

Our Ref: JEH:300978

25 March 2014

NSW Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Neville Osborne & Diane Sarkies

Dear Sir

Application Modification 6 - Taralga Wind Farm DA241/04

We refer to modification No 6 which seeks a minor modification of the heavy vehicle transport route through Goulburn.

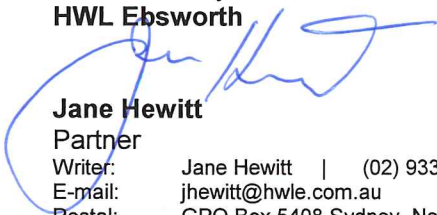
We refer to our meeting with the department on 26 February 2014 and subsequent emails regarding the need for some further survey material in relation to the proposed modified transport route.

Please find enclosed report of Jacobs SKM - Traffic and Noise assessment of new vehicle route through Goulburn. Traffic surveys were undertaken over a 4 day period between Monday 10 March 2014 and Thursday 13 March 2014 inclusive at 3 locations. The survey demonstrates that all roads are currently operating well below capacity. An assessment of construction traffic generation shows that there will be a minimal impact on road capacity.

In relation to noise, noise levels were assessed in relation to several location and sensitive noise receivers were identified. Noise impacts were assessed using the maximum number of vehicle movements and the results indicate that traffic noise level increases will be below the minimum 2dB(A) increase requirement for consideration for mitigation and would be imperceptible against the current noise environment

Please contact Jane Hewitt of this office should you wish to discuss this matter.

Yours faithfully
HWL Ebsworth



Jane Hewitt
Partner

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Date March 2014

Subject Taralga Wind Farm Stage 3 – Traffic and noise assessment of new vehicle route through Goulburn

1. Introduction

This note details an assessment of potential traffic and noise impacts resulting from the proposed new vehicle route through Goulburn as part of the construction of Stage 3 of Taralga Wind Farm.

Construction vehicles will use the following route:

- Exit the Hume Highway at the Hume Street exit > Garroorigang Road > Sloane Street > Grafton Street > Reynolds Street > continue to Taralga village via Union Street, Chantry Street, Tarlo Street and Taralga Road

This route is shown in **Figure 1-1** to **Figure 1-3**.

