

PACIFIC HIGHWAY UPGRADE  
OXLEY HIGHWAY TO KEMPSEY  
NOISE & VIBRATION WORKING PAPER

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PREPARED FOR

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## 4 TRAFFIC NOISE MODELLING & INPUTS

### 4.1 Modelling methodology

Noise levels from both the existing highway and proposed upgraded highway were calculated using procedures based on the prediction algorithms from the manual *Calculation of Road Traffic Noise* (CoRTN) (UK Department of Environment (1998)), a recognised standard for noise predictions. The standard CoRTN prediction procedures were modified in the following ways:

- Use the correction of -1.6 dB(A) to account for the difference between the standard CoRTN façade predictions and traffic noise levels measured under "Australian" conditions (*Prediction Method*, ARRB Research Report, Melbourne, by Saunders R. E., Samuels S. E., Leach R. and Hall A, published in *An Evaluation of the UK DoE Traffic Noise, 1983*). Note that with "Australian" conditions corrections there is a difference of 1.7dBA between an "Australian" free field and façade corrected traffic noise level.
- $L_{Aeq}$  values were calculated from the  $L_{A10}$  values predicted by the CoRTN algorithms using the well-validated approximation  $L_{Aeq,1hr} = L_{A10,1hr} - 3$ .
- Noise source heights were set at 0.5 metres for cars, 1.5 metres for heavy vehicle engines and 3.6 metres for heavy vehicle exhausts, representing typical values for Australian vehicles. Noise from a heavy vehicle exhaust was assessed as 8 dB(A) lower than the noise from the engine.

The models were implemented using *ROADent* software, based on road design points at 10 metre intervals along both the existing highway and upgraded highway. Inputs to the model are listed in Table 4-1.

Traffic noise criteria do not specify what meteorological condition they apply to. Traffic noise models such as CoRTN do not incorporate meteorological data and predict noise levels under neutral meteorological conditions. This does not have any implication on the outcome of the noise assessment since noise management measures are generally dictated by residences close to the road where weather conditions such as wind and wind direction are irrelevant.

Where there are no barriers present, ground was taken to be 50% soft. This has been previously found to give a good correlation with measured noise levels in similar situations. With barriers, hard ground is assumed, as required under the CoRTN procedures.

Table 4-1 Summary of *ROADent* modelling inputs

Input parameter	Data source
Road design	Existing and proposed alignment supplied by GHD Pty Ltd. There have been minor design refinements since the modelling was undertaken. These relate to the layout and arrangements of some of the interchanges and traffic arrangements. The modelling results are dominated by traffic noise from the main carriageways and these minor design refinements do not affect the results.
Topographical data	Contours at 2 metre and 10 metre intervals supplied by GHD Pty Ltd.
Traffic volumes and mix	Supplied by GHD Pty Ltd. All data came from the RTA 2004 survey.

Input parameter	Data source
Vehicle speeds	For existing roads (2016), current posted speed limit. For Proposal (2026), 110 km/hr on freeways, 60 km/hr on-ramps, 80 km/hr on service road between Sancrox Road and Blackmans Point Road and 100 km/hr on service road between Blackmans Point Road and Haydons Wharf Road.
Receiver locations	Based on surveys (aerial photos and ground verification) undertaken by GHD Pty Ltd. All locations potentially affected by the Proposal are included in the noise assessment. Each location is identified by a unique number. It is important to note that not all identified locations are residences. The identified residences would be further validated during the detailed design phase.
Height of receivers	1.5 metres above floor or ground level. In the case of two-storey residences. 1.5 metres above 1st floor level (most affected by traffic noise).
Road surface	Existing roads (including service roads): Combination of dense graded asphalt (CoRTN correction 0 dB), chipseal (CoRTN correction 3 dB) and average concrete (CoRTN correction 2-2.5 dB depending on percentage of heavy vehicle). New roads: Hessian-dragged tyned concrete (CoRTN correction 2.5-3 dB depending on percentage of heavy vehicle) and dense graded asphalt for bridge sections (CoRTN correction 0 dB).

#### 4.2 Modelling scenarios

Two models were created, corresponding to the existing highway and proposed upgraded highway. The following scenarios were modelled.

