

Appendix U

Traffic impact assessment

Environmental impact statement
February 2009



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ACTEW

Report for Enlarged Cotter Dam
Traffic Impact Assessment

February 2009



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1. Introduction

GHD has been commissioned by the ACTEW to prepare a Traffic Impact Assessment as part of the Environmental Impact Statement (EIS) for the proposed Enlarged Cotter Dam. The Cotter Dam lies on the Cotter River located approximately 18 km west of Canberra City. The new Cotter Dam will be constructed approximately 125m downstream of the existing Cotter Dam. The major elements of the Enlarged Cotter Dam project include:

- ▶ a main dam located on the Cotter River in the Lower Cotter Catchment, to be constructed of RCC and to be approximately 80m high;
- ▶ two saddle dams to the right abutment, with approximate height of 11m and 16m, to be constructed of earth and rock-fill.

1.1 Purpose of the Report

This Traffic Impact Assessment was prepared to address traffic implications brought about by the construction activities associated with the enlarged dam. The report provides an assessment of traffic impacts during the construction stage of the project and identifies mitigating measures to address the impacts.

1.2 Report Structure

The report structure is set out as follows:

- ▶ Section 1 – Introduction;
- ▶ Section 2 – Project Site;
- ▶ Section 3 – Existing Road and Traffic Conditions;
- ▶ Section 4 – Construction Traffic Impact;
- ▶ Section 5 – Findings and Recommendations.

2. Project Site

2.1 Location of the Project Site

The project site is located within an area colloquially called “the Cotter”. The focus of the construction activities will be in an area downstream the existing Cotter Dam. The works within this area will include quarrying and stockpiling of dam building material, the preparation of concrete for the construction of the dam and all the associated peripheral works.

The site is accessible from the east via Cotter Road, from the south via Paddy’s River Road and from the north via Brindabella Road. Although most of the construction works will be contained within the construction site, the transport of the construction materials and equipment to the site will impact mainly on the activities along Cotter Road, and to an extent on Paddy’s River Road and Brindabella Road.

Figure 1 Location of the Site



The materials for the construction will comprise of sand, clay, cement and fly ash. Sand and clay will preferably be sourced from within the construction footprint but a portion of the supply may have to be imported into the site. Deliveries of sand and clay will be transported via Cotter Road using standard tipper trucks.

Cement will be sourced from Berrima and will be transported to the site via the Hume Highway, Federal Highway, Majura Road, Morshead Drive, Parkes Way, Tuggeranong Parkway, then on to Cotter Road.

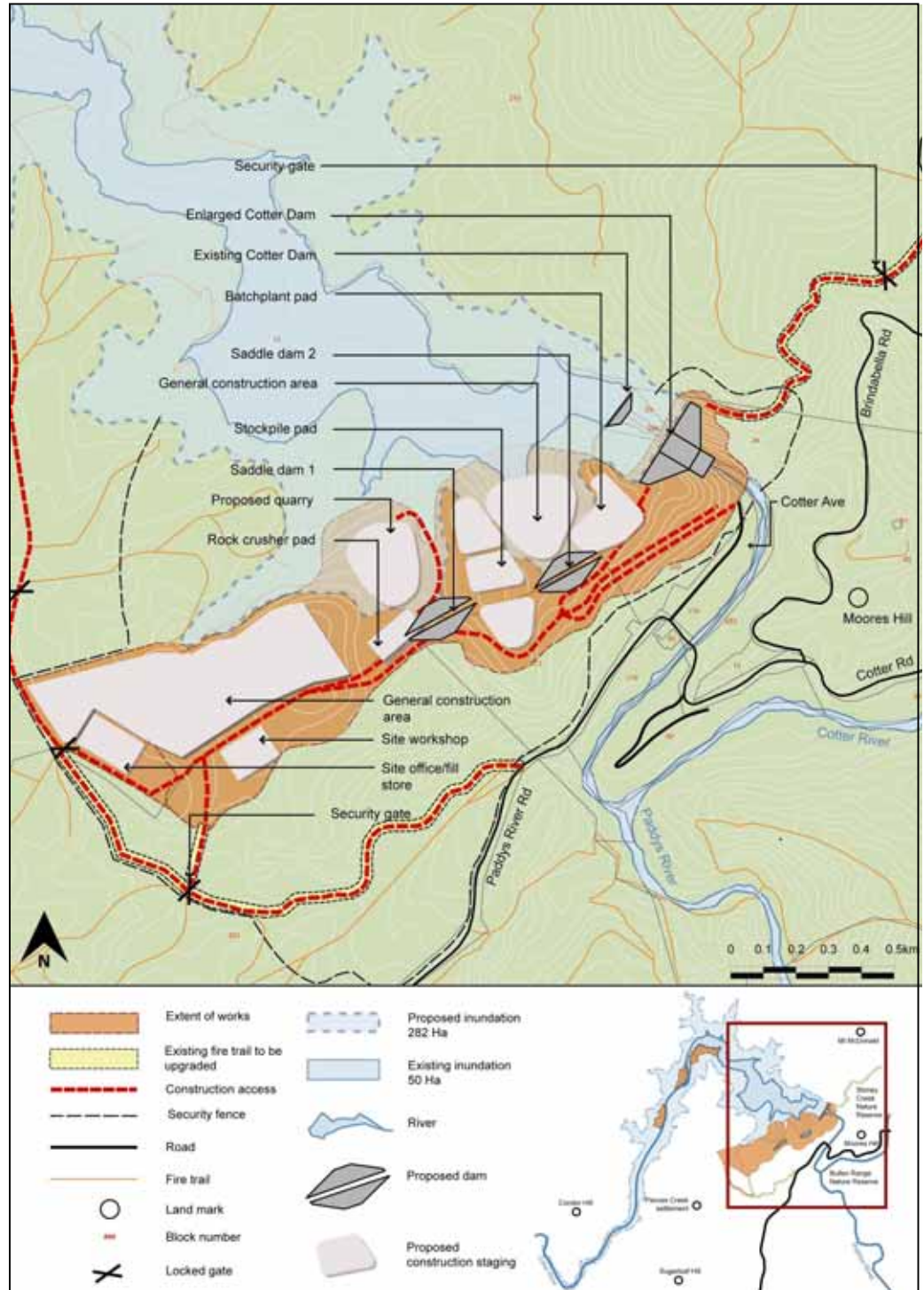
Fly Ash will be sourced from Mt Piper and Fyshwick. Deliveries from Mt Piper will be via Yass, Barton Highway, Gungahlin Drive, Tuggeranong Parkway and Cotter Road.

Thirty percent of the fly ash requirements will be supplied from the Fyshwick depot via Parkes Way, Tuggeranong Parkway and Cotter Road.

