

## **APPENDIX J TRAFFIC IMPACT ASSESSMENT**



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## TRAFFIC IMPACT ASSESSMENT

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**OXLEY SOLAR FARM  
914 GARA ROAD, METZ**

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- Appendix B – Images of Waterfall Way, Gara Road and Silverton Road
- Appendix C – Preliminary Transport for NSW Advice and Commentary

## 1. Introduction

### 1.1 Background

New England Surveying and Engineering have been engaged by NGH Pty Ltd to undertake a Traffic Impact Assessment (TIA) for the proposed 225MW (AC) Oxley Solar Farm.

The TIA aims to address traffic impacts of the development in a details existing site and traffic conditions, outline the proposed development and predicted traffic generation, and consider mitigation measures for any traffic impacts.

### 1.2 Scope and Study Area

This report considers traffic and transport impacts arising from the proposed Oxley Solar Farm development, including:

- The total impact of existing and proposed development on the road network over a 10-year planning horizon;
- The volume and distribution of traffic generated by the proposed development and background traffic at key intersections along the transport routes between the New England Highway and the site;
- Identification of transport routes and the type of vehicles that will be involved in construction and operational activities;
- Sight distance measurements at key intersections along the primary transport routes;
- Swept paths for the largest vehicle at key intersections along the transport routes and site access points;
- Consideration of turning lane warrants and identification of appropriate intersection treatments for the identified intersections based on Austroads guidelines;
- Details of proposed improvements to affected intersections;
- A review of crash records along the transport routes;
- Details of existing and proposed access standards, servicing and parking arrangements;
- Impacts on public transport and consideration of alternative transport modes such as walking and cycling.

The TIA has been prepared in reference to the following publications:

- Austroads Guide to Traffic Management and Transport for NSW (TfNSW) supplements;
- Austroads Guide to Road Design and TfNSW supplements;
- TfNSW (RTA) Guide to Traffic Generating Developments.

### 1.3 Consultation

Prior to report commencement, contact was made with engineering staff at Armidale Regional Council to seek advice and information on roads and access, traffic volumes, crash history and any known traffic issues in proximity to the site. Advice was received that Council have no capital works planned in the area, and there are no identified road safety issues. Council staff also noted that development consent (DA-112-2019, PPSNTH-6) had been issued for the adjoining 29.9MW Stringybark Solar Farm having access from Gara Road.

Northern Region Transport for NSW staff were contacted to review proposed access arrangements off Waterfall Way and advise of any proposed roadworks which may impact the construction of the Oxley Solar Farm. Comments were received by Transport for NSW staff on 15 October 2020 and have been addressed within this Traffic Impact Assessment. A summary of points of issues and responses is included in Appendix C.

## 2. Existing Environment

### 2.1 Development Site

The proposed solar farm is located approximately 14km east of Armidale within the Armidale Regional local government area, as shown in Figure 2.1. The solar farm and associated infrastructure will have a development footprint of 895.5 hectares over the total proposal site area of 1,048 hectares within five separate allotments, being:

- Lot 5 DP253346 (914 Gara Road, Metz);
- Lot 6 DP625427 (972 Gara Road, Metz);
- Lot 2 DP1206469 (1352 Waterfall Way, Metz);
- Lots 7003 and 7004 DP1060201.

