

Appendix 6: Traffic Impact Assessment

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“Rivendell” Feedlot

TRAFFIC IMPACT ASSESSMENT

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“Rivendell”, 698 Woodstock Road, Inverell NSW 2360

June 2021

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1 Introduction

The following provides a Traffic Impact Assessment for the proposed increase in carrying capacity of Rivendell Feedlot located at 698 Woodstock Road, Inverell.

Currently, the feedlot has development consent for a 470 head of cattle (DA 69/98). The proponent proposes to increase the maximum carrying capacity of the feedlot to 2,000 head of cattle. Upgrades to the existing infrastructure as part of this development proposal will result in the facility constructed to Class 1 standards. This complies with the highest standards of designs and management.

This report aims to assess the impact of traffic generated on the local road network by the increase in Feedlot capacity. The Assessment has been prepared as additional information for the development application to be lodged with Inverell Shire Council.

The assessment complies with requirements under the *Environmental Planning and Assessment Act 1979* to consider the environmental impact of a development proposal. In this instance, the environment considered is the road network servicing the proposed development.

1.1 Aims and Objectives

This assessment aims to identify the likely impact of the feedlot capacity increase upon the local road network of the region. Impacts considered include impacts to the road network itself (road condition), the functionality of the road network (road safety and traffic volumes) and amenity impacts of changes to the road network (traffic noise). The assessment also outlines traffic considerations with regards to the proposed capacity increase of the feedlot (adequacy of on-site parking provision, internal traffic circulation and site access to the public road network).

Plans of intersection and/or road upgrades are not included in this assessment but may be required as a part of operational works or negotiated through conditions of approval.

The proposed objectives for the Rivendell Feedlot output increase are to:

- Minimise adverse impacts upon the public road network; and
- Ensure the practicality and safety of traffic management measures on site.

1.2 Scope of Works

The scope of works includes preparation of Traffic Impact Assessment (TIA). The TIA will include the following:

- Determination of the key haulage routes with special considerations for any school zones, school bus routes, residential areas or potential risk locations;
- Assessment of the surrounding environment, existing conditions and road safety;
- Assessment of existing private property driveways and farm access points;
- Liaison with Inverell Shire Council in relation to existing road traffic numbers;
- Assessment of likely impacts associated with road haulage;

- Any mitigation measures required to minimise road impacts, e.g. dust and noise suppression;
- Recommendations for access to the feedlot site on Woodstock Road;
- Calculation of expected contribution rate; and
- Inclusion of Traffic Management Plan and Truck Driver Code of Practice.

The scope of works for this TIA is based on published guidelines for NSW.

2 Proposed Development

The proposed development involves increasing the capacity of the Feedlot at Rivendell from 470 to a maximum of 2,000 head of cattle. At present, the entire facility is operated as a stock holding (3 large temporary containment pens) and drought feeding facility (ten smaller pens). The objective of this development is to improve the economic viability of the existing enterprise at Rivendell by finishing cattle using grain and fodder produced at the property and the surrounding Inverell region. With the increase in capacity, the proponent anticipates processing up to 6,000 head of cattle per year based on 3 cattle turnovers.

The existing infrastructure and footprint including cattle handling facilities, feed mill, grain storage facilities (grain silos and hay sheds), water storages (farm dams and water storage tanks) and machinery sheds will provide the core infrastructure of the new proposal. A new holding pond and upgraded hay shed will be constructed as well as minor earthworks to grade the cattle pens upgrade drainage systems. The existing processing yard capacity is sufficient to accommodate the proposed feedlot extension.

Rivendell fronts Woodstock Road, off the Gwydir Highway. Woodstock Road is the primary access to the Feedlot (Figure 1). The property is not accessible from the Gwydir Highway; however Colley's Lane provides secondary access to the property which is not actively used. Woodstock Road has a bitumen seal for the first 3 km from the Gwydir Highway, which is followed by a gravel road for the remaining 3.8 km to the Feedlot entrance. A small section of the road on either side of the Swan Brook bridge is bitumen sealed. Woodstock Road is a local public road managed by Inverell Shire Council.

Once operational the increased capacity will result in increased traffic generation to and from the feedlot in the following ways:

- Minor increase in light vehicle traffic generated by staff to service increased capacity/output;
- Increased heavy vehicle traffic to haul cattle to and from the feedlot as well as fodder to the site.

Figure 1: Locality Plan of Rivendell Feedlot



Traffic leaving the feedlot will head west along Woodstock Road onto the Gwydir Highway. Once Woodstock Road is approved as a B Double Route (26 m length max) to the intersection of Billabong Road. This represents 5.8 km of the total 6.8km route from the feedlot entrance to the Gwydir Highway. An agreement was reached between the Inverell Shire and the applicant for access by B-doubles to the feedlot site as part of the original DA69-98. Work was undertaken on Woodstock Road to remove two 90-degree bends and form a suitable S-bend. This work involved the applicant gifting land to Council to enable this to occur. The work was undertaken in about 2010.

The final kilometre stretch to the feedlot entrance is an approved B Double route with conditions. The proponent is therefore seeking confirmation to maintain use of this final kilometre stretch as a B-Double route.

Certain sections of Woodstock Road are listed as Crown Road. Crown Roads has advised, as part of their input to the SEARs for the proposed feedlot, that these sections will need to be transferred to Inverell Shire Council to be maintained as public road. This is a matter for Council.

The proposed development will result in an increase in daily traffic volumes along Woodstock Road. This will include light vehicles for one or two additional staff members and B-doubles either delivering or despatching supplies of fodder and cattle to the feedlot.

The majority of workers will travel from Inverell. Currently 2 staff members travel daily to and from Rivendell to oversee operations at the property. The number of staff required to operate the feedlot at a greater output is anticipated double to 4 staff members. One additional staff member will be required as the feedlot manager lives on-farm.

Additional contract workers would also be required for a variety of purposes including veterinarians for cattle health and site maintenance.

The additional truck movement are detailed in the following sections.

3 Existing Conditions

3.1 Existing Vehicle Movements from the Feedlot

At present, the feedlot is empty. It was last utilised as a dry feeding facility during the drought and occasionally used for holding of cattle for 2 to 4 weeks as part of the Applicants stock and station business. Cattle currently graze the property. The property also supports a mix of dryland cropping to produce pasture for cattle and various grain crops.

Current vehicle and truck movements are therefore associated with the dryland and grazing activities on the property. This would include the delivery and despatch of cattle and trucks despatching grain and other farm products at harvest periods. The approved feedlot would generate trucks to move cattle to and from the property in addition to grain and hay for the feed ration.

Peak truck movements along Woodstock Road onto the Gwydir Highway occur during grain harvest between November and December. Truck movements vary significantly but under current operations are unlikely to exceed 2 truck movements (4 two-way movements) per week from the feedlot operation. Light vehicle movements for farm workers are likely to equal 4 movements (8 two-way movements) per day.

3.2 Access Suitability

The current haul route from Rivendell utilises Woodstock Road and the Gwydir Highway. Once on the Gwydir Highway, vehicles can turn east toward the New England Highway or west through Inverell.

3.2.1 Woodstock Road to Rivendell

Site access to the feedlot from Woodstock Road is currently sufficient to provide access to B-doubles according to Austroads standards with a 25m turning radius onto Woodstock Road. The driveway is 7m in width and Woodstock Road is over 6m in width at its narrowest point immediately west of the intersection.

The intersection into the property is free of vegetation allowing for good sight distance for entering and exiting the feedlot. Sight distance to the east of the intersection is in excess of 1 km. Sight distance to the west is approximately 400 m before a bend in the road. This is sufficient sight distance as trucks will all head west and therefore need to give way to traffic to the east.

The intersection meets the minimum standard for a rural intersection. The internal road is a dual carriageway with a width extending to approximately 10m.