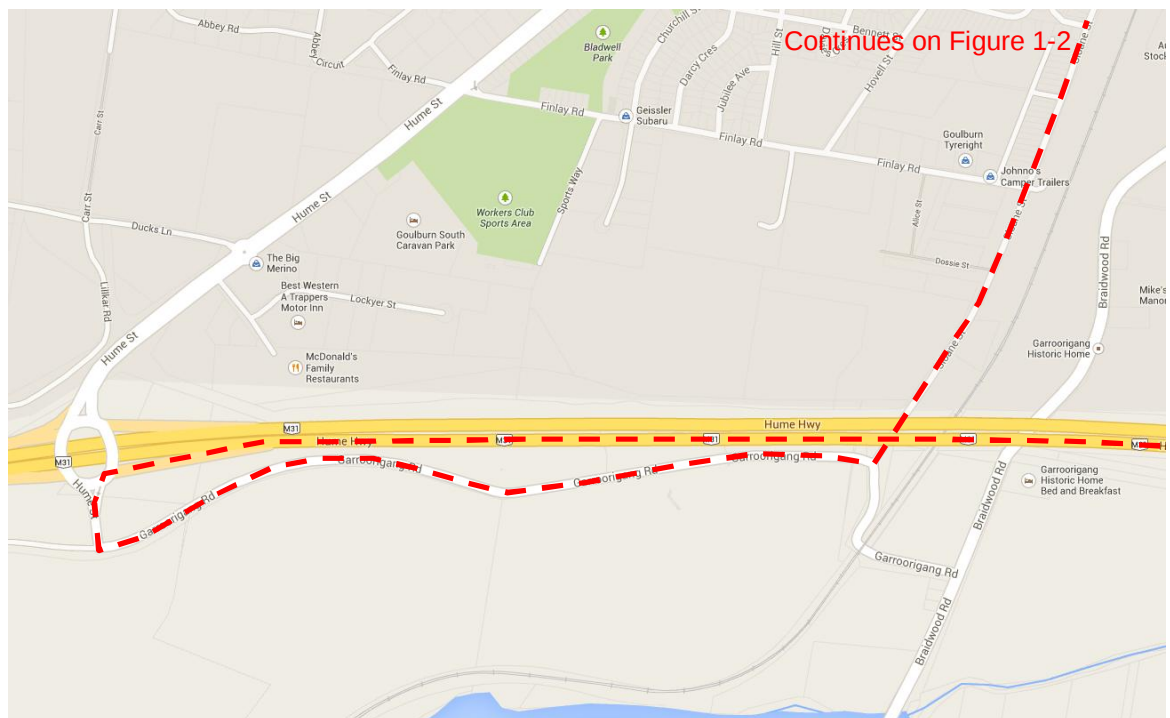


Figure 1-1 Proposed new vehicle route: Hume Highway, Garroorigang Road and Sloane Street

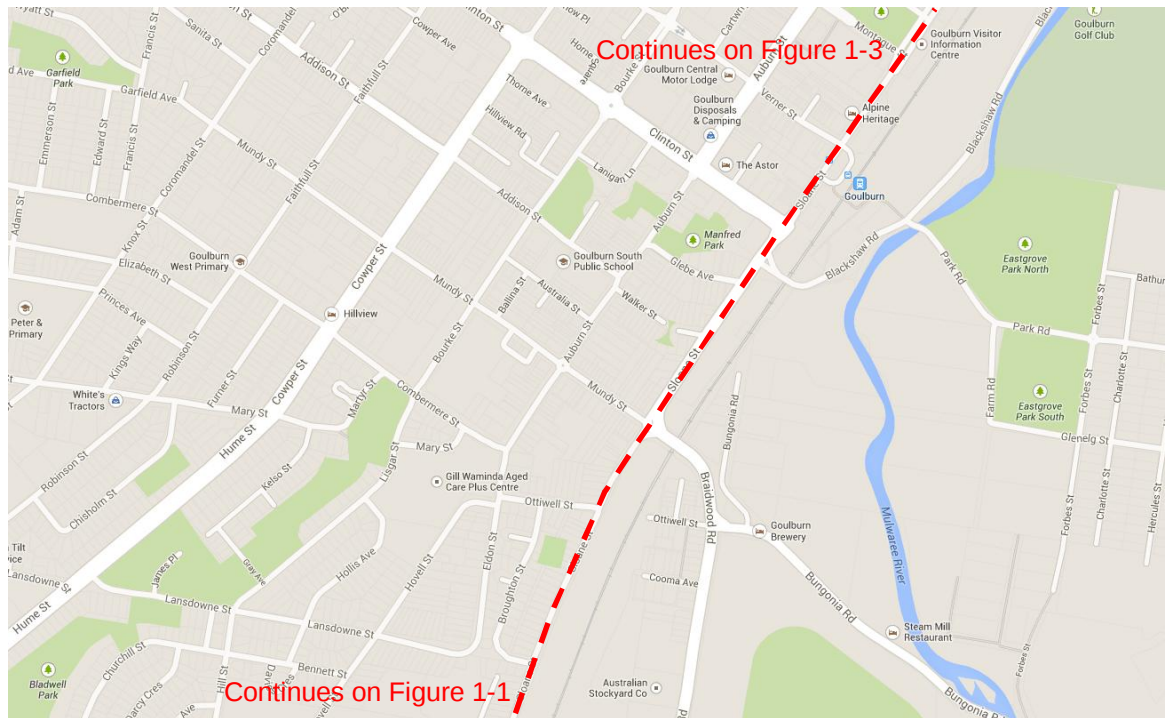


Figure 1-2 Proposed new vehicle route: Sloane Street



Figure 1-3 Proposed new vehicle route: Sloane Street, Grafton Street and Reynolds Street

2. Existing conditions

2.1 Traffic

Road network

It is usual to classify roads according to a hierarchy in order to determine their functional role within the road network. Roads are classified according to the role they fulfil and the volume of traffic they can appropriately convey. Changes to traffic flows on roads can then be assessed within the context of the road hierarchy. The guidelines for the functional classification of roads were developed by Roads and Maritime and are detailed below:

- Arterial road: typically a main road carrying over 15,000 vehicles per day and fulfilling a role as a major inter-regional link (over 1,500 vehicles per hour)
- Sub-arterial road: defined as secondary inter-regional links, typically carrying volumes between 5,000 and 20,000 vehicles per day (500 to 2,000 vehicles per hour). These roads supplement arterial roads in providing for through movement, to an individually determined limit that is sensitive to both roadway characteristics and abutting land uses
- Collector road: provides a link between local roads and regional roads, typically carrying between 2,000 and 10,000 vehicles per day (250 to 1,000 vehicles per hour). At volumes greater than 5,000 vehicles per day, residential amenity deigns to decline noticeably. Trunk collector and spine roads with limited property access can reasonably carry traffic flows greater than 5,000 vehicles per day
- Local road: provides access to individual allotments, carrying low volumes, typically less than 2,000 vehicles per day (250 vehicles per hour)

Roads along the proposed new vehicle route are described below:

- Garroorigang Road is a collector road running east-west between its intersections with Hume Street / Mazamet Road and Sloane Street. It has one lane in each direction and a posted speed limit of 80 km/h. The Garroorigang Road / Hume Street / Mazamet Road intersection is sign-controlled (give-way) with priority given to the east-west movement along Garroorigang Road and Mazamet Road. The Garroorigang Road / Sloane Street intersection is also sign-controlled (give-way) with priority given to the north-south movement along Sloane Street.
- Sloane Street is a collector road running north-south between its intersections with Garroorigang Road and Bradley Street / Grafton Street. The road environment along Sloane Street can be divided into three parts:
 - Between Garroorigang Road and Finlay Road – this section of Sloane Street provides access to a limited number of agricultural and light industrial land uses. The road has one lane in each direction with a posted speed limit of 60 km/h. All intersections along this section of Sloane Street are sign-controlled (give-way) with priority given to movements along Sloane Street
 - Between Finlay Road and Clinton Street – this section of Sloane Street has residential land uses adjoining its western side. The road has one lane in each direction with an additional lane for parking on the western side. The posted speed limit is 60 km/h. All intersections along this section of Sloane Street are sign-controlled (stop or give-way) with priority given to movements along Sloane Street
 - Between Clinton Street and Bradley Street / Grafton Street – this section of Sloane Street forms the eastern boundary of the Goulburn central business district (CBD) and therefore provides access to commercial land uses as well as Goulburn railway station.

The road has one lane in each direction with an additional lane for parking on both sides. The posted speed limit is 60 km/h. Two roundabouts are located on this section of Sloane Street (at its intersections with Clifford Street and Goldsmith Street). All other intersections are sign-controlled (give-way) with priority given to movements along Sloane Street

- Grafton Street is a collector road running north-south between its intersections with Sloane Street / Bradley Street and Sterne Street / Reynolds Street. It is a divided road with a 12 m median and has one lane in each direction with an additional lane for parking on both sides. The posted speed limit is 60 km/h. The road provides access to adjoining residential land uses. All intersections along Grafton Street are sign-controlled (give-way) with priority given to movements along Grafton Street
- Reynolds Street is a collector road running north-south between its intersections with Sterne Street / Grafton Street and Sydney Road / Lagoon Street / Union Street. It provides access to St Joseph's Primary School and a limited number of residential land uses. The road has one lane in each direction with an additional lane for parking on both sides. The posted speed limit is 60 km/h with a 40 km/h school zone in operation between 8.00 am and 9.30 am, and 2.30 pm to 4.00 pm on school days. Intersections along Reynolds Street are sign-controlled (give-way) with the exception of its intersection with Sydney Road / Lagoon Street / Union Street, which is signal-controlled

Traffic volumes

Classified traffic volume counts were undertaken over a four-day period between Monday 10 March and Thursday 13 March (inclusive) at the following locations:

- Sloane Street, between Broughton Street and Ottiwell Street
- Sloane Street, between Braidwood Street and Clinton Street
- Grafton Street, between Bruce Street and Cole Street

These locations are shown in **Figure 2-1**.