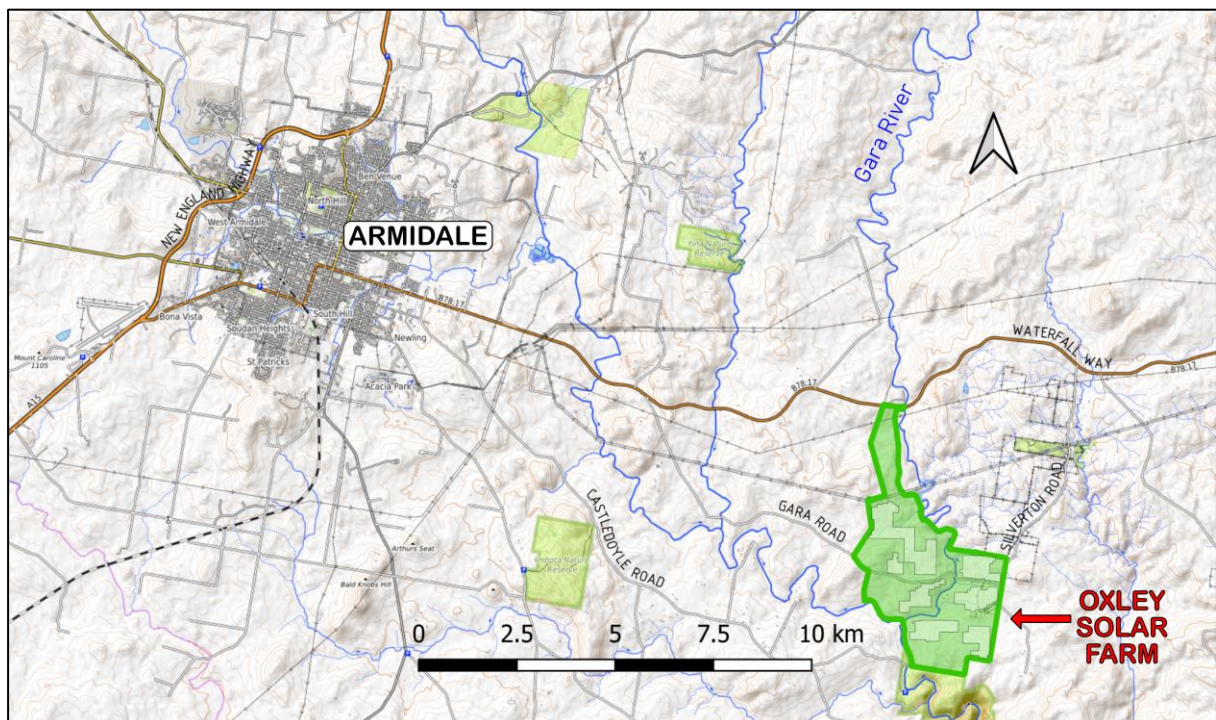


Figure 2.1: Locality Plan (base map: Open Topo Map, 2021)

### 2.2 Site Land Use

The subject land is all zoned RU1 (Primary Production) pursuant to the Armidale Dumaresq Local Environmental Plan 2012. The land on which the development is situated has been historically used for livestock grazing purposes.

Two (2) parallel TransGrid 132kV electricity transmission lines pass through the southern side of Lot 2 DP1206469, and a 66kV transmission line passes through the northern side of this lot.

### 2.3 Nearby Land Uses and Development Approvals

Most adjacent land use is related to primary production, particularly grazing of native vegetation and modified pastures with some dryland cropping. The Armidale Regional Landfill

is located north-west of the site, within Lot 1 DP1206469. A part of Oxley Wild Rivers National Park incorporating the Blue Hole and Gara Falls Reserve adjoins to the south of the site.

The Northern Joint Regional Planning Panel have issued development consent PPSNTH-6 (DA-119-2019) for the 29.9MW Stringybark Solar Farm within Lot 3 DP1206469 located north of Gara Road, immediately to the east of the development site. Approval has also been granted in consent PPSNTH-30 (DA-17-2020) for the 29.9MW Olive Grove Solar Farm west of the Regional Landfill, and in consent SSD 7931 for the 115MW Metz Solar Farm 18km east of Armidale off Waterfall Way. Nearby solar farm developments are shown in Figure 2.2.