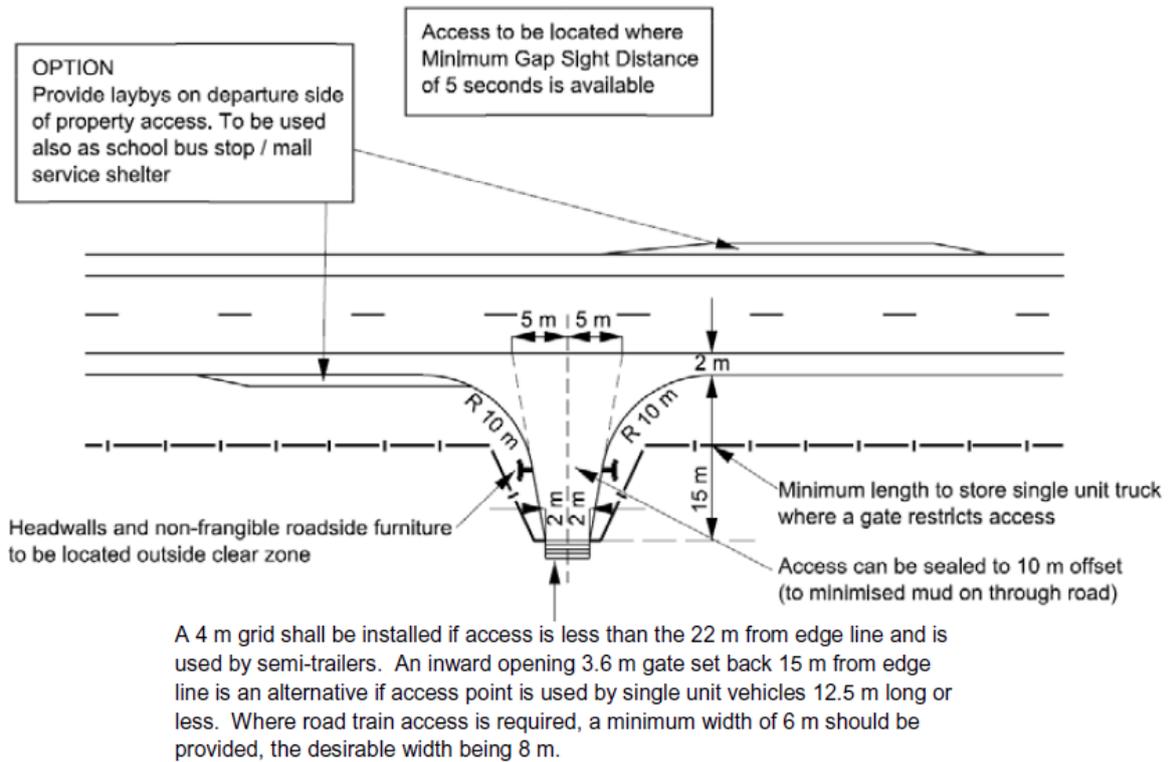
The internal road is currently signed to a speed limit of 40km/h and gravelled to provide all-weather access to the feedlot.



Figure 2: Woodstock Road and Rivendell Entrance intersection looking East.

The following plan presents an excerpt from Austroads design guidelines for a rural property access. The Rivendell access intersection exceeds these dimensions and is therefore capable of supporting a safe entrance for B-double truck units as the largest vehicle to enter the property.

Figure 3: Austroads Guide to Road Design Part 4: Figure 7.2 Rural Property Access



Preferred option with indented access
(showing single carriageway layout)

Woodstock Road services a number of other properties and farms of similar size along its route. It terminates to the east on Kings Plains Road approximately 11km from the Rivendell entrance. The road is generally in good condition with a consistent width. Properties to the east of Rivendell utilise mainly semi-trailers for haulage of materials to and from their land.

3.2.2 Gwydir Highway Intersection with Woodstock Road

The Gwydir Highway is a state highway (B76).

The intersection from Woodstock Road onto the Gwydir Highway has an approximately 16m radius. Woodstock Road is 7.5m in width at the intersection plus 1 m width in sloping grass shoulders. This is sufficient to allow an entering vehicle past if a truck is waiting at the intersection to enter the highway. Intersection dimensions are displayed below.

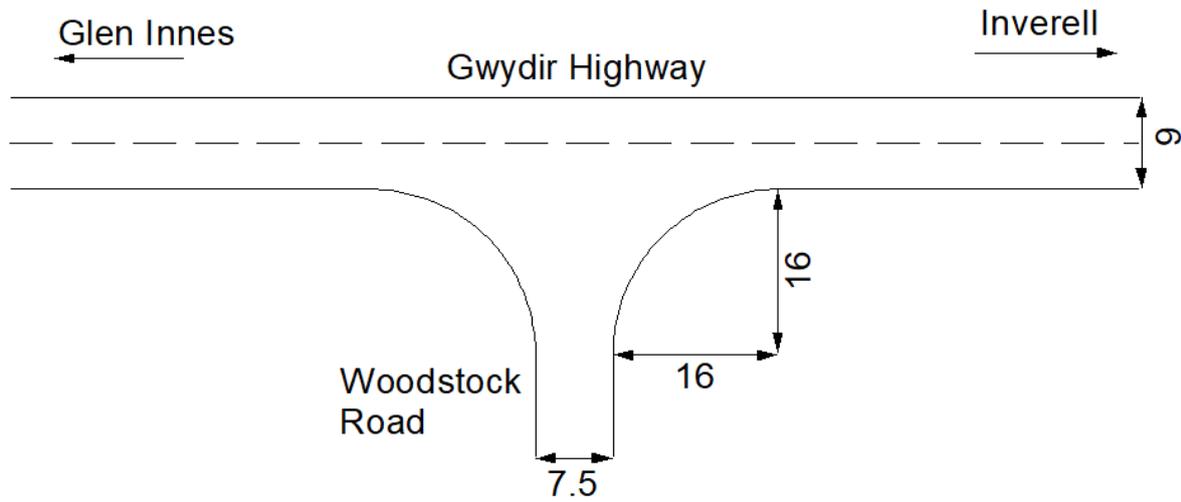


Figure 4: Woodstock Road/Gwydir Highway intersection dimensions

Sight distance onto the Gwydir Highway to the east towards Glen Innes is approximately 200 m. The majority of loaded feedlot related traffic will head in this direction giving way to traffic from the west. The western sight distance is in excess of 3 km. This will allow sufficient time for loaded vehicles to observe oncoming traffic and enter the Highway safely. B-Doubles may need to briefly cross the double line onto the other side of the road when turning east.

Approach site distances have been calculated and are attached in Appendix 1. Both Approach Sight Distance and Safe Intersection Sight Distances were calculated and deemed sufficient for trucks travelling along Woodstock Road at or below 80km/h. The approach from Woodstock Road onto the highway is uphill and therefore truck speed would reduce.

The following provides recent photos of the intersection of Woodstock Road and the Gwydir Highway.



Figure 5: Woodstock Road/Gwydir Highway intersection looking east (200 m sight distance)



Figure 6: Woodstock Road/Gwydir Highway intersection looking west (~3 km sight distance)

3.3 Internal Traffic Circulation

All traffic will continue to enter and exit the site via Woodstock Road. Internal roads will continue to be maintained with regular grading and resurfacing to ensure the site can withstand the increased traffic and be accessed in all-weather scenarios.

An internal traffic speed of 40 km/hr will remain for all vehicles. This will maximise traffic safety and assist in minimising dust and noise emissions. Trucks would normally limit their speed to between 10 and 20 km/h on the basis of slope and careful driving.

3.4 Parking Supply

The development site is located within a rural property which does not have access to public transport, and therefore is only accessible via private vehicle. For industries, it is recommended that parking spaces be provided in accordance with the following rate: 1 parking space per 2 staff employed. As the site is located on an open rural property no specific parking areas will be established other than at the site office. There is sufficient area available to accommodate more than 5-light vehicles at the site office. Trucks will generally not be required to park at the facility other than briefly while delivering and despatching materials.

If necessary, trucks will queue in the turnaround area along the entrance road to wait for loading/unloading if more than one truck has been scheduled. All truck parking would be contained within this internal road to ensure there is no impact to external roads. There is sufficient room along the entrance road for 5 B-Double combinations to park.

There is an existing turn around area 40 m in diameter to allow trucks to load or unload at the cattle yards.

3.5 Operating Hours

Operating hours will be daylight hours, 7-days per week. Construction hours will be limited to commence at 7am and be completed by 6pm, Monday to Saturday. Quiet projects such as fencing would occur on a 7-day basis.

Once the expansion is complete, the main tasks likely to occur include feed preparation and distribution, livestock handling, induction and dispatch, pen cleaning and manure management. The Feedlot would be active between 6am and generally cease general operations by 6pm on a 5-day per week basis. Weekend operation would normally be limited to cattle feeding and would occur between similar hours.