- Existing conditions. Current noise levels were calculated based on 2004 traffic counts. These levels are used to test the integrity of the noise models by comparing the predicted levels with measured levels from noise loggers.
- Year 2016 'Future existing'. In this scenario noise levels were calculated for traffic on the existing road network immediately prior to the anticipated opening of the Proposal. In this scenario, traffic is predicted to increase by up to 50% from year 2004 (depending on the various highway sections).
- Year 2026. Noise levels were calculated for the Proposal 10 years after anticipated opening. In this scenario, traffic is predicted to increase by up to 37% from year 2016 (depending on the various highway sections).

#### 4.3 Traffic modelling parameters

The following parameters were used for the traffic modelling:

- Predicted traffic volumes and Ausroads vehicle classification for 2006 with the existing alignment (Table 4-2).
- 2016 with the existing highway alignment (Table 4-3).
- 2026 with the Proposal (Table 4-4).

Predicted 2026 flows on those sections of the existing highway that would become service roads are shown in Table 4-5 and those on proposed service roads, ramps and overbridges are shown in Table 4-6. The proposed service road network would include the incorporation of existing local roads. Due to the low predicted traffic volumes on these existing roads, traffic modelling has not been undertaken at this stage. Noise assessments for these roads could be required as part of the detailed design process if it is determined that there would be a significant increase in traffic using these roads.

The projected traffic growth for the Oxley Highway to Kempsey section of the Pacific Highway is based on a 4% annual increase. This is based on recorded traffic volumes between 1995 and 2004. Since the projections were calculated, further analysis of this data by the RTA along with recent unpublished data from traffic counts undertaken by the RTA indicates that the actual long term growth rate could be lower, at approximately 2%. The difference is attributed to a marked increase in traffic volumes using the Pacific Highway, in particular B-doubles, in the period of 2001 to 2004. Therefore the projections upon which this assessment is based should be viewed as a worst case scenario and would be refined during the detailed design phase as more information becomes available.

Table 4-2 Predicted traffic flows 2006 along existing highway

Highway section	Direction	Day (7am-10pm)			Night (10pm-7am)			24-hour total (2-way)
		Light	Heavy	% Heavy	Light	Heavy	% Heavy	
Oxley Highway interchange to Hastings River Drive	Northbound	4475	1054	19.1%	604	599	49.8%	13,290
	Southbound	4488	1002	18.2%	449	619	58.0%	
Hastings River Drive to Blackmans Point Road	Northbound	5811	1102	15.9%	569	568	50.0%	16,130
	Southbound	5885	1049	15.1%	574	572	49.9%	
Blackmans Point Road to Haydons Wharf Road	Northbound	5594	1027	15.5%	560	579	50.8%	15,560
	Southbound	5676	1002	15.0%	532	590	52.6%	
Haydons Wharf Road to Stumpy Creek	Northbound	5476	1109	16.8%	497	625	55.7%	15,460
	Southbound	5551	1077	16.2%	498	627	55.7%	

Table 4-3 Predicted traffic flows 2016 along existing highway

Highway section	Direction	Day (7am-10pm)			Night (10pm-7am)			24-hour total (2-way)
		Light	Heavy	% Heavy	Light	Heavy	% Heavy	
Oxley Highway interchange to Sancrox Road	Northbound	4629	1230	21%	341	534	61%	13,468
	Southbound	4629	1230	21%	341	534	61%	
Sancrox Road to Hastings River Drive	Northbound	4679	1244	21%	334	523	61%	13,560
	Southbound	4679	1244	21%	334	523	61%	
Hastings River Drive to Blackmans Point Road	Northbound	5579	1483	21%	384	600	61%	16,092
	Southbound	5579	1483	21%	384	600	61%	
Blackmans Point Road to Cooperabung Drive (south access)	Northbound	5745	1261	18%	424	610	59%	16,080
	Southbound	5745	1261	18%	424	610	59%	
Cooperabung Drive (south access) to Haydons Wharf Road	Northbound	5588	1227	18%	415	597	59%	15,654
	Southbound	5588	1227	18%	415	597	59%	
Haydons Wharf Road to Yarrabee Road	Northbound	5678	1246	18%	424	611	59%	15,918
	Southbound	5678	1246	18%	424	611	59%	
Yarrabee Road to Kundabung Road	Northbound	5656	1242	18%	423	608	59%	15,858
	Southbound	5656	1242	18%	423	608	59%	
Kundabung Road to Stumpy Creek	Northbound	5759	1264	18%	430	619	59%	16,144
	Southbound	5759	1264	18%	430	619	59%	