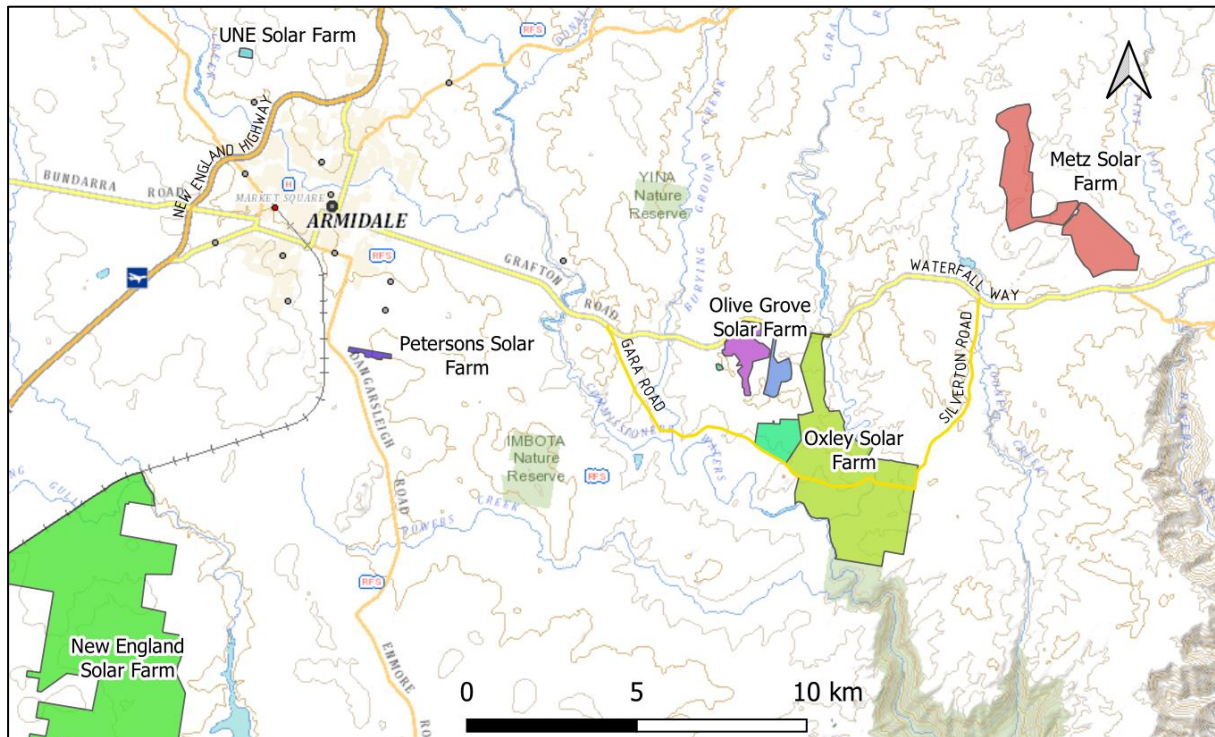


Figure 2.2: Nearby Major Developments (base map: DFSI Spatial Services, 2021)

## 2.4 Surrounding Road Network

### 2.4.1 Waterfall Way

Waterfall Way is a classified (State) road, managed and financed by Transport for NSW (TfNSW), which extends in an east-west direction between the Pacific Highway (HW10) at Raleigh and the New England Highway (HW9) at Armidale. This section of road out of Armidale is also known as Grafton Road or (Main Road) MR76.

Waterfall Way provides the functions of a Major Distributor road as defined within Armidale Regional Council's Road Design Guide, and within the Transport for NSW [Draft Corridor Strategy](#) for Waterfall Way dated July 2017 is identified as a Class II two-lane highway. The Class II category is based on the *Highway Capacity Manual 2010*, representing a scenic or recreational route or one which passes through rugged terrain, where motorists do not necessarily expect to travel at high speeds.

Waterfall Way in the vicinity of the site generally comprises a 7.0m wide undivided sealed carriageway, with sealed shoulders 1.0m wide on each side as shown in Figure 2.3. For new works the carriageway width would be expected to increase to 7.2m. All bridges and culverts between Armidale and the site exceed the minimum 8.4m width recommended in the *Performance Based Standards Scheme Network Guidelines*. The public road reservation is of variable width but includes sections of constant 30 metre width. The posted speed limit on Waterfall Way in the vicinity of the development site is 100km/h.



Figure 2.3: Waterfall Way

At the time of writing, Waterfall Way between Armidale and Dorrigo Mountain was approved for Restricted Access Heavy Vehicles including:

- B-Doubles of length 19m, 23m and 25/26m operating on the General Mass Limit (GML) and Concessional Mass Limit (CML) networks;
- 25/26m B-Doubles and short combinations operating on the Higher Mass Limit (HML) network;
- 4.6m high vehicles;
- Level 1, 2, 3, 4 and 6 Special Purpose Vehicles (the bridge over the Gara River, east of the site, is a restricted structure for Level 6 Special Purpose Vehicles).