2.2 The Construction Area

The construction area will be contained within the vicinity of the existing Cotter Dam, as shown in Figure 2 below:

Figure 2 The Construction Area



3. Existing Road and Traffic Conditions

3.1 Cotter Road

Cotter Road is a two-lane, single-carriageway road linking Canberra in the east with Tharwa in the west. For most of its length, Cotter Road's lane width is 3 m each direction with no shoulders. The posted speed limit along Cotter Road is generally 80 km/hr with some reduced speed zones of 60 km/hr. Majority of its length is situated in unlit rural conditions except for the section from Streeton Drive to Eucumbene Drive where it is situated in a semi-urban area and lighting is provided at the intersections. There are limited intersections from Eucumbene Drive to Camp Cottermouth but numerous rural driveways. From Camp Cottermouth to Paddys River Road Logging, Cotter Road has a steep winding alignment with two single-lane bridge crossings at the Murrumbidgee River and the Cotter River. The crossing at the Murrumbidgee River has actuated signals while the crossing at the Cotter River is uncontrolled.

Cotter Road is also the main access road to a number of sports/training, tourist and recreational sites, as shown in Figure 3:

- ▶ Camp Cottermouth and Greenhills Camp and Conference Centre – accommodation, conference and camping centre for Scouts ACT;
- ▶ National Equestrian Centre (at Kerrabee) – training, riding and facility for equestrian activities;
- ▶ Stromlo Equestrian Centre (at Bibaringa) – training, riding and facility for equestrian activities;
- ▶ Canberra Equestrian Centre (at Chapman) – training, riding and facility for equestrian activities;
- ▶ Cotter Reserve – camping and picnic grounds;
- ▶ Casuarina Sands – picnic grounds, barbeque and swimming spot.

Figure 3 Locations of Recreational Sites



Aside from the facilities above, a number of parks and camping areas are located along the Cotter Road, which generate recreational traffic. Cotter Road is also frequently used by a substantial number of local amateur and professional cyclists as a training route. It was observed that a high number of cyclists use the Cotter Road despite the absence of formal cycleways. It is noted that the restrictive alignment, narrow lane widths and lack of facilities pose a hazard to cyclists and to the general users of the road.

3.2 Brindabella Road

Brindabella Road is a two lane rural road which generally runs in the north-south direction from Cotter Road to Uriarra Road at its northern end. The speed environment along Brindabella Road is generally 60 km/hr, with some reduced speed advisory signs due to the winding horizontal alignment.

3.3 Paddy's River Road

Paddy's River Road is a two lane rural road south of the Cotter Precinct that connects from Tidbinbilla Road in the south and meets up with Cotter Road at its northern end.

3.4 Traffic Volumes along Cotter Road

Traffic data obtained from Territory and Municipal Services (TAMS) provide an indication of the traffic volumes along Cotter Road. The locations of the count stations are shown in Figure 4 below:

Figure 4 Location of Traffic Count Stations along Cotter Road



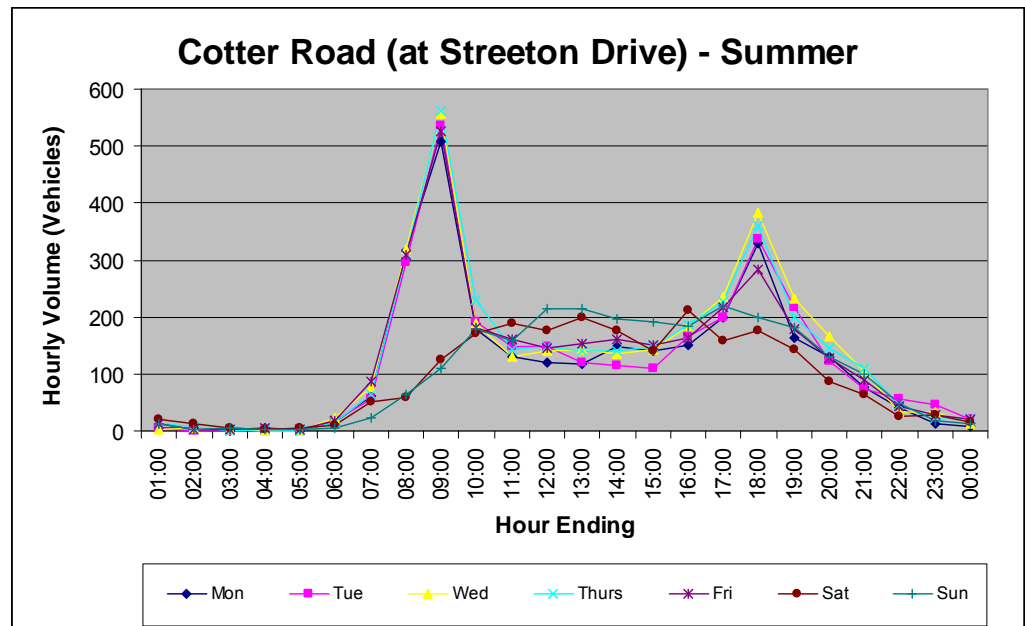
For the traffic count stations at Streeton Drive and Murrumbidgee Bridge, the traffic volume data was collected for a seven-day period in January (summer month) and July (winter month) and summarised in total (both directions) hourly volumes for each period at each location. The results of the surveys provide a seasonal, daily and hourly variation of traffic volumes and the average weekday/weekend day traffic volume for each survey location.

Traffic data for Cotter Road near the intersection with Mt Stromlo Road was collected in February 2008. No traffic data for the winter months is available for this location.

3.4.1 Cotter Road at Streeeton Drive

The observed traffic volumes (January 2008) at this location is shown in Figure 5 below:

Figure 5 Hourly Traffic Volumes, Cotter Road (at Streeeton Drive) – Summer



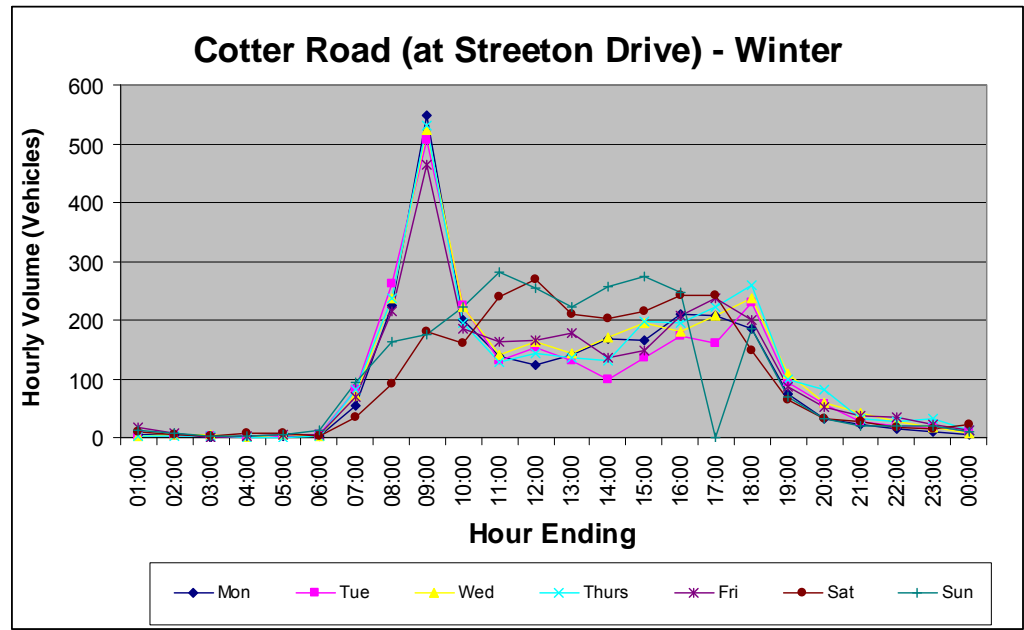
The bi-directional peak traffic volume for this section of Cotter Road was observed to occur from 8:00 to 9:00 a.m. averaging around 540 vehicles per hour on a weekday. The afternoon peak was slightly lower, averaging 340 vehicles per hour on a weekday and occurring from 5:00 to 6:00 pm. From the traffic counts, it is observed that the morning peak is attributable to vehicles travelling eastbound along Cotter Road in the direction towards Canberra City while the afternoon peak is due mainly to traffic flow in the westbound direction. Weekend traffic on both directions was observed to be slightly higher than weekday traffic during the weekday off peak hours but remain low during the weekday peak hours. This is indicative of weekday commuter traffic to and from the city centre with the corresponding peak hour travel representing mainly business or work trips to and from the City.