Some heavy vehicle movements are likely to occur outside normal operating hours (e.g. in summer, it is desirable to transport cattle either at night or in the early hours of the morning for animal welfare reasons). The Feedlot will require the flexibility to allow strategic heavy vehicle movements outside of the normal operating hours. This would be considered similar to existing operations on Rivendell.

Grain deliveries and feed movements onsite would generally be restricted between the hours of 7am and 5pm, Monday to Friday with only minor exceptions for weekends during local harvest times.

Table 1: Operating hours in relation to incoming and outgoing traffic

Activity	Monday to Friday	Saturday	Sunday	Public Holidays
Grain deliveries	7:00am to 5:00pm	Nil*	Nil*	Nil*
Feed distribution	6:00am to 6:00pm	6:00am to 6:00pm	6:00am to 6:00pm	6:00am to 6:00pm
Cattle Movements	6:00am to 6:00pm	6:00am to 6:00pm	6:00am to 6:00pm	6:00am to 6:00pm
Light vehicle traffic associated with employees, site residents or light service vehicles entering or leaving the site	24 hours per day			

Exceptions may be made during local harvest and occasional cattle deliveries outside of these hours.

3.6 Haulage Routes

All traffic loaded with cattle will enter and exit via the Gwydir Highway and Woodstock Road. The majority of fodder trucks are anticipated to follow the same route however some may come from the east along Woodstock from nearby properties. This may have minor impacts on connecting roads.

The extent of this assessment is limited to the major components of the surrounding road network likely to be impacted by increased traffic including the following roads and intersections.

Impacted primary roads include:

- Woodstock Road
 - Waterloo Road
 - Kings Plains Road
- Gwydir Highway

3.7 Existing Road Network

On the 8th of February 2021, SMK Consultants conducted a visual pavement inspection of the main haulage route to the feedlot. The inspection was completed in fine and sunny weather conditions.

The area had received some rainfall in the days preceding the inspection. The roads were driven in both directions and a handheld GPS unit was used to record locations of damage/deficiency and other relevant road characteristics. No geotechnical investigation of the existing pavement has been undertaken as part of this investigation.

3.7.1 Woodstock Road – Bitumen Section

Woodstock Road is a regional road. Inverell Shire Council maintain this road using funding administered from Transport NSW.

The first 3.1 km of Woodstock Road from the Gwydir Highway is bitumen sealed. The road is generally utilised as a double lane road with an average width between 6m and 6.5m. The road is surface is generally in good condition. The shoulders generally have a small slope and around 0.5m in width. The shoulders are mown and well maintained, and guideposts are positioned at regular intervals along the length of the road. This entire section of road is an approved B-double route.

Local regular traffic is limited to occasional trips by farm workers and residents travelling to and from properties to Inverell. The road is occasionally utilised by grain trucks during harvest seasons as they haul grain to various depots around the shire. Sheep and cattle grazing is also practiced in the area which require livestock trucks. Peak livestock buying/selling times vary greatly depending on seasonal weather. Some properties further east of Rivendell are likely to utilise the sealed and B-Double approved Kings Plains Road to access Inverell saleyards.

The southern bitumen section of Woodstock Road has the following notable characteristics:

- No sealing or line marking.
- Concrete causeway (5.7 m width) at the Schumacher Creek Crossing;
- Colleys Lane intersection (main entrance to Rivendell Homestead);
- Three property driveways and associated school bus stop;
- Road does not have a sign posted speed limit but is assumed to be 100km/h (condition dependent) which is consistent with rural roads in the area;
- No 'Give-way' or 'Stop' signs at the Gwydir Highway intersection;
- Width generally around 6 m, narrowest section 5.2m. This slightly smaller than 6.2m required to be classed as a double lane road as per Austroads standards.

3.7.2 Woodstock Road – Gravel

The remaining 3.7 km of Woodstock Road to the feedlot entrance is gravel. Approximately 2.7km of this route is a TfNSW approved B-Double Route. The remaining section to Rivendell Feedlot entrance is locally approved for B-double access. The road is generally double lane, approximately 6.5m in width with the exception of bends and floodway/river crossings. Traffic on this section of the road is anticipated to be less as the much of the local traffic is expected to terminate at the 3 property driveways at the bitumen section of the road.

The northern gravel section of Woodstock Road has the following notable characteristics:

- Concrete causeway (5.6 m width) across floodway
- Dick Redman Bridge across Swan Brook (7.2m width). Bitumen ~100m either side of the concrete bridge.
- Billabong Road intersection

- 90-degree bend at Billabong Road intersection (1 lane, 4m in width plus 0.5m gravel shoulders)
- S Bend and gravel floodway (consistent 6m width)

The following images provide photos of Woodstock Road at these points of interest.



Figure 7: Floodway across Schumacher Creek (5.6m)



Figure 8: Colley's Lane Intersection



Figure 9: Hill crest, “Bernleigh” entrance and school bus stop



Figure 10: Second concrete causeway



Figure 11: Dick Redman Bridge



Figure 12: 90-degree bend and Billabong Road intersection

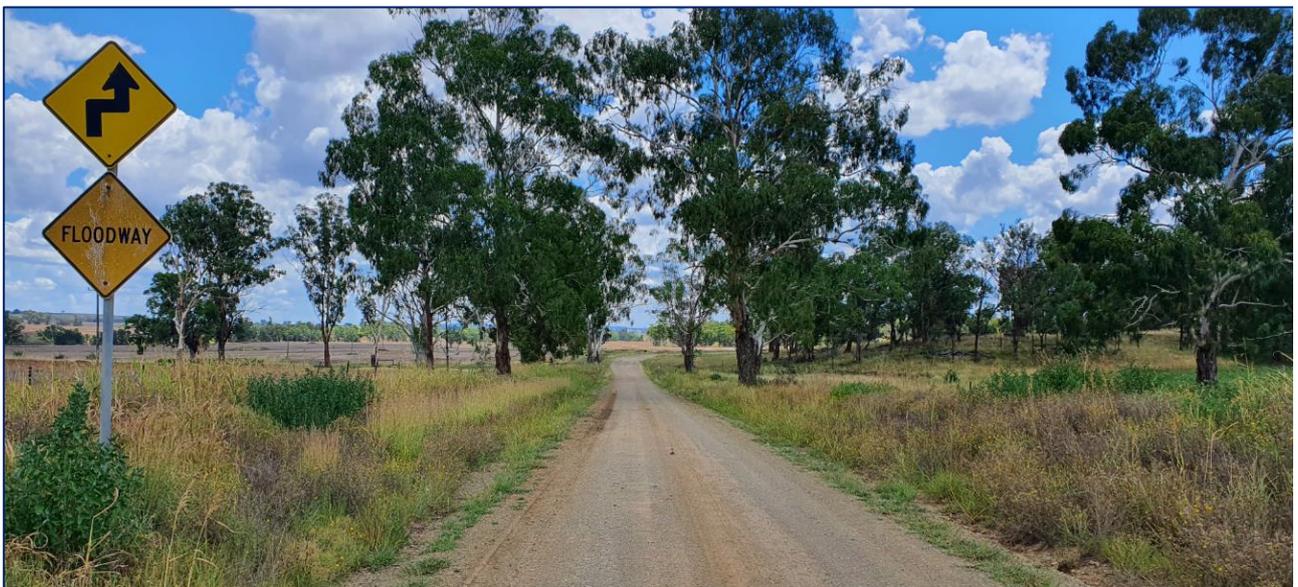


Figure 13: S-bend and floodway

3.7.3 Gwydir Highway

The Gwydir Highway is a state highway (B76) and is the main connection for northern NSW to the New England Highway. In the vicinity of the feedlot it was noted to have the following characteristics:

- Sealed, double lane highway 3.3 metre lanes, centre lines and edge lines;
- Good condition with well-maintained and actively managed shoulders;
- Overtaking lane 6km to the east of Woodstock Road intersection for eastbound traffic;
- Road is fitted with average speed limit cameras east of Inverell and West of Glen Innes;
- Hill crest immediately east of Woodstock Road Entrance reducing sight distance to the east to ~100m;
- Data taken in 2020 at the traffic counter 10km west of Woodstock intersection averaged 1,204 vehicles per day with a split of 21.4% heavy vehicles and 78.6% light vehicles.

