<50	<45	45	-	-	-	-
N071	209	58	60	55	57	3	5	5	7
N072	301	54	56	51	53	-	1	1	3
N073	627	<50	<50	<45	<45	-	-	-	-
N074	350	55	55	54	55	-	-	4	5
N075	424	52	52	50	50	-	-	-	-
N076	152	57	57	54	55	2	2	4	5
N077	148	55	56	54	55	-	1	4	5
N078	137	51	52	48	50	-	-	-	-
N079	133	51	52	48	50	-	-	-	-
N080	309	<50	<50	<45	45	-	-	-	-
N081	330	<50	<50	<45	<45	-	-	-	-
N082	420	<50	<50	<45	<45	-	-	-	-
N083	513	<50	<50	<45	<45	-	-	-	-
N084	420	<50	<50	<45	45	-	-	-	-
N085	128	57	59	54	56	2	4	4	6
N086	244	54	56	51	53	-	1	1	3
N087	260	53	55	50	52	-	-	-	2
N088	309	51	53	48	51	-	-	-	1
N089	334	50	53	47	49	-	-	-	-
N090	230	55	57	52	54	-	2	2	4
N091	268	53	55	50	52	-	-	-	2
N092	356	54	56	51	53	-	1	1	3
N093	367	53	55	50	52	-	-	-	2
N094	372	53	55	50	52	-	-	-	2
N095	458	51	53	48	50	-	-	-	-
N096	353	53	55	50	52	-	-	-	2
N097	364	53	55	50	52	-	-	-	2
N098	563	<50	<50	<45	45	-	-	-	-
N099	540	<50	<50	<45	45	-	-	-	-

8.2 Intermittent Traffic Noise

Intermittent traffic noise sources associated with the proposal include trucks, truck acceleration and engine compression brakes.

For the predictions of the L_{Amax} noise levels, a sound power level of 110dB(A) was assigned to truck pass-bys, 113dB(A) for trucks acceleration and deceleration on the

entry and exit approaches at the road interchanges and 117dB(A) to engine compression brakes.

Appendix 7 presents L_{Amax} noise contours for possible intermittent traffic noise sources. The noise predictions show that the L_{Amax} levels from trucks accelerating, decelerating and engine compression brakes could exceed the night-time L_{Aeq} noise levels by more than 15dB(A).

Reference to research conducted by the *RTA* "*A Vehicle Maximum Noise Level Study – Proceedings of Acoustics, 3-5 November 2004, Gold Coast, Australia*", showed that approximately 25% of drivers apply engine compression brakes due to road geometry conducive to driver hesitation or behavioral change.

Based on the forecast traffic data and research conducted by the *RTA, Table 9* presents a summary of the number of possible night-time truck noise events.

Table 9 Predicted Number of Night-time Truck Noise Events

Road Name	Number of Night-time Truck Noise Events	
	Year 2010	**Year 2020**
	Branxton Interchange	
WB Offramp	2	2
WB Onramp	13	33
EB Offramp	18	43
EB Onramp	1	2
to New England Highway NB	20	45
from New England Highway SB	15	32
to Cessnock Road SB	0	0
from Cessnock Road NB	1	1
	New England Highway Junction	
Southern Approach NB	20	45
Southern Approach SB	15	32
Northern Approach SB	14	24
Northern Approach NB	24	48
Western Approach EB	14	22
Western Approach WB	8	9

Table 9 Predicted Number of Night-time Truck Noise Events (contd.)

Road Name	Number of Night-time Truck Noise Events	
	Year 2010	Year 2020
	Cessnock Road Junction	
Southern Approach NB	2	2
Southern Approach SB	2	2
Northern Approach SB	0	0
Northern Approach NB	1	1
Western Approach EB	2	2
Western Approach WB	2	2
	Allandale Road Interchange	
WB Offramp	4	4
EB Onramp	4	4
Southern Approach NB	3	3
Southern Approach SB	3	3
Northern Approach SB	5	5
Northern Approach NB	5	5
	Loxford Interchange	
WB Offramp	8	9
EB Onramp	7	9
Southern Approach NB	7	9
Southern Approach SB	8	9
	Kurri Kurri Interchange	
WB Offramp	43	48
WB Onramp	3	5
EB Offramp	3	4
EB Onramp	32	35
Northern Approach NB	15	18
Northern Approach SB	15	18
Southern Approach SB	53	62
Southern Approach NB	43	47
	Buchanan Interchange	
WB Offramp	16	17
WB Onramp	28	33
EB Offramp	25	40
EB Onramp	14	17
Northern Approach NB	50	68
Northern Approach SB	45	55
Southern Approach SB	32	37
Southern Approach NB	37	43

Table 9 Predicted Number of Night-time Truck Noise Events (contd.)