Traffic volumes observed during the winter (July 2008) manifested increased weekend traffic on both directions when compared to traffic volumes observed in the summer. This highest hourly volume recorded was 549 vehicles for both directions and this volume was observed between 8:00 am and 9:00 am on a Monday. The afternoon peak was observed to be from 5:00 to 6:00 pm on a Thursday,

On the overall, the graph below shows that the peak hourly volumes generally occur on a weekday but with weekend traffic generally higher than the normal weekday off-peak traffic.

Figure 6 shows the hourly traffic volumes observed at along Cotter Road (at Streeton Drive) during the winter period.

Figure 6 Hourly Traffic Volumes, Cotter Road (at Streeton Drive) – Winter



The 7-day average daily traffic observed at this location is about 2,600 vehicles a day during winter and about 2,800 vehicles a day during summer. Peak hour volumes comprised approximately 18-20% of the total daily traffic.

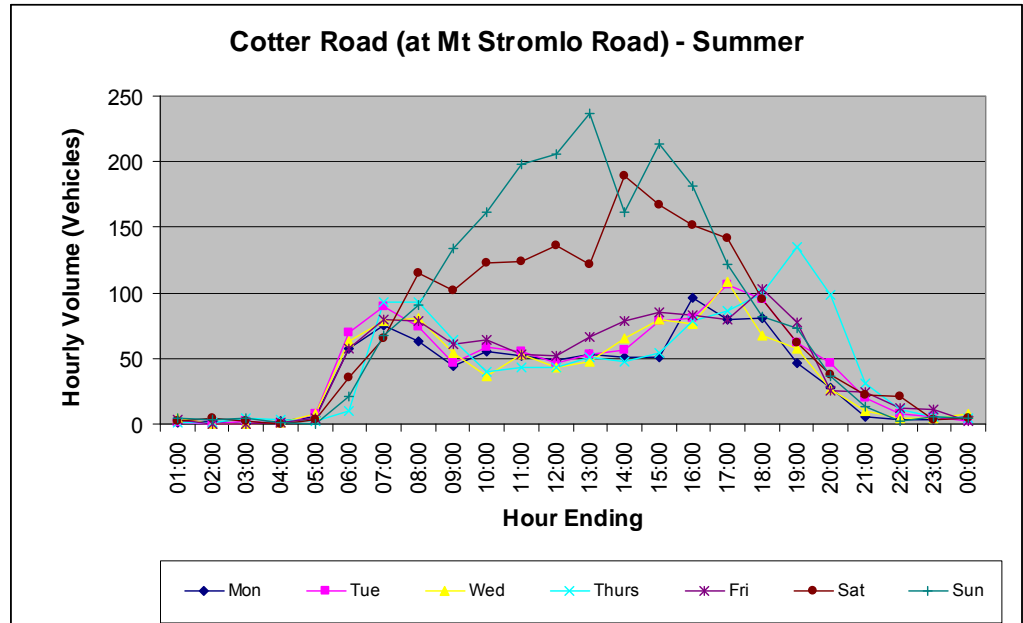
3.4.2 Cotter Road at Mt Stromlo Road

The traffic volumes observed on Cotter Road in the vicinity of Mt Stromlo Road is shown in Figure 7.

From the graph below, it can be seen that weekend traffic was observed to be generally higher than weekday traffic and the peak periods were observed to occur around midday on a Sunday. This traffic profile differs from the traffic profile observed along Cotter Road at Streeton Drive. Considering that the predominant land uses along Cotter Road to the west of Eucumbene Drive are mostly for recreational use, this may be indicative of leisure and recreational trips mostly occurring on a weekend.

The 7-day average daily traffic observed at this location was recorded to be 1,200 vehicles per day. The average weekday daily traffic was recorded to be 1,030 vehicles per day while the average weekend traffic was recorded to be 1,900 vehicles per day. Peak hour volumes comprised approximately 9-10% of the total daily traffic.

Figure 7 Hourly Traffic Volumes, Cotter Road (at Mt Stromlo Road) – Summer



3.4.3 Cotter Road at Murrumbidgee Bridge

The traffic profile observed along Cotter Road at Murrumbidgee Bridge manifested the same trends as that observed along Cotter Road at Mt Stromlo Road. Weekend traffic appeared to be higher than weekday traffic for both the summer and the winter counts. Peak volumes were observed to occur mostly on a Sunday. The average weekday daily traffic was recorded to be approximately 720 vehicles per day while the average weekend daily traffic was recorded to be 1,200 vehicles per day. Similarly, the peak hour volumes comprise 9-10% of the total daily traffic.

Figure 8 and Figure 9 show the traffic volumes observed at this location.