### 2.4.2 Gara Road

Gara Road is a minor unsealed local rural road for which Armidale Regional Council is the roads authority. The Gara Road intersects with Waterfall Way 9km east of Armidale.

Gara Road has a trafficable width between 5m and 7m, suitable for two-way traffic, and is typically widest on the western end where rural residential traffic volumes are higher. The road reservation has variable width in parts, but is most commonly 30m wide. The formed Gara Road passes through a reserve for access within Lot 6 DP625427, west of the Gara River. The road formation is not wholly or partially coincident with the public road reservation in some sections. Gara Road is sealed for approximately 75m south of the intersection with Waterfall Way, minimising the tracking of gravels onto Waterfall Way.

Gara Road crosses numerous large waterways, including Burying Ground Creek and Gara River near their confluence with Commissioners Waters. These waterway crossings comprise causeways which are subject to regular flooding.

The functional hierarchy of Gara Road, based on classifications within the Armidale Regional Council *Road Design Guide*, appears to vary from “Rural Access Major” in the western-most section, “Rural Access Minor” in the central section, and “Rural Access Lane” on the eastern-most section.

When inspected in August 2020, Gara Road was in a good, smooth condition as shown in Figure 2.4, with some gentle corrugations in parts. Hazards such as crests, causeways and sharp bends were well signposted, though there was no signage to indicate priority where the roads narrowed to single lanes at causeways. Constraints to two-way traffic are shown in Table 2.1. Images of Gara Road are shown in *Appendix B*.



Figure 2.4: Gara Road

Table 2.1: Existing Constraints to Two-Way Vehicle Traffic on Gara Road

Chainage	Constraint to two-way traffic
3,255m	Single lane causeway across Burying Ground Creek
4,285m	Single lane causeway (~4m wide) over unnamed non-perennial waterway
5,350m	Single lane causeway (~3.5m wide) over unnamed non-perennial waterway
9,050m	Single lane causeway across Gara River

Gara Road is currently approved for Restricted Access Heavy Vehicle movements including:

- B-Doubles of length 19m, 23m and 25/26m operating on the GML and Concessional Mass Limits (CML) networks, subject to road network manager area travel restrictions;
- Level 2, 3, 4 and 6 Special Purpose Vehicles

There are no posted speed limit signs on Gara Road. The default rural speed limit of 100km/h applies, and drivers must drive to road conditions.

A heritage culvert (I222) is located under Waterfall Way near the intersection of Gara Road and Waterfall Way as shown in Figure 2.5.



Figure 2.5: Heritage culvert (I222) located near the Gara Road / Waterfall Way intersection

### 2.4.3 Silvertown Road

Silvertown Road resembles a “Rural Access Minor” roadway in the northern section, and “Rural Access Lane” in the southern section.



Figure 2.6: Silvertown Road

Silvertown Road only crosses waterways having small catchment areas, providing more flood immunity than Gara Road.

When inspected in August 2020, Silverton Road was in good, smooth condition. Hazards such as crests, causeways and sharp bends were well generally signposted, though there was no signage to indicate priority or narrowing roads at single lane causeways and stock grids. Constraints to two-way traffic are shown in Table 2.2. Images of Silverton Road are shown in *Appendix B*.

**Table 2.2: Existing Constraints to Two-Way Vehicle Traffic on Silverton Road**

Chainage	Constraint to two-way traffic
1,450m	Single lane causeway over unnamed non-perennial waterway
2,075m	Public gate including single-lane stock grid
5,270m	Public gate including single-lane stock grid

## 2.5 Haulage Route and Key Road Intersections

The proposed haulage route between the New England Highway and the site is summarised in Table 2.3.