3.7.4 General Road Network Comment

Current haulage routes include sealed and unsealed roads considered to be in good to very good condition at the time of the assessment. The identified roads are considered suitable for continued use by the Feedlot. No specific sites or sections have been identified as critical or unsafe. Gravel pavement depth is considered sufficient (>250 mm) to support ongoing truck use. It should be noted that wet weather generally results in truck deliveries or despatches from the proposed feedlot to be delayed until conditions dry out. This is a result of conditions for moving cattle at the feedlot, deliveries or collections from other sites, and general handling limitations (e.g. Loading of stockfeed in wet weather is not suitable.)

3.8 Current Traffic

3.8.1 Traffic Volumes

Current traffic along Woodstock Road is considered moderate. The road is mostly utilised by farmers and workers accessing local properties. Peak traffic volumes are likely to be encountered during December when cereal growers haul product to grain depots during harvest. Regular truck traffic would occur from the movement of stock to and from the local district.

The Applicant has indicated that the existing cattle production enterprise at Rivendell generates approximately 2-3 trucks (4-6 truck two-way movements) per week.

Traffic data for points along Woodstock Road was provided by Inverell Shire Council:

Table 2: Woodstock Road Traffic Data

Date	Location	ADT*	% Heavy Vehicles
15/03/2018	Schumachers Creek Causeway (bitumen section)	105	17.1
11/09/2016	Swan Brook Bridge (gravel section)	54	19

*ADT – Average Daily Traffic (Vehicles per day)

This data indicates that half of the daily traffic along Woodstock road turns off at the properties 'Bernleigh' and 'Blocken' and before reaching the Swan Brook Bridge. Approximately 19% of the traffic along Woodstock road is classed as heavy vehicle.

The counter located at the Gwydir Highway reported 21.4% heavy vehicles and an ADT of 1,204.

Predicted traffic volumes to be generated by the development are discussed in the following section 4 of this report.

3.8.2 Traffic Safety

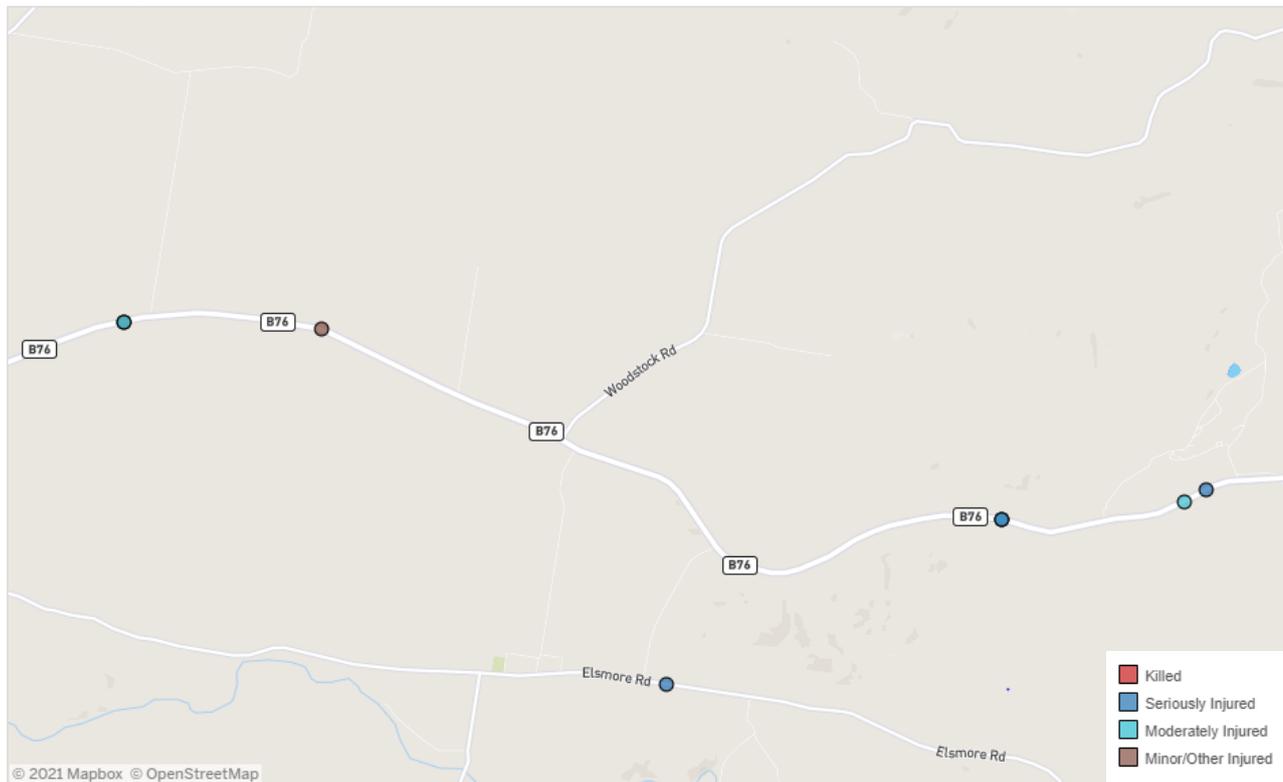
The NSW Centre for Road Safety provides crash statistics for all reportable accidents to occur within NSW. The data available between 2015 and 2020 is presented on a plan for the local government areas in Figure 14. These indicate that a low number of traffic incidents occur on rural roads in the vicinity of the development site. This is likely to be a result of low traffic density of these roads. By contrast, roads with higher traffic densities (such as the Gwydir Highway) have experienced a greater number of collisions during this time period.

The data indicates that there have been 6 accidents within 10km along the Gwydir Highway on either side of the Gwydir/Woodstock Road Intersection. This would suggest a low level of traffic accidents for the local area and does not include any fatalities.

The mapping does not indicate any hot-spots or sites that have a regular traffic safety issue other than minor accidents within the Inverell Shire area.

Figure 14: Recorded accident data for Gwydir Highway near Woodstock Road

Road Users by LGA: Inverell



3.9 Proposed Developments in the Vicinity

Information provided by Inverell Council suggests that no applications have been submitted to Council over the last 5 years that are considered potential traffic generating development along Woodstock Road or the Gwydir Highway. Development Applications in the area have mainly pertained to residential and farm shed applications.

There have been development applications in the greater region for wind and solar farms which have the potential to increase traffic along the Gwydir highway in the future. This is unlikely to have any cumulative impact with Rivendell Feedlot vehicle traffic.

4 Traffic Generated by the Proposed Development

The proposal involves increasing the carrying capacity of Rivendell Feedlot to 2,000 head. With three turnovers per annum, the feedlot will have the potential to process 6,000 head each year. The traffic generated by the development will include heavy-vehicle traffic carrying feed, cattle, and light vehicles transporting employees, visitors and service personnel.

4.1 Construction Traffic

Construction planned for the development includes the construction of an effluent pond, hay shed, expansion of an existing silage pit and various earthworks to create the required drains and levees to capture site runoff. A number of pens are also undergoing conversions and upgrades requiring earthworks and grading.

The proponent estimated that it will take approximately 3 months to complete the construction of the feedlot. This will require the delivery of earthworks equipment including an excavator and grader to site. The equipment delivery is likely to need two heavy vehicle movements at the start of works and another two to remove the equipment from site at the conclusion of works.

Light traffic during the works will consist of between 2 and 4 vehicles per day for a four-week period during earthworks and another 2 and 4 light vehicles during any other construction works.

4.2 Predicted Light Vehicle Movements - Operational

Light traffic from staff, contractors and veterinarians are expected to generate the majority of light vehicle traffic. The feedlot currently employs 2 full time equivalent staff for servicing and maintenance work. Two additional staff will be required for day-to-day operations once the feedlot reaches full capacity of 2,000-head. At most this will total 4 two-way light vehicle movements per day. Staff may also carpool to the property if they are based in Inverell.

On weekends less staff (approximately 2) will be required with reduced deliveries.