Figure 8 Hourly Traffic Volumes, Cotter Road (at Murrumbidgee Bridge) – Summer

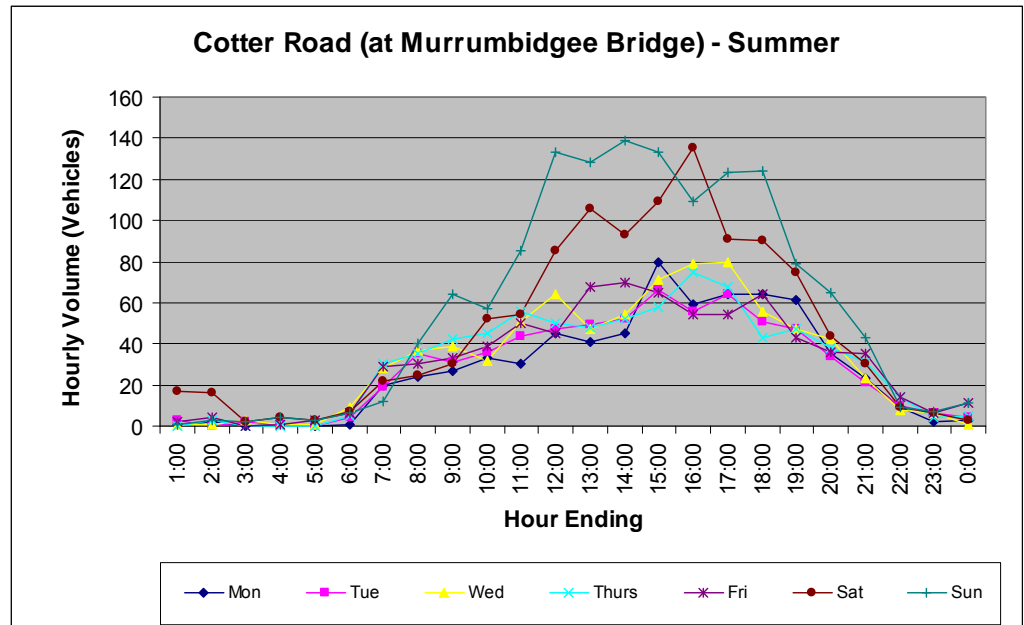
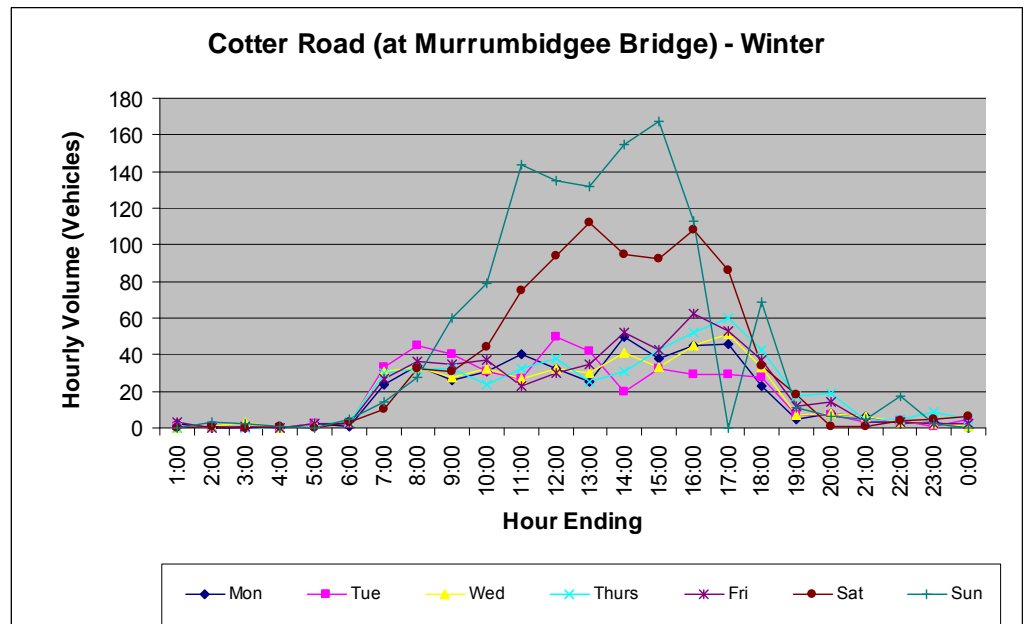


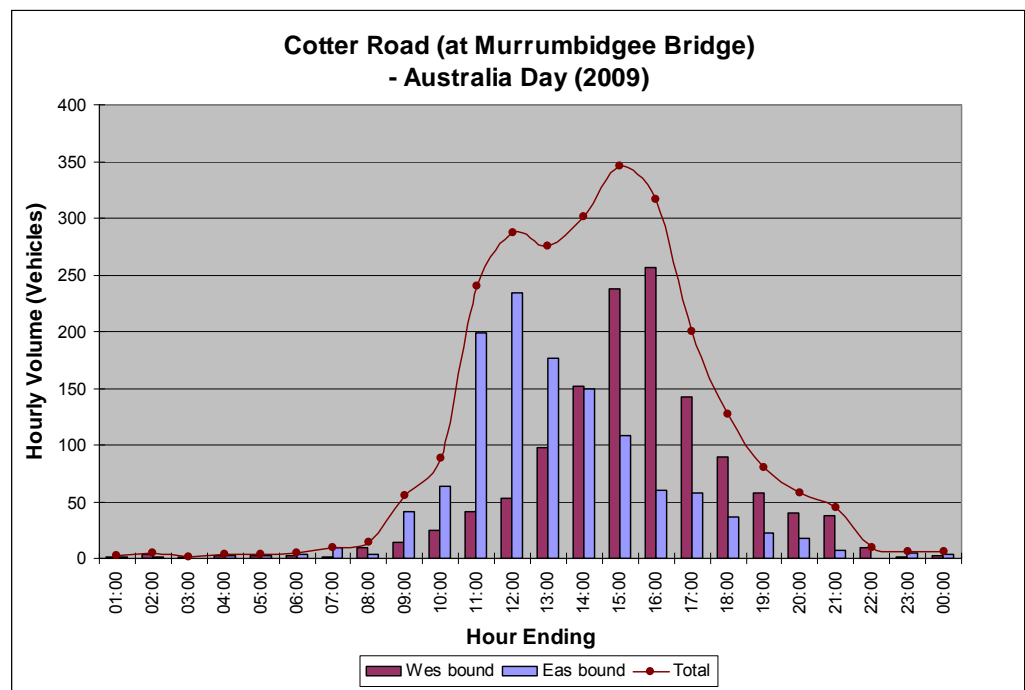
Figure 9 Hourly Traffic Volumes, Cotter Road (at Murrumbidgee Bridge) – Winter



3.5 Traffic Volume on Cotter Road During Special Events

To gain information of traffic volumes on Cotter Road during special events, the traffic count data on Cotter Road at Murrumbidgee Bridge for Australia Day held 26 January 2009 was requested from TAMS. This is shown in Figure 10 below:

Figure 10 Hourly Traffic Volumes, Cotter Road (at Murrumbidgee Bridge) – Australia Day (2009)



The data above indicates a significant increase in traffic volumes on Cotter Road during a public holiday. When compared to normal day traffic, it is evident that the volumes have increased by a factor of 2.5 during the peak hour and a factor of 3.5 for the daily weekday traffic. When compared to normal weekend traffic, the traffic volumes on Australia Day were observed to be almost doubled that of the average daily weekend traffic.

It is noted that a number of annual and/or special cycling events take place in and around the vicinity of the the Cotter Precinct in 2009 (and onwards) that will potentially attract the same volume of traffic as that during the Australia Day holiday. These events include:

- ▶ 2009 World Mountain Bike and Trials Championships at the Stromlo Forest Park – this event is expected to attract more than 750 of the world’s top mountain bike riders, as well as 30,000 visitors from up to 40 countries and will run from 1-6 September 2009;
- ▶ Tour de Femme – this annual event is a women’s ride that doubles as a race and participation event. The event takes place annually in the month of November and



can attract more than 600 riders. While registration is at the Stromlo Forest Park, the race commences from Alexandrina Drive, Yarralumla, near the Canberra Yacht Club (Lotus Bay), and proceeds on to Commonwealth Avenue, returning to the start via Parkes Way, the Tuggeranong Parkway, Cotter Road, Novar Street, Alexandrina Drive, Hopetoun Circuit, Adelaide Avenue, State Circle, Flynn Drive and then finishes in Alexandrina Drive at the Canberra Yacht Club.