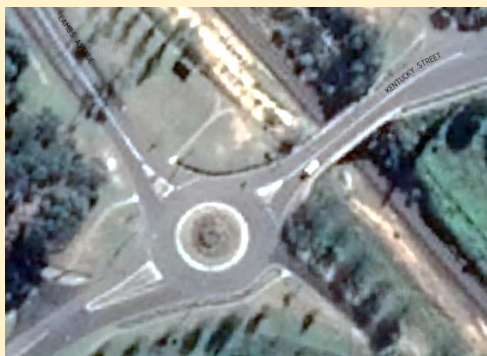
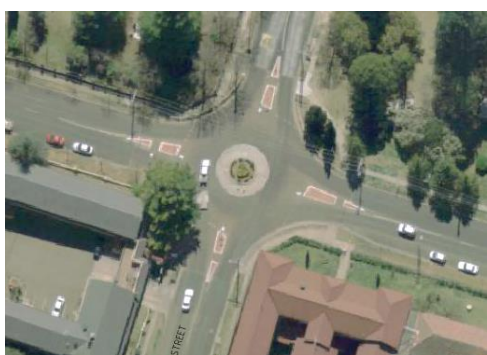
**Table 2.3: Key Intersections Along Haulage Route from New England Highway**





Segment	Road Name	Start Point	End Point
1	Uralla Road	New England Highway	Miller Street
2	Kentucky Street	Miller Street	Dangar Street
3	Dangar Street	Kentucky Street	Barney Street
4	Barney Street	Dangar Street	Canambe Street
5	Grafton Road (Waterfall Way)	Canambe Street	Waterfall Way Property Access

The route passes five (5) schools within Armidale including Martins Gully Public School, New England Girls School (NEGS), Armidale Secondary College, Armidale City Public School and The Armidale School (TAS).

Existing key intersections on the heavy vehicle haulage route between the New England Highway and the northern parts of the development site are summarised in Table 2.4. Those rows in Table 2.4 shaded in gold represent intersections which are specifically identified as short-term priorities within the *Draft Waterfall Way Corridor Strategy* to increase corridor efficiency and safety.

Table 2.4: Key Intersections Along Haulage Route from New England Highway

Intersection	Description	Image
New England Highway and Uralla Road	Two-lane roundabout. Haulage route requires right turn to access site, and left turn upon return journey.	
Uralla Road / Kentucky Street and Miller Street / Galloway Street	Four-way intersection. Haulage route requires travel straight through on the priority road.	
Kentucky Street and Dangar Street / O'Connor Road, South Armidale	Single lane roundabout. Haulage route requires left turn to access site, and right turn upon return journey.	
Dangar Street and Barney Street, Armidale	Single lane roundabout. Haulage route requires right turn to access site, and and left turn upon return journey.	

Intersection	Description	Image
Barney Street and Marsh Street, Armidale	Signalised intersection, two-lanes on each approach leg. Haulage route requires travel straight through the intersection with no turning required.	
Barney Street and Canambe Street	Single lane roundabout. Haulage route requires travel straight through the roundabout with no turning required.	
Waterfall Way and Gara Road	T-intersection. Haulage route requires travel straight through on Waterfall Way (the priority road). Light vehicles will access southern parts of the site via this intersection.	
Waterfall Way and Site Access	Existing setback single lane rural property access. Haulage route requires a right turn into the site, and a left turn during egress. An upgraded replacement property access is proposed 130m west of the existing access.	

The Transport for NSW Restricted Access Vehicle mapping as shown in Figure 2.7 demonstrates that all roads and intersections along the haulage route are currently approved as 25/26m B-Double routes on the HML network. Heavy vehicles carting materials to the site will be no larger than vehicles already using these intersections. Overmass and/or over-dimension permits will be obtained prior to haulage by any heavy vehicles exceeding approved mass or dimensional limits.