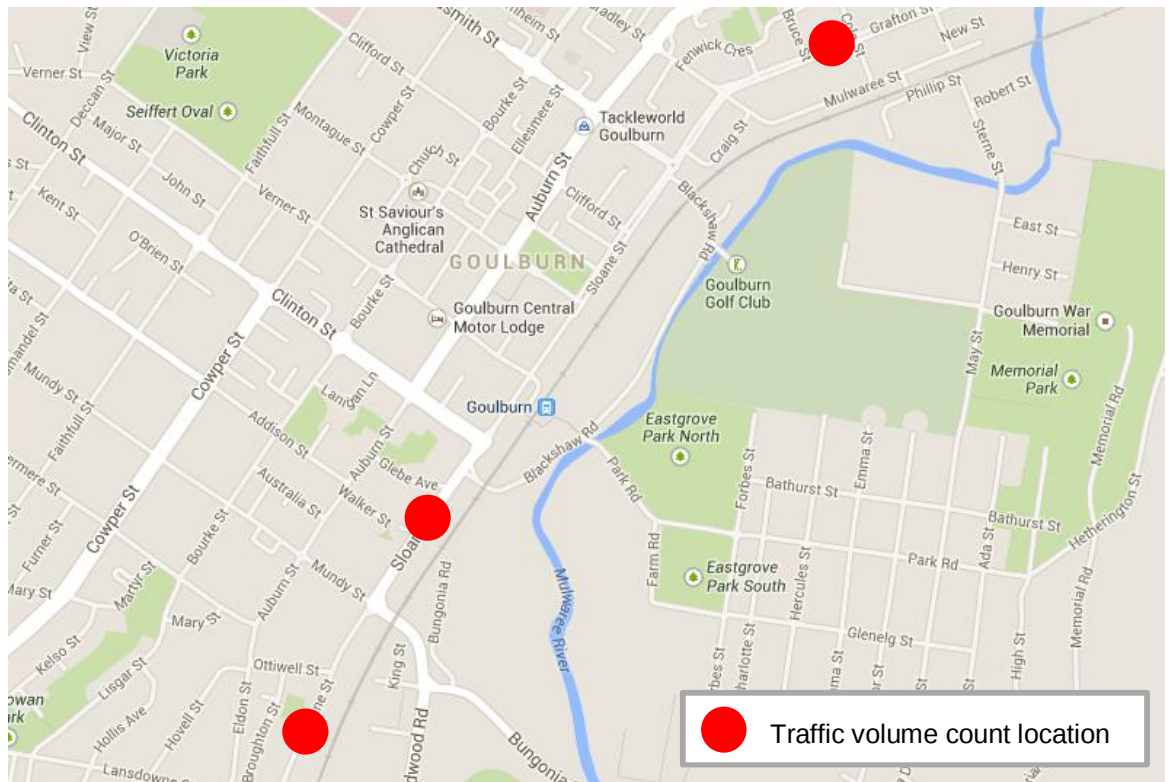


Figure 2-1 Traffic volume count locations

Hourly average day traffic profiles at each location are shown in **Figure 2-2** to **Figure 2-4**. At all three locations, the AM peak hour occurs between 8.00 am and 9.00 am, and the PM peak hour occurs between 3.00 pm and 4.00 pm. It can also be observed that traffic volumes increase on approach to the CBD.