- ▶ Canberra Tour – this annual event is scheduled to take place on the 2nd and 3rd of May in 2009 and sometime April or May in 2010 and 2011. The races start and finish at the Stromlo Forest Park Criterium Circuit but have a time trial course and Stages 1 to 3 road race course. The time trial course is from the Stromlo Forest Park Criterium Circuit, along Uriarra Road and back. Stages 1 and 2 road race course traverses Uriarra Road then via Uriarra Crossing, Brindabella Road, Cotter Road through to Murrumbidgee Bridge, Cotter Road, then turn at Cotter/Uriarra Rd intersection before heading to Stromlo Forest Park. Stage 3 road race course takes on Uriarra Road, Cotter Road, through to Murrumbidgee Bridge, continues on the Paddys River Road to Tharwa. The return route takes on Cotter Road, Brindabella Road, via Uriarra Crossing back onto Uriarra Road and to Stromlo Forest Park.

It is evident that during such events, it would be expected that traffic on Cotter Road, Brindabella Road and Uriarra Road would be outside the usual volume and vehicle mix given that the nature of some of the events being races that are contested using the road itself. Special traffic management measures are essential to ensure safety and efficiency of the network. To avoid conflict between regular road users, construction traffic and special events traffic, specific arrangements would be negotiated with the various event coordinators to ensure that adequate access are available to all users.

3.6 Roadway Capacity

Cotter Road, Brindabella Road and Paddy's River Road are two-lane rural highways (one per direction) based on the Austroads Road Classification hierarchy. The *AUSTROADS Guide to Traffic Engineering Practice - Part 2: Roadway Capacity* indicates that two-lane rural highways have a capacity of 2,800 passenger cars per hour total for both directions of flow, under ideal conditions where there are no restrictive roadway, terrain or traffic conditions. However, considering the prevailing roadway and traffic conditions along Cotter Road, it is estimated that the total service flow rate could be around 1,400 passenger cars per hour total for both directions of flow.

In cases where traffic, terrain or geometric data may not be precisely known, the *AUSTROADS Guide* provides planning guidance on maximum AADT values that two-lane, two-way rural roads can accommodate under various terrain conditions.

Austroads defines level of service as a qualitative measure describing operational conditions within a traffic stream. The term Level of Service (LOS) and its characteristics for rural roads is defined in Table 1.



Table 1 Level of Service (LOS) for Rural Roads

| LOS | Description | Rating |
|-----|-----------------------------------|------------|
| A | Free, unrestrictive flow | Very good |
| B | Mostly free flow, few disruptions | Very good |
| C | Stable flow | Good |
| D | Mostly stable flow, some delays | Acceptable |
| E | Congested flow, delays common | Bad |
| F | Forced flow | Bad |

Source: Austroads Guide to Traffic Engineering Practice, Part 2

The volume and composition of traffic on a given road determines the level of interaction between vehicles and is measured as its LOS. LOS decreases with increasing traffic volumes. LOS A, LOS B, LOS C in a rural context are all satisfactory. LOS D can be satisfactory in some circumstances.

Table 2 shows the values for various Levels of Service for a rural road in rolling terrain with varying ratios of design hour volume to AADT.

Table 2 Maximum AADTs for Various Levels of Service on Two-Lane Two-Way Rural Roads on Rolling Terrain

| Design Hour Volume to AADT Ratio | Level of Service | | | | |
|----------------------------------|------------------|-------|-------|-------|--------|
| | A | B | C | D | E |
| 0.10 | 1,100 | 2,800 | 5,200 | 8,000 | 14,800 |
| 0.11 | 1,000 | 2,500 | 4,700 | 7,200 | 13,500 |
| 0.12 | 900 | 2,300 | 4,400 | 6,600 | 12,300 |
| 0.13 | 900 | 2,100 | 4,000 | 6,100 | 11,400 |
| 0.14 | 800 | 2,000 | 3,700 | 5,700 | 10,600 |
| 0.15 | 700 | 1,800 | 3,500 | 5,300 | 9,900 |

Source: AUSTRROADS Guide to Traffic Engineering Practice, Part 2: Roadway Capacity, Table 3.9

For a Level of Service C, the maximum AADT values range from 3,500 to 7,900 depending on the design hour volume to AADT ratio. The peak hour volumes along Cotter Road were observed to be approximately 10% of the average daily traffic in the rural sections. In the semi-urban section, the peak hour traffic was around 17% of the average daily traffic.



Comparing these values with the existing AADT levels along the Cotter Road indicates that the roadway has spare capacity to accommodate additional traffic. This is shown in Table 3.

Table 3 Existing Level of Service on Cotter Road

| Location on Cotter Road | Average Daily Traffic ¹ | | LOS | |
|----------------------------------|------------------------------------|---------|---------|---------|
| | Weekday | Weekend | Weekday | Weekend |
| Streeton Drive | 3083 | 2962 | C | C |
| Mt Stromlo Road | 1030 | 1875 | A | B |
| Murrumbidgee Bridge ² | 471 | 1001 | A | B |

¹ At peak conditions

² One lane, two way conditions apply

3.7 Current Program - Cotter Road Pavement Rehabilitation Project

The Territory and Municipal Services (TAMS) of the ACT is currently undertaking the Cotter Road Pavement Rehabilitation Project as part of their annual road pavement resurfacing program for 2008/09. Works commenced in May 2008 and will take approximately 6-12 months to complete. The road works include the rehabilitation of the existing pavement on Cotter Road, including lane widening, the extension of culverts and widening of shoulders at selected sections. The upgrading will potentially address road safety issues with regard to below standard lane widths, lack of shoulders, lack of safety barriers and the presence of hazards (i.e. culvert headwalls) and hence, is expected to improve the condition and safety of Cotter Road. The benefits of this upgrade would extend beyond the regular road users and would include the additional temporary traffic brought about by the construction of the Cotter Dam and the holding special events in and around the Cotter Precinct.



4. Construction Traffic Impact

4.1 Construction Activity

It is anticipated that the construction activity would occur over a period of approximately 24 months. Assuming that construction works commence in June 2009, it is expected that the project would be completed by the end of May 2011. Traffic volumes expected to be generated by the construction employees and by materials delivery would vary depending on the construction phasing and methodology. The final traffic volumes would depend on the extent and quality of material quarried/gained from the site and the extent of reuse of site material. The traffic movements assumed in this analysis is based on the assumption that substantial volumes of aggregate and other materials will need to be imported. Hence, the calculated traffic volumes will represent the worst-case scenario.

The sequencing of construction activities is as follows:

4.1.1 Stage 1 - Initial Phase

This phase is expected to take approximately nine months and would involve the construction of the coffer dams and diversion, excavation of the main dam foundation and preparation of the dam foundation. This will require the transport to the site of earthmoving equipment, concrete batch plants and aggregate crushing equipment. It will also require the preparation of the quarry and stockpiling areas.

While large equipment will be brought onto the site, construction operations are largely self-contained and do not require the importation of large quantities of materials.

4.1.2 Stage 2 - Intermediate Phase

This phase is expected to take around seven months and would involve the construction of the main dam wall.

4.1.3 Stage 3 - Completion of Construction

This phase is expected to take around eight months and signals the completion phase of the main embankment and detailed conventional concrete structures.

4.2 Construction Hours

Standard hours of construction for the duration of the construction program are anticipated to be between 7:00 am and 6:00 pm, Monday to Friday and 7:00 am to 4:00 on Saturday, excluding public holidays. However, it is anticipated that throughout Stage 2 of the construction program, specific activities such as Roller Compacted Concrete (RCC) will require continuous operation. Hence, for the duration of Stage 2, night operations will take effect.