Road Name	Number of Night-time Truck Noise Events	
	Year 2010	**Year 2020**
Buchanan Road Junction		
Southern Approach NB	50	68
Southern Approach SB	45	55
Northern Approach SB	38	48
Northern Approach NB	37	48
Western Approach EB	8	9
Western Approach WB	13	20
George Booth Drive Junction		
Western Approach EB	35	40
Western Approach WB	30	37
Southern Approach NB	2	2
Southern Approach SB	2	2
Eastern Approach WB	32	37
Eastern Approach EB	37	43
Newcastle Interchange		
F3 South to F3-Branxton Freeway	45	75
F3 South to Newcastle Link Road	53	100
F3-Branxton Link to F3 South	27	47
Newcastle Link Road to F3 North	33	35
Newcastle Link Road to F3 South	105	218
F3 North to Newcastle Link Road	32	40
Underpasses and Overpasses		
Tuckers Lane – EB	3	3
Tuckers Lane – WB	3	3
Camp Road – NB	4	4
Camp Road – SB	4	4
Old Maitland Road – NB	13	15
Old Maitland Road – SB	15	18

8.3 Adverse Weather Conditions

It is acknowledged that the study area is affected by weather conditions, particularly temperature inversions that could enhance noise propagation.

To evaluate the effects of weather conditions, noise modeling was conducted to assess the effects of temperature inversions and wind.

Table 10 presents a summary of predicted road traffic noise levels (compared to calm weather condition) for various distances from the road with a temperature gradient of

3°C/100m and wind speeds of 1.5m/s and 3m/s from source to receptor. Results of the noise modeling (*Table 10*) show that depending on the distance from the road and the road alignment, traffic noise could increase by:

- 1-3dB(A) with a temperature inversion of 3°C/100m;
- 2-5dB(A) with wind speed of 1.5m/s towards the receptor; and
- 4-10dB(A) with wind speed of 3m/s towards the receptor.

Table 10 Noise Increase due to Weather Conditions
dB(A) re 20 $\times 10^{-6}$ Pa

Road Condition		Distance from Road Alignment (m)				
		100	**200**	**300**	**400**	**500**
3°C/100m Temperature Inversion						
Chainage 36600m	road in 8m high cut	0	1	1	2	2
Chainage 36900m	road at level with ground	1	1	1	1	1
Chainage 36900m	4m high roadside barrier - road at level with ground	0	0	1	2	2
Chainage 37700m	road on 10m high embankment	1	1	2	3	3
1.5m/s Wind towards Receptor						
Chainage 36600m	road in 8m high cut	2	2	3	4	6
Chainage 36900m	road at level with ground	2	2	3	3	3
Chainage 36900m	4m high roadside barrier - road at level with ground	2	2	4	5	6
Chainage 37700m	road on 10m high embankment	3	4	4	5	6
3m/s Wind towards Receptor						
Chainage 36600m	road in 8m high cut	4	6	8	10	12
Chainage 36900m	road at level with ground	4	4	5	6	7
Chainage 36900m	4m high roadside barrier - road at level with ground	4	5	8	10	12
Chainage 37700m	road on 10m high embankment	7	7	8	9	11

9.0 POSSIBLE NOISE CONTROL OPTIONS

The noise modeling results (*Appendices 5* and *6*) show that without secondary noise mitigation the *ECRTN* noise goals would be exceeeded at properties in the townships of Kurri Kurri and Branxton, Allandale and Greta rural areas and isolated properties along the proposed road corridor.

The following section of the report presents options for noise mitigation that may be appropriate. The noise mitigation options have been consulted with the *RTA* to take account of practicality and possible secondary impacts.

9.1 Roadside Acoustic Barriers and Earth Mounds

Road traffic noise levels could be reduced with the construction of roadside barriers, earth mounds or a combination of barrier and earth mounds along the road alignment. The levels of noise reduction achieved would depend on the locations and heights of the noise source, receivers and barriers.

Table 11 presents a summary of the heights and locations of conceptual barriers/earth mounds modeled for the road project. The locations of the barriers/earth mounds were discussed with the *RTA* during the conceptual design assessment stage and selected to provide noise reduction for built-up residential areas.

Atkins Acoustics was advised during the preparation of the noise assessment that alterations to the proposed Anvil Creek Development had not been finalised nor approved by Cessnock Council or the Department of Planning *(DoP).* As advised by the *RTA*, 4 m high noise barriers relative to the finished road surface have been modeled where the road is on embankment.

Appendices 8 and *9* present the predicted $L_{Aeq,15hr}$ and $L_{Aeq,9hr}$ noise level contours with the noise mitigation options summarised in *Table 11*. The predictions show that road traffic noise generated from the proposed Link when assessed in townships of Kurri

Kurri, Branxton and Allandale, and Greta rural communities could be controlled.