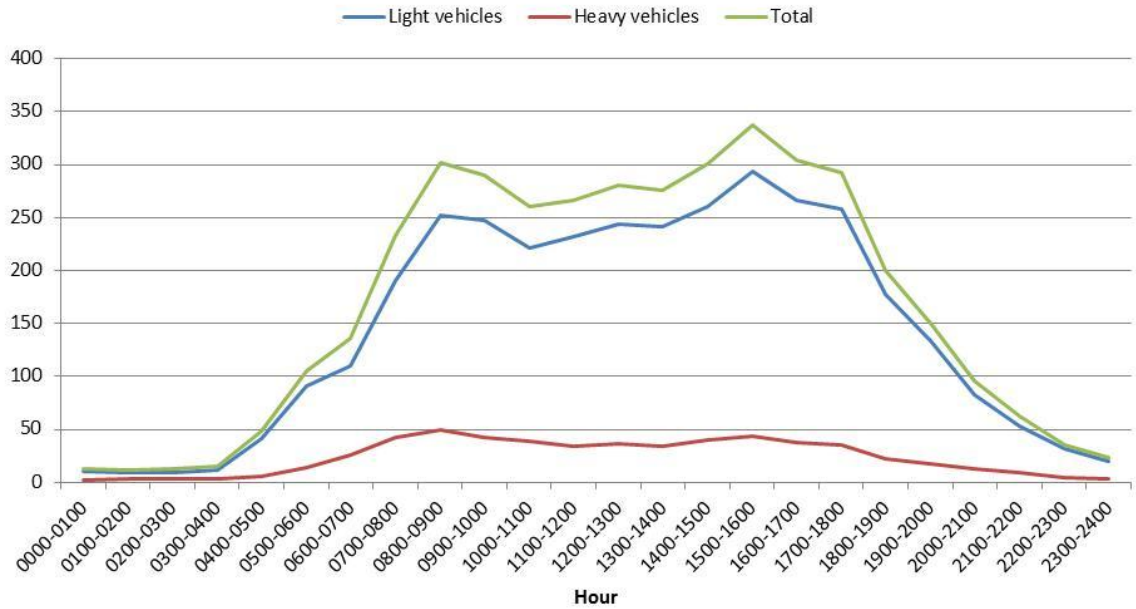


Figure 2-2 Hourly average day traffic profile on Sloane Street, between Broughton Street and Ottiwell Street

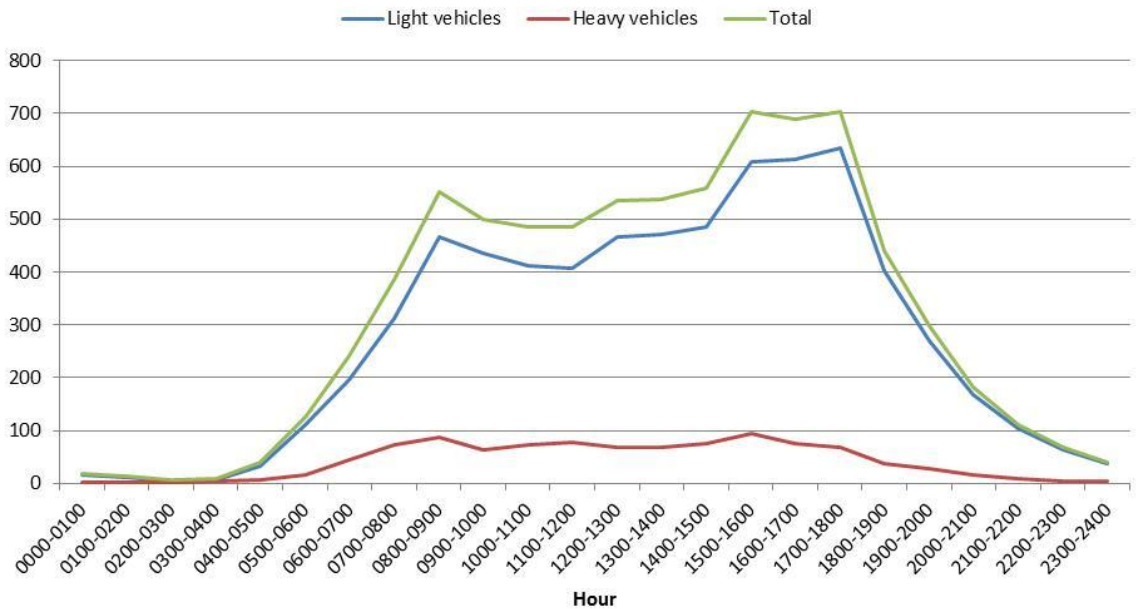


Figure 2-3 Hourly average day traffic profile on Sloane Street, between Braidwood Street and Clinton Street