4.3 Proposed Construction Access Routes

There are primary and secondary access routes proposed for entry and exit to the construction site, as described below:

4.3.1 Primary Access

The primary access route will be via Cotter Road. Vehicles that meet normal width and loading standards, including workforce and delivery vehicles, will pass over the existing bridges on the Murrumbidgee and Cotter Rivers.

4.3.2 Secondary Access

Secondary access routes will be via Point Hut Crossing or via Brindabella Road. These routes will be utilised for oversized loads.

4.4 Traffic Generation

The main traffic generated through the construction phase would be from equipment and material deliveries, such as:

- ▶ Construction materials;
- ▶ Construction equipment and machinery;
- ▶ Specific components for the dams; and,
- ▶ Movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

4.4.1 Light Vehicle Traffic

Light vehicle traffic is expected to use Cotter Road as the primary access. Light vehicle traffic will be generated by:

- ▶ Workforce attendance of approximately 140 personnel on an ordinary hour shift;
- ▶ Workforce attendance of 50 personnel on night and weekend shifts;
- ▶ Trades vehicles attending the site for light fabrication and equipment servicing;
- ▶ Ambulance and emergency services.

Over the full construction period, the peak construction workforce is estimated to be approximately 190 persons (140 on day shift and 50 on night shift basis). Based on the characteristics of the Project route, it is assumed there would be a typical car driver rate of 100%. Application of this car driver rate to an assumed worst case scenario workforce yields a traffic generation in the order of 140 light vehicles a day for Stage 1 (months 1 to 9 and months 17 to 24) and 190 light vehicles a day for Stage 3 (months 10 to 16).

4.4.2 Heavy Vehicle Traffic

Heavy vehicle traffic will vary at each phase and will consist of:



- ▶ Earthmoving equipment such as bulldozers, off-highway haul trucks, front-end loaders, graders, rollers, excavators and backhoes;
- ▶ Ready mixed concrete deliveries;
- ▶ Large quarrying equipment, including crushers, conveyors and screening plant plus generators to power the crusher;
- ▶ Clay and sand deliveries;
- ▶ Cement and fly-ash deliveries; and,
- ▶ Progressive removal of equipment and construction equipment.

The number of vehicles per day attributed to the delivery of materials can be summarised as follows:

Table 4 Deliveries of Construction Materials

| Material | No. of vehicle trips per day (vpd) | Stage 1 | Stage 2 | Stage 3 |
|-----------------------|---|----------------|-----------------|----------------|
| Cementitious Material | 1 | Months 1-7 | | Months 17-24 |
| | 3 | Months 8-9 | | |
| | 5 | | Month 10 and 16 | |
| | 9 | | Month 11 | |
| | 15 | | Month 12 | |
| | 23 | | Month 13 and 14 | |
| | 7 | | Month 15 | |
| | Sand | 1 | Months 3-7 | |
| 4 | | Months 8-9 | | |
| 12 | | | Month 10 | |
| 22 | | | Month 11 | |
| 38 | | | Month 12 | |
| 60 | | | Month 13-14 | |
| 17 | | | Month 15 | |
| 12 | | | Month 16 | |
| Clay | 22 | Months 3-7 | | |



It should be noted that the above estimates were made based on the current construction scenario. It is anticipated that the final numbers may vary as further project detailed design develops and as construction equipment and methodology becomes finalised.

Oversized Vehicles for Construction Equipment

It is anticipated that movements of oversized vehicles transporting large construction equipment will primarily occur in Stage 1 (months 2 to 9) and Stage 3 (months 17 to 24). These oversized vehicles are expected to use the secondary access routes and not Cotter Road. Deliveries of most construction materials would be from Cotter Road with most deliveries occurring in Stage 2 (months 10 to 16).

Delivery of Diesel Fuel

In addition to the above, there is the option of delivery of diesel fuel. Investigations are in progress to determine the feasibility of providing mains supply instead of diesel generation for the operation of construction plant and equipment. Should diesel fuel be required, it is estimated that a total of 10,000 litres a day would need to be delivered. A standard tanker can accommodate 35,000 litres and there will be provision for on-site storage of 100,000 litres. Hence, it is estimated that deliveries of diesel fuel would utilise 4 loads of fuel tankers for the initial delivery (or 1 load per day for four days) and 1 load every three days for the entire duration of the construction.

4.4.3 Estimated Total Vehicle Movements

It is expected that between 16 and 83 heavy construction vehicles would access the site on a daily basis.

The estimated number of vehicle movements per stage component over the estimated construction period of 24 months is shown in Table 5.

Table 5 Total Number of Truck Movements per day by Construction Month

| | Light Vehicles | | | Heavy Vehicles | | | Total |
|---------|------------------|---------|---------|-----------------|---------|---------|------------|
| | Stage 1 | Stage 2 | Stage 3 | Stage 1 | Stage 2 | Stage 3 | |
| June 09 | 280 ^a | | | 2 | | | 282 |
| July 09 | 280 | | | 32 ^c | | | 312 |
| Aug 09 | 280 | | | 80 ^d | | | 360 |
| Sept 09 | 280 | | | 80 | | | 360 |
| Oct 09 | 280 | | | 80 | | | 360 |
| Nov 09 | 280 | | | 80 | | | 360 |
| Dec 09 | 280 | | | 80 | | | 360 |
| Jan 10 | 280 | | | 46 ^e | | | 326 |



| | Light Vehicles | Heavy Vehicles | Total |
|----------|-----------------------|-----------------------|--------------|
| Feb 10 | 280 | 46 | 326 |
| Mar 10 | 380 ^b | 36 ^f | 416 |
| April 10 | 380 | 64 ^g | 444 |
| May 10 | 380 | 108 ^h | 488 |
| June 10 | 380 | 166 ⁱ | 546 |
| July 10 | 380 | 166 | 546 |
| Aug 10 | 380 | 50 ^j | 430 |
| Sept 10 | 380 | 34 | 414 |
| Oct 10 | 280 ^a | 34 | 314 |
| Nov 10 | 280 | 34 | 314 |
| Dec 10 | 280 | 34 | 314 |
| Jan 11 | 280 | 34 | 314 |
| Feb 11 | 280 | 34 | 314 |
| March 11 | 280 | 34 | 314 |
| April 11 | 280 | 34 | 314 |
| May 11 | 280 | 34 | 314 |

Notes:

- a. 140 day shift personnel
- b. 140 day shift personnel + 50 night shift personnel
- c. 15 oversized vehicles + 1 delivery of sand + 1 delivery of diesel fuel
- d. 15 oversized vehicles + 22 deliveries clay + 1 delivery of sand + 1 delivery of cement + 1 delivery of diesel fuel
- e. 15 oversized vehicles + 4 deliveries of sand + 3 deliveries of cement + 1 delivery of diesel fuel
- f. 12 deliveries of sand + 5 deliveries of cement + 1 delivery of diesel fuel
- g. 22 deliveries of sand + 9 deliveries of cement + 1 delivery of diesel fuel
- h. 38 deliveries of sand + 15 deliveries of cement + 1 delivery of diesel fuel
- i. 60 deliveries of sand + 22 deliveries of cement + 1 delivery of diesel fuel
- j. 17 deliveries of sand + 7 deliveries of cement + 1 delivery of diesel fuel

Table 5 shows that the maximum daily truck generated from the construction would occur during the months of June and July 2010. It should be noted that the above estimates were made based on the current construction scenario. It is anticipated that the final numbers may vary as further project detailed design develops and as construction equipment and methodology becomes finalised.