4.3 Predicted Heavy Vehicle Movements

Operational heavy vehicle traffic at the Feedlot will comprise of:

- B-Doubles delivering stock to the feedlot;
- Transport of grain and hay produced on Rivendell to the silos on Rivendell;
- Import of additional feed from neighbouring, local producers;
- Export of stock via B-Doubles once target weight has been reached;
- Export of excess stockpiled manure which could not be spread at Rivendell;

The following provides an estimation of the required vehicle movements based on current movement and increased output levels. Assumptions used for this calculation include:

- Cattle trucks will travel one-way empty and one way full;
- Feed trucks enter full and leave empty;
- 100% occupancy
- Average cattle weight in: 350Kg
- Average cattle weight out: 550Kg
- Feed ration consumption will be approximately 13.5 kg per head per day, based on cattle feed consumption of 3% of cattle weight where average cattle weight is 450kg;
- All hay/silage requirements and 30% of grain requirements will be produced on farm, with the remainder of the grain trucked in;
- No cattle will be bred on site;
- All cattle and feed transport will be based on B-Doubles with a maximum load capacity of 92 head (IN) and 68 head (OUT) (based on "Australian Animals Welfare Standards and Guidelines: Land Transport of Livestock")
- Some seasonal variations will occur

Error! Reference source not found. outlines predicted annual vehicle movements for Rivendell at current levels, at 80% occupancy and 100% occupancy:

Table 3: Predicted Traffic Movements for Rivendell Feedlot

Predicted Traffic Movements – Rivendell Feedlot				
Movement Type	Existing Approval	Maximum Occupancy (100%)	Expected Occupancy (80%)	Frequency
Annual Cattle Throughput	1,410	6,000	4,800	Annually
Cattle Truck Movements	36	154	123	Annually
	0.7	3.0	2.4	Weekly
	0.1	0.4	0.34	Daily
Feed Truck Movements	61	259	207	Annually
	1.2	5	4	Weekly
	0.17	0.71	0.57	Daily
Total Truck Movements	97	413	330	Annually
	1.86	7.94	6.34	Weekly
	0.27	1.13	0.9	Daily

The calculations indicate that the under full operational capacity, the feedlot would require 8 B-Doubles per week to move stock and feed to and from the property. At the more realistic occupancy of 80-percent which is generally achievable as a result of cattle supply, feed prices and market variations, the feedlot would operate with an average of 1-truck movement per day. When compacted to the current feedlot activity, this is an increase of from approximately 2-trucks per week to between 6 and 8-trucks per week.

The above calculations allow for all feed and cattle to be brought to the property. This can be combined with an estimated 4-light vehicles per day moving to and from the feedlot. On this basis, the feedlot is not considered to be a large traffic generating development.

5 Traffic Management

5.1 Driver Code of Conduct

Rivendell staff and drivers will be required to adhere to all road laws as well as site speed limits on the property. All staff are responsible for their behaviour when driving vehicles for Rivendell. Breaches of laws/site speed limits will mean dismissal of staff or contractors involved.

The original development prior to upgrades of Woodstock Road alignment at Rivendell, all trucks were escorted to and from the property along Woodstock Road. This was deemed unnecessary once the road was aligned to cater for B-doubles.

Truck drivers will be engaged on the basis of their ability and behaviour on local farm roads. This can be controlled by management with a selection process of which firms are contracted to supply feed and cattle to the site.

5.2 Public Transport

There is a signed bus stop outside the property of “Bernleigh” along Woodstock Road. The “Bernleigh” driveway has an intersection width of 20m onto the Woodstock Road shoulder. This is sufficient for a bus to pull off Woodstock Road entirely to allow a truck to safely pass. There is no local school bus route information available online, but it is assumed that there are a number of school bus stops along the Gwydir Highway to Inverell. School buses are on the road shortly before and after school hours, Monday to Friday during the school term. Rivendell trucks continue to operate during these hours however drivers are expected to be aware of school hours and observe safe stopping distances when following a school bus for the truck to come to a complete stop at short notice.

5.3 Pedestrian Network

There are no designated pedestrian crossings located within the haulage route. The busiest area of pedestrian traffic would be associated with the township of Inverell and Glen Innes. Trucks must follow heavy vehicle routes through the towns to avoid pedestrian risks. Truck drivers must also observe all speed limits. Trucks should observe speeds slower than the limits to ensure trucks can come to a complete stop at short notice.

Children from “Blocken” may need to cross the road to access the bus stop at “Bernleigh”. Trucks must observe speed limits and reduce speeds particularly when travelling north over the crest towards the property driveways. Trucks should be able to come to a halt at short notice when coming down from this crest as there is a smaller sight distance due to the crest.

6 Impact on Road Network

6.1 Impact on Traffic Volumes

Rivendell is located in a rural region, in which high traffic volumes and traffic congestion are not significant issues throughout the majority of the year. Peak traffic volumes on the road network are typically experienced in association with periods of harvest.

Unfortunately, data at peak times could not be provided by Inverell Shire Council for Woodstock Road to model the worst-case scenario. Data averaged across 2020 has been used for ADT figures for the Gwydir Highway.

Total traffic numbers and predicted increases due to the feedlot expansion are summarised below in Table 4.

Table 4: Predicted Daily Vehicle Movements from Rivendell

Road	Current		Proposed (Feedlot traffic)	TOTAL (Current + Proposed)	
	Year data collected	ADT*	ADT*	ADT*	% Increase in Vehicle Movements
Woodstock (Bitumen)	2018	105	10	115	9.5 %
Woodstock (gravel section)	2016	54	10	64	18.5 %
Gwydir Highway	2020	1,204	10	1214	0.8%

*ADT – Average Daily Traffic (Vehicles per day in both directions)

The increase of 10 vehicles per day to Woodstock Road is considered minor according to 2018 data on the bitumen section near the counter at Schumacher Creek Crossing. The traffic increase on the gravel section of road to 64 vehicles per day is relatively minor. The consideration of minor relates to the potential increase of 1-truck per day and the remaining vehicles would be light vehicles carrying staff and service providers.

Woodstock Road is capable of catering for the traffic increase; however, Rivendell Management must still actively monitor the condition of the gravel section to ensure it remains in a safe condition. This would be more important during and after a rain event.

The option of delaying truck movements to ensure they occur outside of school bus hours is available to management. This would not be a significant inconvenience when only 1-truck per day is expected at the feedlot site.

The increase in traffic along the Gwydir Highway is considered to be extremely minor (0.8%) and is unlikely to impact the condition of the Highway.

6.2 Impacts on Road Condition

The proposed haulage route includes sealed and unsealed roads considered to be in good to moderate condition with minor pavement damage. The pavement conditions are considered suitable to support the proposed daily movement of one truck and several light vehicles. These roads pass through rural areas, and do not have high crash frequencies. This may reflect local road users being aware of some limitations on the roads and observing appropriate driving behaviours to limit speed to the road conditions.

As the main haulage route is within the Inverell Shire, the development would potentially be subject to the following Council policy:

- Inverell Shire Council “Section 94 Development Contribution Plan – Traffic Generating Development” (2003).

The contribution plan allows the Council to levy contributions from traffic generating developments under Section 7.11 (previously Section 94) of the *Environmental Planning and Assessment Act 1979*. These contributions are typically utilised to cover the costs of maintenance, repair and reconstruction of roads as a result of damage caused by heavy vehicles generated by the development. The levy is typically charged on a per head basis for cattle feedlots.

Sections of Woodstock Road have been identified to be as narrow. In such sections, it is expected that oncoming trucks will on occasion place their passenger side wheels off the gravel. This may increase shoulder damage in some sections where there is a rough or washed-out edge between the gravel shoulder and road. Areas concern would be addressed by appropriate traffic management and driver behaviour. The actions would include:

- Driver Code of Conduct to include a requirement for truck drivers to utilise 2-way communication when they need to travel the relevant section of road.
- Under worst case conditions, establish a routine where empty trucks are to slow and place wheels off the edge of the seal, allowing loaded trucks to remain on the seal, to avoid exacerbation of road edge issues by loaded trucks.

The remainder of the main haul route, the seal width is considered sufficient for trucks to pass without a need to place a wheel off the edge of the road.

6.3 Impact on Traffic Safety

The site access at Woodstock Road and the intersection onto the Gwydir Highway have appropriate sight distances. The main busier intersection to be used by feedlot vehicles is not considered as a point of safety risk.

Some safety issues have been identified on local roads. These are listed below:

- Give-way sign on Woodstock Road and the Gwydir Highway is required.
- Woodstock Road has narrow sections around bends where trucks and/or light vehicles passing each other would need to place wheels on the road shoulders.

On occasions, the main haul route will be impacted by issues such as fog and wet weather. Rivendell staff and operators must always drive in a manner that is in accordance with road conditions. This condition specifically refers to weather conditions where visibility is reduced and road condition in the case of a section of road being less trafficable. Management will need to ensure that this conduct is adopted, including cessation of haulage when visibility is significantly impaired during winter periods of fog.