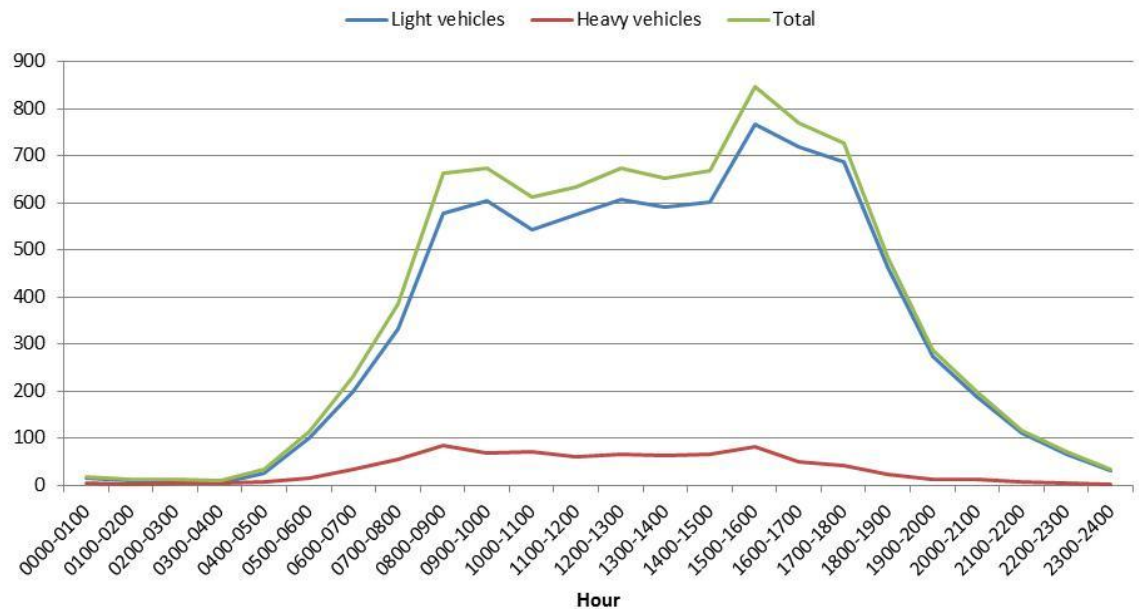


Figure 2-4 Hourly average day traffic profile on Grafton Street, between Bruce Street and Cole Street

Road capacity

The surveyed traffic volumes were assessed against the theoretical capacity of the respective sections of road. The results are shown in **Table 2-1**.

Table 2-1 Existing road capacity

Road	Direction of travel	Maximum volume in one hour	Capacity ¹	Volume / capacity ratio
Sloane Street, between Broughton Street and Ottiwell Street	Northbound	158	1,298	0.12
	Southbound	179	1,258	0.14
Sloane Street, between Braidwood Street and Clinton Street	Northbound	339	1,265	0.27
	Southbound	364	1,279	0.28

¹ Based on the Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis*, Part 4, Section 4.1 (Uninterrupted Single Lane Flow)

Road	Direction of travel	Maximum volume in one hour	Capacity ¹	Volume / capacity ratio
Grafton Street, between Bruce Street and Cole Street	Northbound	478	1,327	0.36
	Southbound	370	1,300	0.28

A volume / capacity ratio of greater than one indicates that a section of road is operating in excess of its theoretical capacity. Therefore the subject sections of road are currently operating well below capacity.

It was observed during the traffic survey that all key intersections along the proposed new vehicle route were operating satisfactorily with no significant delays for any approach during the AM and PM peaks.

2.2 Noise

Noise-sensitive receivers

Noise-sensitive receivers can be generally defined as any residential dwelling, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of worship, library or court of law.

Noise-sensitive receivers along the proposed new vehicle route were identified by aerial photography, and identification of all structures within the noise study area was undertaken through a visual mapping exercise. The location of the structures combined with cadastral information was then used to determine the initial classification of residential dwellings, industrial or commercial premises and unspecified buildings such as sheds.

A summary of identified noise-sensitive receivers is presented in **Table 2-2**.