For the proposed Anvil Creek Development predicted road traffic noise levels for single storey dwellings and with 4m high barriers on the embankment of the proposed road would satisfy the 55dB(A) $L_{Aeq,15hr}$ and 50dB(A) $L_{Aeq,9hr}$ assessment goals at a set back distance of 120m from the road.

Table 11 Modeled Barrier Heights and Locations F3 to Branxton Link

Chainage (m)		Length (m)	Height (m)	Location	
From	To				
140	270	130	3	top of cut	Kurri Kurri Interchange, southern approach
13,900	14,800	900	3	top of cut	Southern side, Kurri Kurri
27,960	28,800	840	4	top of fill	Eastern side, Anvil Creek Development
29,020	30,800	1,780	4	top of fill	Eastern side, Anvil Creek Development
31,600	32,400	800	3.5	top of fill	Eastern side, Tuckers Lane
36,800	38,000	1,200	4	top of fill	Northern side, Branxton

9.2 Treatment to Individual Dwellings

Given the proposed road would pass a number of isolated residential properties, noise controls in the form of acoustic treatment to the individual dwellings would normally be considered appropriate for exposed properties.

Treatment to individual properties or dwellings could include external court yard walls, closing exposed door and window openings, upgrading exposed building façade/glazing, sealing off openings and exposed wall vents and provisions for ventilation support. Final acoustic treatments and detailing would be dependent on inspections of the individual properties.

Nominally noise reductions achieved from a typical building facade with open windows would be in the order of 10dB(A). With the windows closed, noise reductions would be in the order of 20-25dB(A). It is noted that the provision of acoustic treatment to

dwellings would provide no acoustic benefit to outdoor areas.

Finalisation of noise control options and design should be undertaken as part of the detailed road design and on the basis of practicality, cost effectiveness, equity, aesthetics and owner preference. This should occur following consultations with local councils and property owners and prior to the construction of the proposed Link.

9.3 Property Acquisition

A number of properties would be acquired as part of the proposal due to the fact that practical control measures would not be able to reduce the predicted noise impacts to within the assessment goals. In addition, there are other environmental factors that would require the acquisition of a number of properties. The RTA as part of the proposal would identify property acquisitions.

9.4 Future Planning

Local Councils have a role in ensuring that road traffic noise is considered when determining rezoning and development applications under the provisions of the Environmental Planning and Assessment Act, 1979. It is recommended that local Councils consider planning strategies for future land zoning and development adjacent to the road corridor.

9.5 Future Development in Traffic Noise Control

As part of the Government's long-term plan to reduce road traffic noise, strategies that are being considered include controlling noise emissions from individual vehicles, developing programs to monitor and control noise vehicles, controlling noise from trucks and engine brakes and reducing traffic speed. The effective implementation of these programs will assist in future reductions to traffic noise on all roads.

10.0 NOISE FROM COMBINED HEAVY/LIGHT VEHICLE REST AREAS

The designated heavy/light vehicle rest areas north-west of the Branxton township could accommodate up to thirty (30) heavy vehicles (15 northbound and 15 south-bound). The closest residential properties in the Branxton township are in the order of 750m from the rest areas. There are a number of isolated residential properties with frontages to the New England Highway that are located approximately 100m from the rest areas.

The combined heavy/light vehicle rest areas at Buttai could accommodate up to twenty-five (25) light vehicles and fifteen (15) heavy vehicles for north-bound traffic; and twenty-five (25) light vehicles and eighteen (18) heavy vehicles for south-bound traffic. There are no residences identified in the immediate vicinity of the Buttai rest areas.

Noise associated with the combined heavy/light vehicle rest areas would include refrigerated trucks and transient activities associated with engine idling and revving, acceleration, deceleration and air brakes.

10.1 Noise Assessment Goals

For assessment purposes the *INP* recommends that the $L_{Aeq,15min}$ noise levels from stationary noise sources (refrigerated trucks) should not exceed the background L_{A90} noise levels by more than 5dB(A).

For night-time transient activities (10:00pm – 7:00am), the *ENCM* recommends the $L_{A1,1min}$ noise levels should not exceed the background L_{A90} level by more than 15dB(A) when assessed outside a bedroom window.

From evaluation and assessment of the ambient noise measurement results *(Appendix 3) Table 12* presents a summary of the background noise levels and recommended assessment goals for the rest areas/truck stops.