6.3.1 Woodstock Road (gravel)

It is noted that sections of Woodstock are utilised as a one lane road due to road width. Wheel tracks are in the centre of the road and therefore the issue of oncoming traffic needing to place their outside wheel on the roadside exists. Road width generally allows two vehicles to pass on either side of the road however most local road users drive down the middle of the road, as suggested by the wheel tracks. This includes the approaches to the S Bend and the 90 degree turn at Billabong Road. The frequency of oncoming traffic meeting would be low considered that hourly traffic movements are predicted to be in the order of 3 vehicles per hour or slightly higher at peak times.

An assessment of the 90-degree bend has indicated an available radius of between 60m and 70m in the corners. This is a relatively gradual bend with sufficient sight distance around the bend at both approaches.

This section of road has previously been assessed by Council during the development of the existing feedlot and local approval to allow B-doubles to access the feedlot. Council has altered the sections of Woodstock Road which they considered to be of concern in relation to truck movements and general road safety. This matter was discussed with Shire representatives during a Planning Focus meeting. No issues of concern were raised for the movement of B-doubles along Woodstock Road.

In addition precautions are required as a result of concern by others, it would be possible to install speed restrictions on corners, including but not limited to:

- Speed of Rivendell trucks to be reduced to 40 km/h along gravel sections as well as 20 km/h in the 90-degree bend.
- Rivendell trucks not to exceed 80km/h at any point along Woodstock Road.

- Rivendell trucks to utilise flashing lights to increase visibility.
- Ensure trucks are not utilised outside of daylight hours (applicable during winter)
- All semi-trailers to maintain two-way communication with feedlot management whilst on Woodstock Road.
- Trucks not to use Woodstock Road after 15mm of rain where local deliveries or despatches are occurring.

Similar to the majority of local property service roads within the Shire, the gravel section of Woodstock Road has no recorded issues of traffic conflict but does not meet current minimum standards for a two-way local road. The following figure provides an excerpt from Austroads Guide to Road Design Part3: Geometric Design. The table suggests a minimum lane width of 3.7m for a rural road with an AADT of less than 150. The road meets this criterion with a minimum width of 4m around the Billabong Road bend. The gravelled shoulder is 0.5 m in width and can be utilised if two oncoming vehicles meet.

Guide to Road Design Part 3: Geometric Design

Table 4.5: Single carriageway rural road widths (m)

Element	Design AADT				
	1–150	150–500	500–1000	1000–3000	> 3000
Traffic lanes ⁽¹⁾	3.7 (1 x 3.7)	6.2 (2 x 3.1)	6.2–7.0 (2 x 3.1/3.5)	7.0 (2 x 3.5)	7.0 (2 x 3.5)
Total shoulder	2.5	1.5	1.5	2.0	2.5
Minimum shoulder seal <small>(2),(3),(4),(5),(6)</small>	0	0.5	0.5	1.0	1.5
Total carriageway	8.7	9.2	9.2–10.0	11.0	12.0

- 1 Traffic lane widths include centrelines but are exclusive of edge-lines.
- 2 Where significant numbers of cyclists use the roadway, consideration should be given to fully sealing the shoulders. Suggest use of a maximum size 10 mm seal within a 20 km radius of towns.
- 3 Wider shoulder seals may be appropriate depending on requirements for maintenance costs, soil and climatic conditions or to accommodate the tracked width requirements for Large Combination Vehicles.
- 4 Short lengths of wider shoulder seal or lay-bys to be provided at suitable locations to provide for discretionary stops.
- 5 Full width shoulder seals may be appropriate adjacent to safety barriers and on the high side of superelevation.
- 6 A minimum 7.0 m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles).

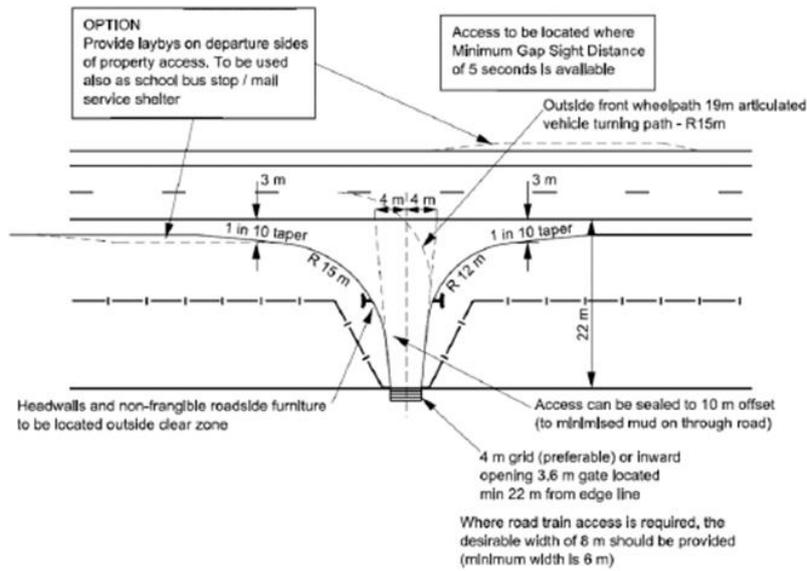
Figure 15: Austroads Single Carriageway Rural Road Width Requirements

6.3.2 Feedlot Entrance

Improvements to the feedlot entrance are deemed unnecessary based on Austroads property access standards for articulated vehicles (Figure 16). The radius of the left turn for the haulage route is 18m. The driveway is 7m in width and tapers out to 35m onto the road shoulder. These dimensions are sufficient for all applications and articulated vehicles required by the feedlot.

The intersection is free of vegetation allowing for good sight distance for those entering and exiting the feedlot. Sight distance to the east of the intersection is in excess of 1 km. Sight distance to the west is approximately 400 m before a bend in the road. This is sufficient a sufficient sight distance as trucks will all head west and therefore need to give way to traffic to the east. Larger trucks will only need to cross onto the opposite section of road momentarily while turning onto Woodstock Road. The 400 m of sight distance in the western direction is sufficient for this.

Figure 7.4: Example of a rural property access specifically designed for articulated vehicles



Note: Minimum requirement for a single carriageway with design AADT < 2000 or minimum requirement for dual carriageway left-in-left-out access for single unit truck. Where AADT > 1000 and access is required for a semi-trailer then use the layout.

Source: Department of Main Roads (2006)¹⁰.

Figure 16: Rural property access for articulated vehicles

6.4 Impact of Traffic Noise and Dust

The proposed development will result in a net increase in traffic volumes on the public road network in the form of one additional truck per day and potentially 2 or 3 more light vehicles along Woodstock Road. The potential for noise and dust impacts throughout the local road network related to the development must be considered.

The closest residences to the haulage route have been identified in Table 5 as well as the potential amenity impacts. Figure 17 shows the location of the residents in relation to the haulage routes.

Table 5: Haulage Route Receptors

#	Address	Lot and DP	Distance to road (m)	Sealed/unsealed	Potential Issue
R1	“Blocken” 257 Woodstock Road, Woodstock, NSW 2793	Lot 181 DP 753315	38	Sealed	Noise
R2	“Bernleigh” 250 Woodstock Road, Woodstock, NSW 2793 Primary	Lot 1 DP 874254	275	Sealed	-
R3	“Bernleigh Cottage” 250 Woodstock Road, Woodstock, NSW 2793 Secondary	Lot 1 DP 874254	200	Sealed	-
R4	3 Woodstock Road, Elsmore NSW 2360	Lot 187 DP 257484	30	Sealed	Noise
R5	5031 Gwydir Highway, Elsmore NSW 2360	Lot 1 DP 504977	35	Sealed	Noise



Figure 17: Residences within 500m of Haulage Route

The following assumptions have been made in identifying the five (5) Receptors:

- House >400m from sealed road are not a concern for noise and dust.
- House <400m from unsealed road may have a concern about dust.
- House <100m from sealed road may have a concern about noise.
- House <100m from unsealed road may have concern about noise and dust.

There is limited potential for the increased noise and dust production along the sealed section of Woodstock Road to exceed acceptable criteria. There are 2 residences along the route within 100m of the road which are likely to experience the noise generated from one additional truck movement per day. The property of "Blocken" (R1) at 257 Woodstock Road and the dwelling at 3 Woodstock Road (R4) located at the Gwydir Highway intersection are both within 100m of the haul route. The residence at Blocken would experience approximately 30-second of heavy vehicle noise as a truck moves to and from the feedlot.