Table 2-2 Summary of noise sensitive receivers

Section of route	Number of noise-sensitive receivers
Garroorigang Road, Sloane Street (between Garroorigang Road and Braidwood Street)	62
Sloane Street, between Braidwood Street and Clinton Street	16
Sloane Street, between Clinton Street and Bradley Street / Grafton Street	18
Grafton Street, Reynolds Street	87

Existing noise levels

A theoretical traffic noise level may be calculated for any given mix of traffic if the number of vehicles and the percentage of heavy vehicles in the traffic stream are known. This method is known as the Calculation of Road Traffic Noise and is used widely within NSW and Australia to

model and predict traffic noise. Additional information on the road surface type, the traffic speed, the gradient of the road, and the distance to a receiver location also influence the calculation of traffic noise. For the assessment of noise levels resulting from additional road use by construction traffic, these variables would not change and therefore a simple increase in traffic numbers may be used to determine the potential for impacts.

Existing noise levels corresponding to the surveyed traffic volumes at the three count locations are presented in **Table 2-3** to **Table 2-5**.

Table 2-3 Existing noise levels on Sloane Street, between Broughton Street and Ottiwell Street

Hour	Existing noise level dB(A)
0700-0800	68.2
0800-0900	69.1
0900-1000	68.6
1000-1100	68.2
1100-1200	68.0
1200-1300	68.2
1300-1400	68.1
1400-1500	68.6
1500-1600	69.0
1600-1700	68.5
1700-1800	68.2

Table 2-4 Existing noise levels on Sloane Street, between Braidwood Street and Clinton Street

Hour	Existing noise level dB(A)
0700-0800	70.5
0800-0900	71.6
0900-1000	70.7
1000-1100	71.0
1100-1200	71.1
1200-1300	70.9
1300-1400	70.9
1400-1500	71.2
1500-1600	72.2
1600-1700	71.8
1700-1800	71.6

Table 2-5 Existing noise levels on Grafton Street, between Bruce Street and Cole Street

Hour	Existing noise level dB(A)
0700-0800	69.8
0800-0900	71.9

Hour	Existing noise level dB(A)
0900-1000	71.5
1000-1100	71.4
1100-1200	71.1
1200-1300	71.5
1300-1400	71.2
1400-1500	71.4
1500-1600	72.4
1600-1700	71.3
1700-1800	70.9

3. Potential impacts

3.1 Traffic

Construction vehicle trip generation

The anticipated number of vehicle trips generated by the construction of Stage 3 of Taralga Wind Farm is detailed in **Table 3-1**.

Table 3-1 Proposed construction vehicle trip generation (approximate number of daily one-way movements shown)

	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15
Light vehicles	34	29	18	16	14	14	10	8	6	1	4	4
Heavy vehicles	158	146	121	68	13	13	9	6	4	1	2	2
Total vehicles	192	175	139	84	27	27	19	14	10	2	6	6

Impact on road capacity

The impact of construction vehicles on existing road capacity has been assessed and is shown in **Table 3-2**. For the purposes of this assessment volumes for March 2014 have been used as it represents the maximum volume over the 12-month construction period. In addition, it has been assumed that the number of vehicles will be evenly distributed between the expected construction work hours (7.00 am to 6.00 pm) – i.e. four light vehicles per hour ($34/11 = 3.09 = 4$) and 15 heavy vehicles per hour ($158/11 = 14.4 = 15$) between 7.00 am and 6.00 pm.

The results show that there will be minimal impact on road capacity as a result of construction vehicles, indicated by volume / capacity ratios of less than one.

The addition of construction vehicles on the subject sections of road is not expected to have an adverse impact on existing intersection performance.

Table 3-2 Impact of construction vehicles on existing road capacity

Road	Direction of travel	Surveyed peak hour volume + construction vehicles	Capacity	Existing volume / capacity ratio	Volume / capacity ratio during construction
Sloane Street, between Broughton Street and Ottiwell Street	Northbound	177	1,298	0.12	0.14
	Southbound	198	1,258	0.14	0.16
Sloane Street, between Braidwood Street and Clinton Street	Northbound	358	1,265	0.27	0.28
	Southbound	383	1,279	0.28	0.30
Grafton Street, between Bruce Street and Cole Street	Northbound	497	1,327	0.36	0.37
	Southbound	389	1,300	0.28	0.30

Impact on other road users

The addition of construction vehicles on the subject sections of road is not expected to have an adverse impact on other road users including buses, pedestrians and cyclists.