As earlier noted, oversized vehicles are expected to use secondary access roads to and from the Site. It is estimated that 15 oversized vehicles will be required for Stages 1 and 3. Hence, 30 truck movements a day for Stages 1 and 3 will not be using Cotter Road, leaving a maximum of 50 truck movements a day on Cotter Road for Stage 1 and, only 4 truck movements a day on Cotter Road for Stage 3.



4.5 Impact on Access Roads

Based on the worst-case scenario where the heavy vehicle traffic generation during the weekday is in the order of 166 trucks per day, comprising of 83 In and 83 Out. It has been noted, though, that significantly less vehicular traffic will occur if construction material is able to be sourced from site.

The proportion of these movements occurring during the AM and PM peak periods is conservatively estimated at approximately 25%, with a split between arrivals and departures of 50/50. Therefore, the worst-case scenario that truck movements occur during the AM and PM peak periods is forty-two (42) vehicles per hour, comprising of 21 In and 21 Out.

For light vehicles, it is likely that the arrival of workers for the day shift will occur before the AM peak hour and departure would be after the PM peak hour. For the night shift, the arrival of the workers will coincide with the afternoon peak and the departure will be before the morning peak. Therefore the proportion of these movements occurring during the AM and PM peak periods is conservatively estimated at approximately 30% with the total daily arrivals being 190 In and 190 out. Based on this assumption, the weekday peak period traffic generation will be in the order of 57 additional vehicle trips per hour. This volume may further be assumed to be distributed among three access routes

On the overall, this additional volume in light vehicles and heavy vehicles is unlikely to impact on the existing road network operations in terms of roadway capacity since the roads have adequate spare capacity beyond this additional volume. An additional daily volume of 546 vehicles on a weekday on Cotter Road would translate to a maximum of approximately 3,600 vehicles a day (weekday) at the semi-urban section near Streeton Drive and around 1,000 vehicles a day at Murrumbidgee Bridge. Hence, the level of service along Cotter Road would be in the order of LOS B to LOS D. Cotter Road has substantial capacity to accommodate construction traffic.

Table 6 Future Level of Service on Cotter Road

| Location on Cotter Road | Average Daily Traffic (Weekday) | | | LOS |
|----------------------------------|---|---|-------|-----|
| | Existing Average Daily Traffic ¹ | Additional Generated Traffic ² | Total | |
| Streeton Drive | 3083 | 546 | 3629 | D |
| Mt Stromlo Road | 1030 | 546 | 1576 | B |
| Murrumbidgee Bridge ³ | 471 | 546 | 1017 | B |

¹ At peak conditions on weekday

² At peak construction months

³ One lane, two way conditions apply



It is noted, however, that this volume is attributed to worst-case scenario. Final traffic volumes are likely to be less since these calculations were based on the premise that substantial volumes of aggregate and other materials will be imported. Depending on the extent and quality of material quarried or gained from the site and the extent of reuse of site material, the estimated traffic movements could significantly drop.

4.6 Impact on Access Roads during Special Events

During special events, existing traffic volumes are anticipated to double, if not triple. Given the existing volumes of traffic and with the additional traffic attributed to these special events it is recognized that road capacity may be exceeded at specific sections of Cotter Road. Particularly, in the semi urban strip from Tuggeranong Parkway to Streeton Drive where the LOS is at LOS C. From Eucumbene Drive to Camp Cottermouth, the additional traffic can still be accommodated but at Murrumbidgee Bridge, it is expected that significant delays will be experienced.

If construction traffic is to be added to the 'special event' traffic, it is likely that certain sections of Cotter Road will experience significant delays and the potential risks for collisions would increase without the proper traffic management measures. Hence, a Special Traffic Management Plan should be developed to address specific arrangements for traffic routing and priority flows. Construction vehicles should be kept to a minimum and if not, use the alternative secondary routes.

4.7 Road Safety

Additional traffic volumes on the lightly trafficked roads affected by the project will increase the risk of collisions, particularly early in the project, until local drivers become accustomed to the project traffic. To mitigate this risk, appropriate traffic control devices should be in place.

On Cotter Road, where travel speeds and traffic volumes are higher, appropriate warning signs should be erected on the approaches to Streeton Drive, Eucumbene Drive, Uriarra Road, Mount Stromlo Road and Brindabella Road. Particular attention needs to be given to management of traffic during peak traffic periods as the holiday season, weekends, and special cycling events when traffic volumes increase significantly. Visitors travelling to and from the Stromlo Forest Park, Cotter Reserve, Cottermouth Camp, National Equestrian Centre and the various leisure and recreational parks are typically unfamiliar with local conditions and would probably not be aware of the construction traffic movements in the vicinity. A road safety audit of Cotter Road conducted in August 2008 highlighted the following issues:

- ▶ The intersection of Mt Stromlo Road and Cotter Road is poorly laid out. A section of additional shoulder pavement on Cotter Road may mislead drivers by suggesting that there is additional width in the shoulder to overtake a right turning vehicle.
- ▶ The access to the National Equestrian Centre is poorly aligned and has worn linemarking;



- ▶ Sight distance at a number of locations is restricted by overgrown vegetation and/or lack of benching on cut batters.

4.8 Issues identified in Relation to Impacts to Existing Traffic Movements during the Construction of the Enlarged Dam

In the presentation of the draft EIS, a range of issues relating to traffic were identified as issues requiring consideration and attention particularly during construction of the enlarged dam. It is anticipated that traffic disruption along Cotter Road will have an impact on the travel movements of the residents, visitors and business owners of properties within the catchment area along Cotter Road.

Submissions received highlight the following issues relating to traffic:

- ▶ The road reserve is extremely narrow in certain locations with no shoulders provided. The lack of space and the absence of overtaking lanes pose an increased risk to cyclists;
- ▶ The road alignment is steep and winding and inadequate visibility of approaching vehicles makes entering and exiting properties along Cotter Road dangerous;
- ▶ There are three agistment facilities with access from Cotter Road. Hence, Cotter Road is also frequented by agisters, horse riders and service providers to and from the agistment facilities. With limited road space and inadequate line of sight, there is danger of collision with vehicles;
- ▶ Lack of signage on speed restrictions and;
- ▶ The anticipated increase in heavy vehicle movements within Cotter Road and on the existing road alignment can pose a safety risk to the general traffic.

In consideration of the issues identified above, the construction program has been designed to minimise the potential impact to the business activities and the existing road activity along Cotter Road. Notwithstanding careful consideration, there remains traffic impacts brought about the construction activity that will need to be managed and mitigated in order to minimise overall impacts to the residents and business in the project site.



5. Findings and Recommendations

5.1 Summary of Findings

It is anticipated that the traffic impacts of the Project would mainly occur at Cotter Road during the 24-month construction period of the Project. This is mainly due to the additional volume of traffic on the normally light-trafficked local road and the significant increase in heavy vehicle volumes.