R4 is a newer house built approximately 30m from Woodstock Road and 50m from the Gwydir Highway. The residence would be impacted by noise generated by the 1,200 vehicles moving along the Gwydir Highway and the 105 vehicles travelling on Woodstock Road. The additional noise impacts would consist of noise generated for a 30-second period as the additional one truck and two or three light vehicles travel to and from the feedlot.

The dwelling at 5031 Gwydir Highway (R5) has also been considered for noise concern as trucks will be accelerating past the dwelling after turning out of the Woodstock Road onto the Gwydir Highway. The additional truck movements to the east will potentially involve one cattle truck every second day. The noise impact would last approximately one to two minutes as the trucks negotiate through the intersection and up the hill to the east from the intersection.

The feedlot trucks are anticipated to make a relatively small impact to both R4 and R5 due to their proximity to the Gwydir highway. Both dwellings would already experience a significant amount of highway noise. The increase in vehicles caused by the feedlot is anticipated to increase traffic by (0.7%) on the Gwydir Highway.

Driver behaviour and appropriate haulage hours are the most appropriate methods to ensure noise is kept at an acceptable level for the rural dwelling at "Blocken". The majority of truck movements to and from the feedlot will occur in day-time hours and therefore sleep disturbance is not considered an issue.

When transporting materials, the following noise management measures will be available to feedlot management to limit the impact from the additional minor amount of traffic:

- Heavy vehicle traffic strictly limited to the hours of 7am-6pm Monday to Friday, 7am-3pm Saturday and 8am-3pm Sunday;
- Only live cattle loads will be able to operate outside these hours for animal welfare reasons;
- Enforce a maximum speed of 40 km/h on internal roads;
- Operate well-maintained plant, vehicles and equipment, and ensure all plant, vehicles and equipment are serviced in accordance with, or more frequently than, manufacturers' specifications;
- Avoid unnecessary revving of engines;
- Ensure that any extraneous noises are rectified;
- Avoid the use of compression braking at the Gwydir Intersection and near sensitive receptors on Woodstock Road (R1-R3).

Dust on Woodstock Road is considered to have little effect as the surrounding sensitive receptors are in excess of 500m from the road. Dust is therefore not considered to be an issue on the proposed haulage route.

Dust management measures in all trafficable areas on site will include:

- Enforce a maximum speed of 40 km/h on internal roads.
- Keep trafficable areas as clean as possible.
- Maintain internal road surfaces in good condition.
- If required, during dry times, apply water on trafficable areas and feed roads (approx. rate 2L/m²/h).

Provided Feedlot Management continues to manage dust and noise effectively and addresses the concerns of sensitive rural receptors the potential for the increase in heavy vehicle traffic to adversely impact the amenity of rural areas within the vicinity of the freight routes is considered minimal.

6.5 Cumulative Impacts with Neighbouring Developments

Potential cumulative impacts are those which are generated by the combined impacts on the local environment as a consequence of the project, together with other developments of a similar nature (both existing and proposed). The area currently supports a mixture of cropping and cattle production which tend to generate seasonal traffic from local properties. Cereal harvest periods will see a cumulative increase in traffic throughout the region. Local traffic along the sub-arterial haulage route will not be significantly affected as product will only be hauled directly from properties along the haul route to market. Woodstock Road is unlikely to be used as a through road for other properties within the region as most trucks use selected main roads which are in good condition. This would include the Gwydir Highway and Kings Plains Road. Road limit restrictions will also reduce through traffic on Woodstock Road.

Inverell Shire Council has indicated that there are no other significant traffic generating developments currently under consideration that are likely to create a cumulative impact with the operations at Rivendell.

6.6 Recommended Works

This investigation identified that the gravel section of Woodstock Road may need to undergo some works to improve its safety and suitability as a haul route for B-Doubles.

Council has approved this section of road for B-doubles to access Rivendell Feedlot. The proposal may generate one truck per day which is a minor increase in traffic on this road.

The issue identified on this gravel pavement relates to road edges and local traffic tending to remain in the centre of the road and use the road as a single lane road. To alleviate such issues if they are of concern would involve maintenance of road edges to reform road shoulders to allow full use of the available road width.

7 Conclusions

SMK Consultants were commissioned by N.A. & M.L. Jamieson to prepare a Traffic Impact Assessment to assess their proposed development to increase the Rivendell Feedlot capacity to 2,000 head at 698 Woodstock Road, Inverell. The increase will allow the feedlot a maximum turnover of 6,000 head per year based on 3 cattle turnovers per year. This Traffic Impact Assessment has considered the potential impacts of the proposed output increase upon traffic on site and within the wider region.

The main haulage route for all feedlot related traffic will be via Woodstock Road and the Gwydir Highway. The feedlot will use double decker B-Double trucks to maximise haulage efficiency and reduce the number of trucks required on the road. Rivendell has an existing approval from Council to use B-doubles to and from the feedlot along Woodstock Road.

It has been concluded that the proposed feedlot expansion would result in a net increase in traffic generation from the subject site, but that this traffic increase would not significantly impact upon road safety, traffic density, road utility or general amenity within the region.

Of particular concern is the unsealed section of Woodstock road which all feedlot related traffic must use. This section of road was subject to improvements under existing approvals issued to Rivendell.

This investigation recommends the following matters to be addressed by Rivendell Feedlot:

- Continued liaison with the community along the haulage route, in particular the property entrances and homes close to the haulage route;
- Ensure Rivendell drivers observe appropriate speed limits around the 90-degree bend and through the S Bend on Woodstock Road;
- Rivendell drivers observe speeds of 80km/h or less on all other section of Woodstock Road (Drive to road conditions);
- Comply with all reasonable conditions of approval as issued by the Inverell Shire Council;
- Installation of give way signs at all intersections along the immediate haul route.

Overall, the impact of the proposed development upon the road network is considered to be minimal. The traffic generation potential of the proposed development is therefore not considered to pose a risk to the amenity, safety, functionality or accessibility of the wider region.

References:

- NSW Department of Environment, Climate Change and Water 2011, 'NSW Road Noise Policy
- NSW RTA 2002, 'Guide to Traffic Generating Developments, Section 2 – Traffic Impact Studies'

Appendix 1: Approach Site Distance Calculations

Approach Site Distances (ASD)

Provision of ASD for cars:

- The minimum level of sight distance which must be available on the minor road approaches to all intersections to ensure that drivers are aware of the presence of an intersection;
- For major road approaches where practical, drivers should see the pavement markings within the intersection and should be achieved where practicable. However, the provision of ASD on the major road may have implications (e.g. costs, impact on adjacent land and features) in which case Stopping Site Distance (SSD) is the minimum sight distance that should be achieved on the major road approaches to the intersection and within the intersection;
- Numerically equal to normal car SSD – which is defined as the distance travelled by a vehicle between the time the driver receives a stimulus signifying a need to stop, and the time at which the vehicle comes to rest; and
- Varying the SSD may include the object height used in its calculation. ASD is measured from a driver's eye height (1.1m) to 0.0m, which ensures that a driver is able to see any line marking and kerbing at the intersection whereas SSD is measured from 1.1m to 0.2m (a nominal object height).

Provision of ASD for trucks: ASD for trucks should be provided at intersections to ensure that trucks approaching the intersection, at the 85th percentile operating speed of trucks, are able to stop safely. Rivendell trucks are anticipated to drive at or below 80km/hr due to the number of obstacles along Woodstock Road. ASD for trucks on the intersection approaches should be measured from the truck driver eye height (2.4m) to the pavement level at the stop or holding line (0.0m).