Table 12 Noise Assessment Goals for Heavy/Light Vehicle Rest Areas
dB(A) re 20 $\times 10^{-6}$ Pa

Assessment Location	Night-time L_{A90} Background Noise Level	Noise Assessment Goal	
		$L_{Aeq,15min}$	$L_{A1,1min}$
Branxton	32	37	47
Buchanan	30	35	45

10.2 Predicted Noise Levels

Sound power levels (SWL) and source heights used for modeling noise from the rest areas, include:

- 113dB(A) for truck acceleration and deceleration. Source height 1.5m above the ground level;
- 116dB(A) for air brakes. Source height 1m above the ground level; and
- 102dB(A) for refrigerated trucks (per truck). Source height 3m above the ground level.

For modeling purposes it was assumed that refrigerated trucks occupied 50% of the rest area capacity. Additionally, a 4.5m high acoustic barrier/earth mound would be provided along the eastern site boundary of the Branxton rest area (eastbound traffic).

Appendices 10 and *11* present the predicted $L_{Aeq,15min}$ and L_{Amax} noise levels for the Branxton and Buttai rest area under calm weather condition.

The truck stop noise predictions show that levels of 31dB(A) $L_{Aeq,15min}$ and 38dB(A) L_{Amax} at the closest Branxton residence satisfy the recommended goals of 37dB(A) $L_{Aeq,15min}$ and 47dB(A) L_{Amax} respectively.

The predicted noise levels for the residential properties to the north of the Branxton rest areas of 48dB(A) $L_{Aeq,15min}$ and 57dB(A) L_{Amax} exceed the assessment goals. For these properties, the *RTA* would consider provision of building treatments to the dwellings.

10.3 Adverse Weather Conditions

The results of noise modeling show that the rest areas $L_{Aeq,15min}$ and L_{Amax} noise levels in the Branxton township increase by 3dB(A) with a temperature inversion of 3°C/100m. Nonetheless, the predicted noise levels would satisfy the assessment goals of 35dB(A) $L_{Aeq,15min}$ and 45dB(A)L_{Amax}.

With 1.5m/s westerly wind, the predictions show noise levels from the rest areas would increase by 7-10dB(A) and that the resultant levels would exceed the assessment goals of 35dB(A) $L_{Aeq,15min}$ and 45dB(A) L_{Amax}.

11.0 SUMMARY

This report presents a summary of the results and findings of a noise assessment for the proposed F3 to Branxton Link between the F3 Freeway at Seahampton and the New England Highway at Branxton.

The report has been prepared to incorporate the changes to the road alignment, forecast traffic volumes and assessment guidelines and supersedes the previous findings presented in Atkins Acoustics Report Nos. 24.2803.R1:GA49 and 30.5147.R2:DD18 Rev 01 "*Road Traffic Noise Assessment – National Highway Extension, Seahampton to Branxton*".

The noise assessment goals adopted were 55dB(A) $L_{Aeq,15hr}$ and 50dB(A) $L_{Aeq,9hr}$ at 1m from the residential building facades, in accordance with the Department of Environment and Conservation *(DEC)*, Environmental Criteria for Road Traffic Noise *(ECRTN).*

Maximum highway truck noise levels (L_{Amax}) have been modeled and addressed in accordance with the protocol in the RTA Environmental Noise Management Manual *(ENMM).*

For the assessment of noise from the combined heavy and light vehicle rest areas in Branxton and Buttai, the DEC Environmental Noise Control Manual's *(ENCM)* recommendations were considered. For stationary noise sources such as refrigerated trucks, the assessment goal adopted was the $L_{Aeq,15min}$ source noise level not to exceed the background level by more than 5dB(A). For night-time transient activities such as truck acceleration/ deceleration and air brakes, the assessment goal adopted was the $L_{A1,1min}$ source noise level not to exceed the background level by more than 15dB(A).

The assessment has shown that, in the absence of noise mitigation, the predicted road traffic noise levels from the proposed Link would exceed the assessment goals at a number of properties in built-up residential areas and at isolated properties exposed to the road corridor.

Conceptual noise control options including acoustic barriers/earth mounds, provision of acoustic treatments to the affected dwellings and property acquisitions have been considered for the purpose of reducing road traffic noise exposure *(Section 9).* The final selection of traffic noise mitigation would be dependent on feasibility and practicality, secondary factors such as visual characters, consultation with community, affected property owners and relevant authorities.

As part of the NSW Government long term plan to reduce road traffic noise, strategies being considered include controlling noise emissions from individual vehicles, developing programs to monitor and control noisy vehicles and the control of noise from trucks and engine brakes. The progressive and effective implementation of these programs will assist in further reduction to road traffic noise.

In regard to future planning, the local Councils have a role in ensuring that road traffic noise is considered when determining rezoning, development and building applications under the provisions of the Environmental Planning and Assessment Act, 1979 and Local Government Act, 1993. It is recommended that local Councils consider planning strategies for any future development adjacent to the proposed road corridor and the outcomes adopted as part of Local Planning Controls.