The volume and intensity of truck movements would vary during the 24-month construction duration and by construction stage. The additional construction traffic due to the project can be adequately accommodated at acceptable levels of service. The delivery of materials and equipment would spread over the construction period and the movement of these vehicles can be arranged to minimise impact on the local community, who would be kept informed of the progress of the construction works, potential impacts and safeguards incorporated.

As most of the construction activity will be confined within the construction site, traffic movements within the site shall be managed by an appropriate traffic control plan for work sites.

Off site, the main issue highlighted and identified is the issue of traffic safety in terms of increased heavy vehicle movements along Cotter Road, the interaction between the various road users of Cotter Road and the lack of safety measures to safeguard the well being of the road users. A road safety audit of Cotter Road was undertaken in August 2008 and the findings have identified features to improve road safety. It is recognised, however, that improving the road infrastructure is beyond the scope of the proponent of this project. The ongoing works for Cotter Road Rehabilitation Program, currently being undertaken by the Territory and Municipal Services (TAMS), ACT is intended to address anticipated growth in daily traffic brought about by new developments in the area and to incorporate road infrastructure improvement measures to address safety issues. Continuous liaison and discussions with TAMS by the residents and road users may be effective to communicate specific improvement measures that are not yet in the program but may possibly be incorporated in future works. As an example, Cotter Road is a popular cycling route but lacks a formal cycleway. Delineating and completing the cycleway will significantly benefit the cycling community, and other road users.

5.2 Recommendations

It is recognised that there is a safety issue for relatively high speed traffic travelling along Cotter Road conflicting with increased construction traffic using Cotter Road and there is increased risk of collisions due to poor sight distance and alignment. To moderate the potential risk of high impact collisions, it is recommended that the speed limit be lowered to 60 km/hr on the approaches to intersections and local access roads for the duration of the construction period to moderate the risk of high impact collisions. Appropriate warning signs of trucks entering Cotter Road should be erected at



Tuggeranong Parkway/Cotter Road, approaches at Streeton Drive, Eucumbene Drive, Uriarra Road, Mt Stromlo Road and Brindabella Road. Appropriate warning signs should also be installed at local access roads from the National Equestrian Centre, Camp Cottermouth, Mt Stromlo Forest Park and the Cotter Reserve.

In order to minimise the impact of truck movements on the existing road users, the majority of the truck movements for delivery will be confined within the off peak period of the traffic movements along Cotter Road, notably between 9 am and 4 pm, and outside the peak commuter times and recreation travel times. It is also cited that traffic activity is substantially high on weekends due to the presence of leisure and recreational facilities along Cotter Road. Hence, opportunities to minimise heavy vehicle movements along Cotter Road would be further investigated. A proportion of heavy vehicle movements to and from the construction site during weekends could be diverted to alternative routes. It is also deemed feasible that the transport of construction waste for off-site disposal be limited by targeting reuse of material on site as part of the construction.

Traffic management issues can be addressed with the preparation of a Comprehensive Traffic Management Plan. A Special Traffic Management Plan would also be prepared to address traffic conditions during special events. The specific months when these events are to take place will be clearly noted and construction delivery processes would be rearranged to cater to the affected days. Deliveries will be diverted to alternative secondary routes to eliminate potential safety risks along Cotter Road due to construction traffic.

A number of mitigating measures can be identified to ensure that transport and traffic impacts arising from the construction and operation are minimised. These measures would be incorporated into a Comprehensive Traffic Management Plan for the Project and shall be developed in consultation with Roads ACT. A 'shared roads' policy outlining the responsibility of all related construction traffic will be developed as part of the plan.

An important mitigation measure relating to construction traffic impacts would be the implementation of a community information and awareness program. This awareness program would be initiated prior to construction commencing and during the construction period to ensure that the local residents are fully aware of the construction activities with particular regard to construction traffic accessing the site. The awareness program shall identify communication protocols for community feedback on issues relating to construction vehicle driver behaviour and construction related matters.

Some of the other initiatives that would be undertaken as part of the Traffic Management Plan would include:

- ▶ In consultation with Roads ACT, general signposting of the access roads with appropriate heavy vehicle and construction warning signs;
- ▶ Review of speed restrictions along Cotter Road and additional signposting of speed limitations;



- ▶ Installation of specific warning signs at entrances to the construction site to warn existing road users of entering and exiting construction traffic;
- ▶ Establishing equestrian walking routes and crossing points;
- ▶ Distribution of day warning notices to advice local road users of scheduled construction activities;
- ▶ Installation of appropriate traffic control and warning signs for areas identified where potential safety risk issues exist;
- ▶ The promotion of car pooling for construction staff and other shared transport initiatives during the construction phase;
- ▶ Management of the transportation of construction materials to maximise vehicle loads to therefore minimise vehicle movements;
- ▶ Whenever practical vehicles associated with the construction works would use secondary access roads instead of Cotter Road; and
- ▶ Inducting truck and vehicle operators on the requirements of the Traffic Management Plan and the 'shared roads' guide for Cotter Road.

5.3 Response to Issues Raised from the Community Consultation

In response to the specific issues raised by the community (see Section), Table 7 presents a summary of the actions and initiatives to be undertaken to address these issues.

Table 7 Summary of Actions to Address Issues Raised

| Issues | Actions/Recommendations |
|---|--|
| Narrow Road Reserve and lack of space for cyclists; poor road alignment and inadequate visibility | Road infrastructure improvements are beyond the scope of the Cotter Dam project. However, the ongoing Cotter Road Rehabilitation Program of the TAMS is anticipated to incorporate road infrastructure improvement measures to address safety issues. Continuous liaison and discussions with TAMS by the residents and road users may be effective to communicate specific improvement measures that are not yet in the program but may possibly be incorporated in future works. |
| Safety risk notable at access to properties along Cotter Road | A general review of speed restrictions along Cotter Road and additional signposting of speed limitations would be undertaken such the speed limit be lowered to 60 km/hr on the approaches to intersections and local access roads for the duration of the construction period to moderate the risk of high impact collisions. Appropriate warning signs should also be installed along Cotter Road and at local access roads from the National Equestrian Centre, Camp Cottermouth, Mt Stromlo Forest Park and the Cotter Reserve. |
| Safety of agisters, horse | A "shared roads policy" would be developed. |



| Issues | Actions/Recommendations |
|--|--|
| riders and other road users | Equestrian walking routes and crossing points will be established; Appropriate warning signs and speed limitation signages will be erected; Opportunities to minimise heavy vehicle movements along Cotter Road would be further investigated |
| Lack of signages for speed restrictions | A general review of speed restrictions along Cotter Road and additional signposting of speed limitations would be undertaken |
| Safety risk to general public due to increase in heavy vehicle traffic | Majority of the truck movements for delivery will be confined within the off peak period of the traffic movements along Cotter Road, notably between 9 am and 4 pm, and outside the peak commuter times and recreation travel times Opportunities to minimise heavy vehicle movements along Cotter Road would be further investigated |



GHD

10 Bond Street Sydney NSW 2000

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T: 2 9239 7100 F: 2 9239 7199 E: sydmal@ghd.com.au

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