Approach sight distances for trucks are numerically the same as the SSD values for trucks provided in the Austroads Document Guide to Road Design – Part 3: Geometric Design. ASD is applied as shown in Figure 3.

$$ASD = \frac{R_T \times V}{3.6} + \frac{V^2}{254 \times (d + [0.01 \times a])}$$

Where:

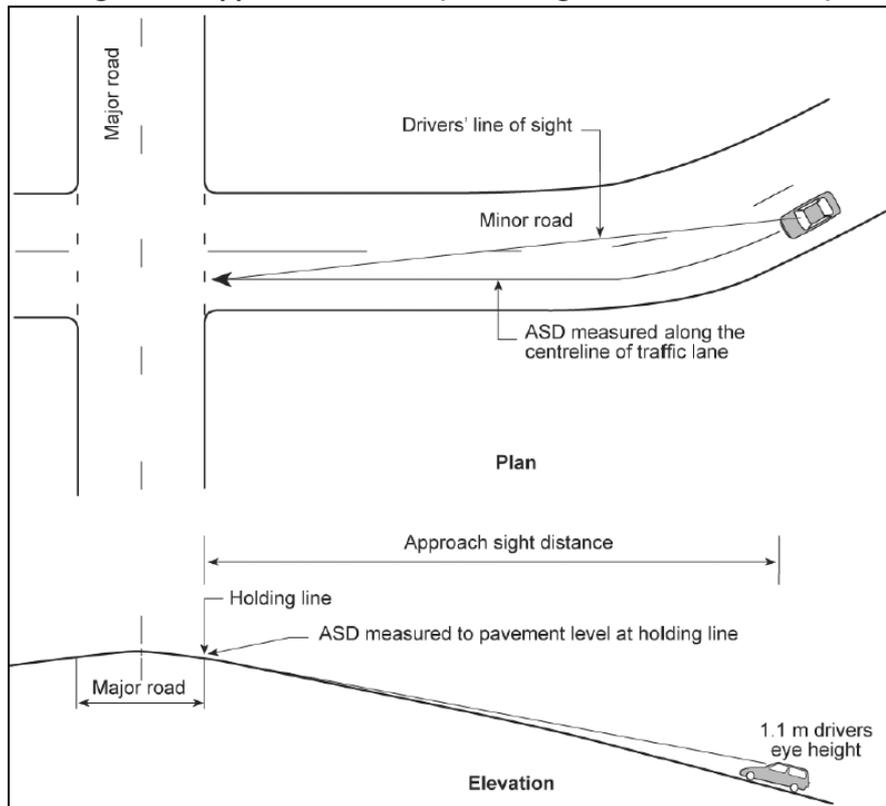
- ASD = Application Sight Distance
- R_T = Reaction Time (s) = 2.0s
- V = Operating (85thile) speed (Km/h) = 68km/h
- d = Coefficient of deceleration = 0.22
- a = Longitudinal grade (% + uphill, - downhill) = 0.0%

$$ASD = \frac{2.0 \times 68}{3.6} + \frac{68^2}{254 \times (0.22 + [0.01 \times 0])}$$

ASD = 120.52 m

The available ASD to the west (towards Inverell) is in excess of 1km and to the east (towards Glen Innes) is approximately 200m which is more than the minimum required ASD (97.75m) as shown below in Figure 5. There is a driveway to 3 Woodstock road 60 m from the intersection at 3 Woodstock Road. This is deemed to have little to no effect on intersection safety as the driveway has sufficient sight distance in both directions (full sight of intersection and >200m intersection along Woodstock Road). All traffic will be slowing to either pass through the intersection or access the driveway. The Approach Sight Distance of the from Woodstock Road to the Gwydir Highway intersection is therefore satisfactory.

Figure 18: Application of ASD (Source Figure 3.1 AGRD04A/09)



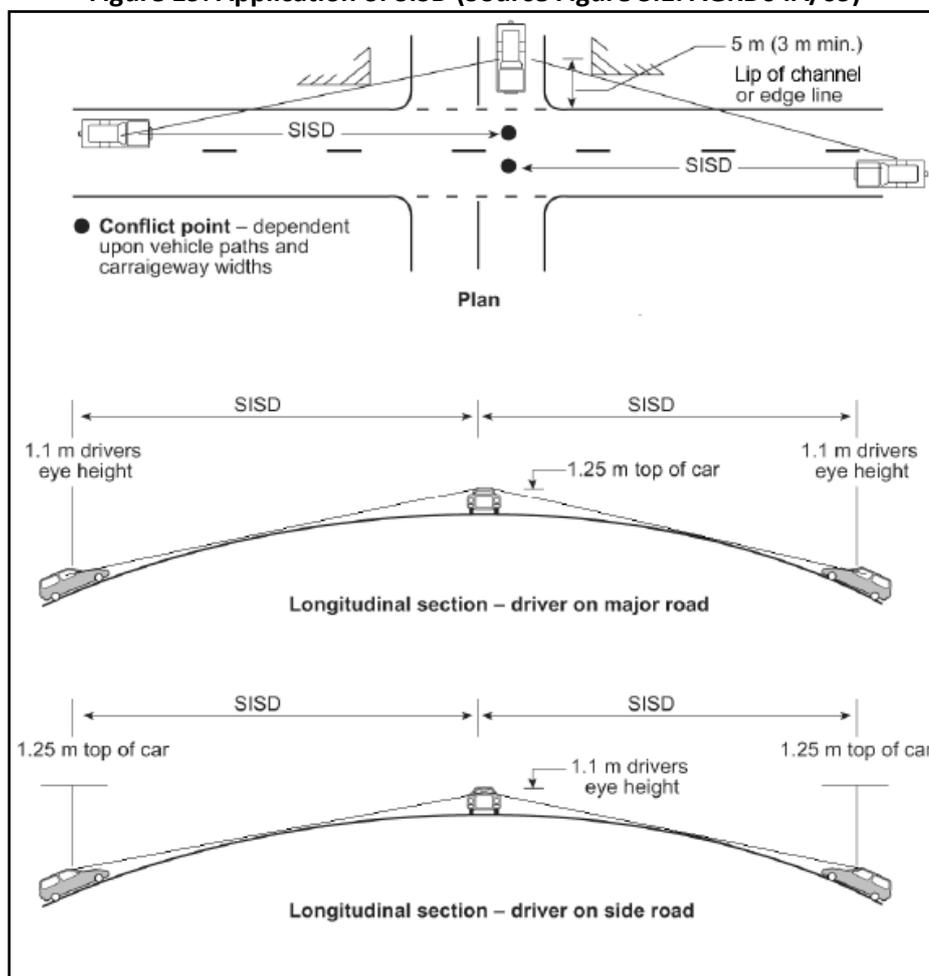
Safe Intersection Sight Distance (SISD)

SISD refers to the distance required for the driver of a vehicle, on the non-terminating road, to observe a vehicle entering from a minor road, decelerate and stop prior to a point of collision. In this context, it is the minimum sight distance which should be provided on the major road of the intersection. SISD:

- Is viewed between two points to provide inter-visibility between drivers and vehicles on the major road and minor road approaches. It is measured from a driver eye height of 1.1 m above the road to points 1.25 m above the road which represents drivers seeing the upper part of cars. Figure 3.2 illustrates the longitudinal section for the two cases representing inter-visibility; one for drivers on the major road and the second for a driver waiting in the minor road for an opportunity to enter the major road;
- Assumes that the driver on the minor road is situated at a distance of 5.0 m (minimum of 3.0 m) from the lip of the channel or edge line projection of the major road. SISD allows for

- a 3 s observation time for a driver on the priority legs of the intersection to detect the problem ahead, (e.g. car from minor road stalling in through lane) plus the SSD;
- Provides sufficient distance for a vehicle to cross the non-terminating movement on two-lane two-way roads, or undertake two-stage crossings of dual carriageways, including those with design speeds of 80 km/h or more;
- Should also be provided for drivers of vehicles stored in the centre of the road when undertaking a crossing or right-turning movement;
- Enables approaching drivers to see an articulated vehicle, which has properly commenced a manoeuvre from a leg without priority, but its length creates an obstruction; and
- Is measured along the carriageway from the approaching vehicle to the conflict point, the line of sight having to be clear to a point 5.0 m (3.0 m minimum) back from the holding line or stop line on the side road.

Figure 19: Application of SISD (Source Figure 3.1. AGRD04A/09)



The Safe Intersection Sight Distance (SISD) for the access intersection has been calculated as:

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + [0.01 \times a])}$$

Where:

- SISD = Safe Intersection Sight Distance

- D_T = Decision Time (s) = Observation Time (s) + Reaction Time (s) = 5.0s
- V = Operating (85%ile) speed (Km/h) = 68km/h
- d = Coefficient of deceleration = 0.22
- a = Longitudinal grade (% + uphill, - downhill) = 0.0%

$$SISD = \frac{5 \times 68}{3.6} + \frac{68^2}{254 \times (0.22 + [0.01 \times 0])}$$

SISD = 177m

The available SISD to the east and west of the Gwydir Highway and Woodstock intersection is in the order of 200m or more. The SISD on Woodstock before the Gwydir Highway intersection is therefore satisfactory.