With respect to emergency vehicles, no adverse impacts are expected. No road closures or significant delays at intersections are anticipated. Emergency services will be notified of over-dimensional vehicle schedules and proposed access routes.

3.2 Noise

The *NSW Road Noise Policy* outlines noise guidelines for general road traffic projects but does not provide a direct reference to the assessment of road traffic resulting from construction activities.

Due to their temporary nature, traffic noise for construction sites is generally assessed under the RMS guidelines for minor works. These guidelines identify a limit of noise increase due to traffic movements of 2 dB(A) above existing hourly traffic noise levels before considering the need for mitigation of noise impacts.

An assessment of traffic noise due to the increase in vehicle movements along the proposed new vehicle route has been undertaken. The difference in noise levels between existing traffic flows and the estimated increase due to construction activities has been calculated for each section of road, assuming parameters such as traffic speed, distance to the receiver locations, and road surface would remain the same. For the purposes of this assessment traffic volumes for March 2014 have been used as it represents the maximum volume over the 12-month construction period. In addition, it has been assumed that the number of vehicles will be evenly distributed between the expected construction work hours (7.00 am to 6.00 pm) – i.e. four light vehicles per hour ($34/11 = 3.09 = 4$) and 15 heavy vehicles per hour ($158/11 = 14.4 = 15$) between 7.00 am and 6.00 pm.

Estimated noise level increases at the three traffic volume count locations are presented in **Table 3-3** to **Table 3-5**.

Table 3-3 Estimated noise level increases on Sloane Street, between Broughton Street and Ottiwell Street

Hour	Existing noise level dB(A)	Traffic noise due to construction vehicles dB(A)	Difference dB(A)
0700-0800	68.2	70.0	1.7
0800-0900	69.1	70.6	1.5
0900-1000	68.6	70.2	1.6
1000-1100	68.2	70.0	1.7
1100-1200	68.0	69.8	1.8
1200-1300	68.2	70.0	1.7
1300-1400	68.1	69.8	1.8
1400-1500	68.6	70.2	1.6
1500-1600	69.0	70.5	1.5
1600-1700	68.5	70.1	1.7
1700-1800	68.2	69.9	1.7

Table 3-4 Estimated noise level increases on Sloane Street, between Braidwood Street and Clinton Street

Hour	Existing noise level dB(A)	Traffic noise due to construction vehicles dB(A)	Difference dB(A)
0700-0800	70.5	71.6	1.1
0800-0900	71.6	72.5	0.9
0900-1000	70.7	71.8	1.1
1000-1100	71.0	72.0	1.0
1100-1200	71.1	72.1	1.0
1200-1300	70.9	72.0	1.0
1300-1400	70.9	72.0	1.0
1400-1500	71.2	72.2	1.0
1500-1600	72.2	73.0	0.8

Hour	Existing noise level dB(A)	Traffic noise due to construction vehicles dB(A)	Difference dB(A)
1600-1700	71.8	72.6	0.9
1700-1800	71.6	72.5	0.9

Table 3-5 Estimated noise level increases on Grafton Street, between Bruce Street and Cole Street

Hour	Existing noise level dB(A)	Traffic noise due to construction vehicles dB(A)	Difference dB(A)
0700-0800	69.8	71.1	1.3
0800-0900	71.9	72.8	0.8
0900-1000	71.5	72.4	0.9
1000-1100	71.4	72.3	0.9
1100-1200	71.1	72.1	1.0
1200-1300	71.5	72.4	0.9
1300-1400	71.2	72.2	1.0
1400-1500	71.4	72.3	0.9
1500-1600	72.4	73.1	0.8
1600-1700	71.3	72.2	0.9
1700-1800	70.9	71.9	1.0

The results indicate that traffic noise level increases would be below the minimum 2 dB(A) increase requirement for consideration of mitigation. For all sections of affected road, the estimated noise increase is expected to be imperceptible against the current noise environment.

4. Summary and conclusion

The traffic and noise assessment has shown that there will be minimal impacts resulting from the proposed new vehicle route through Goulburn as part of the construction of Stage 3 of Taralga Wind Farm.

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