Table 4-4 Predicted traffic flows 2026 along the Proposal

Highway section	Direction	Day (7am-10pm)			Night (10pm-7am)			24-hour total (2-way)
		Light	Heavy	% Heavy	Light	Heavy	% Heavy	
Oxley Highway interchange to Sancrox Road	Northbound	6350	1688	21%	468	733	61%	18,478
	Southbound	6350	1688	21%	468	733	61%	
Sancrox Road to Blackmans Point Road interchange	Northbound	5274	1402	21%	389	608	61%	15,346
	Southbound	5274	1402	21%	389	608	61%	
Blackmans Point Road interchange to Haydons Wharf Road	Northbound	7636	1676	21%	543	849	61%	21,408
	Southbound	7636	1676	21%	543	849	61%	
Haydons Wharf Road to Yarrabee Road	Northbound	7300	1603	18%	545	785	59%	20,466
	Southbound	7300	1603	18%	545	785	59%	
Yarrabee Road to Kundabung Road	Northbound	7272	1596	18%	543	782	59%	20,386
	Southbound	7272	1596	18%	543	782	59%	
Kundabung Road to Stumpy Creek	Northbound	7405	1626	18%	553	796	59%	20,760
	Southbound	7405	1626	18%	553	796	59%	

Table 4-5 Predicted 2026 flows on existing highway service road between Sancrox Road and Haydons Wharf Road

Service road (existing highway) section	Direction	Day (7am-10pm)			Night (10pm-7am)			24-hour total (2-way)
		Light	Heavy	% Heavy	Light	Heavy	% Heavy	
Sancrox Road to Hastings River Drive	Northbound	723	216	23%	80	24	23%	2,086
	Southbound	723	216	23%	80	24	23%	
Hastings River Drive to Blackmans Point Road	Northbound	2164	240	10%	240	27	10%	5,342
	Southbound	2164	240	10%	240	27	10%	
Blackmans Point Road to Cooperabung Drive (south access)	Northbound	410	46	10%	46	5	10%	1,014
	Southbound	410	46	10%	46	5	10%	
Cooperabung Drive (south access) to Haydons Wharf Road	Northbound	198	13	6%	22	1	6%	468
	Southbound	198	13	6%	22	1	6%	



Table 4-6 Predicted 2026 flows on service roads, ramps and overbridges

Area	Road section	Direction	Day (7am-10pm)			Night (10pm-7am)			24-hour total (2-way)	
			Light	Heavy	% Heavy	Light	Heavy	% Heavy		
Sancrox Road traffic arrangement	On-ramp (including Sancrox Road until roundabout)	Northbound	60	18	23%	7	2	23%	87	
	Off-ramp (including Sancrox Road until roundabout)	Northbound	1146	342	23%	127	38	23%	1,653	
	On-ramp (including Fernbank Creek Road until roundabout)	Southbound	1146	342	23%	127	38	23%	1,653	
	Off-ramp (including Fernbank Creek Road until roundabout)	Southbound	60	18	23%	7	2	23%	87	
	Service road joining Sancrox Road and Fernbank Creek Road (via overbridge)	Eastbound on overbridge		633	189	23%	70	21	23%	1,826
		Westbound on overbridge		633	189	23%	70	21	23%	
	Blackmans Point Road interchange	On-ramp	Northbound	1855	206	10%	206	23	10%	2,290
		Off-ramp	Northbound	108	12	10%	12	1	10%	133
Blackmans Point Road interchange	On-ramp	Southbound	108	12	10%	12	1	10%	133	
	Off-ramp	Southbound	1855	206	10%	206	23	10%	2,290	
Haydons Wharf Road half interchange	On-ramp	Northbound	341	22	6%	38	2	6%	403	
	Off-ramp (including overbridge)	Southbound	341	22	6%	38	2	6%	403	
	Service road joining existing highway to Cooperabung Drive	Eastbound		195	12	6%	22	1	6%	230
		Westbound		195	12	6%	22	1	6%	230
Kundabung Road traffic arrangement	Overbridge	Eastbound	101	11	10%	101	11	10%	224	
		Westbound	101	11	10%	101	11	10%		