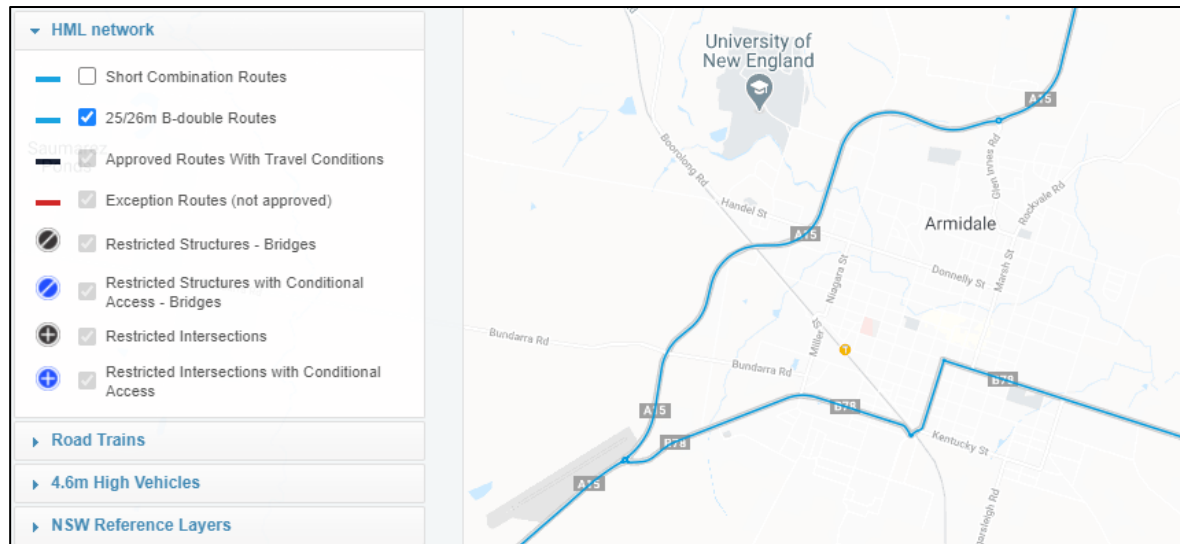


Figure 2.7: Currently Approved Restricted Access Vehicle HML 25/26m B-Double Routes

## 2.6 Road Safety

The Transport for NSW Draft Corridor Strategy for Waterfall Way includes an action to progressively treat high risk isolated curves to reduce the relatively high proportion of off-road on-curve crashes, including within section between Ebor and Armidale. A further action proposes to carry out a route safety review between Dorrigo and Armidale.

Crash data from the Transport for NSW Centre for Road Safety was analysed for the 5-year period 2014 to 2018 inclusive, and revealed that there were no crashes on either Gara Road or Silverton Road or their respective intersections with Waterfall Way, and there were no recorded crashes on Waterfall Way between the Armidale Regional Landfill access and Gara River bridge. Three injury crashes were recorded in this period within 200m east of Argyle-Mining Vale Road all relating to vehicles running off the road in daylight hours. The Draft Waterfall Way Corridor Strategy includes an action to progressively treat high risk isolated curves on the route to reduce the relatively high proportion of off-road, on-curve crashes between Ebor and Armidale.

Based on the review of crash data, there are no specific road safety issues relating to the proposed development.

## 2.7 Existing Traffic

Traffic counts were performed by Armidale Regional Council between the dates of 28 May 2020 and 11 June 2020. The counts were taken:

- On Waterfall Way, 100m east of the Armidale Regional Landfill entrance;
- On Gara Road, 25m from the Waterfall Way intersection;
- On Silverton Road, 100m from the Waterfall Way intersection.

Covid-19 travel restrictions were removed on 1 June potentially effecting results, and so AADT results reported in Table 2.5 are based on the shorter period 1 June to 11 June instead of the

full recording period, representing the period having the highest traffic counts. Full traffic count data is detailed in Appendix A.

**Table 2.5: Traffic Volumes on Approach Roads**

ROAD NAME	2020 AADT (two-way)	AM Peak (period)	PM Peak (period)	% HEAVY VEHICLES		
				Medium	Long	TOTAL
Waterfall Way	1,597	141 (11:15-12:15)	159 (15:15-16:15)	6.1%	4.5%	10.6%
Gara Road	104	11 (08:00-09:00)	13 (15:45-16:45)	9.6%	0.3%	9.8%
Silverton Road	18	4 (07:45-08:45)	3 (15:45-16:45)	22.2%	0.4%	22.6%

Historic RMS traffic counts on Waterfall Way near Gara River are shown in Table 2.6. Based on measured 2020 count of 1,597 vehicles per day, a trendline shows long term traffic growth of 1% per annum.

**Table 2.6: Historic Traffic Counts on Waterfall Way at Gara River (station 92394)**

Year	2007	2008	2011	2012
<b>Traffic Count (both directions)</b>	1,391	1,450	1,295	1,326
<b>Light Vehicles</b>	92%	93%	94%	94%
<b>Heavy Vehicles</b>	8%	7%	6%	6%

Edwards Coaches operate two school bus services on Waterfall Way between Armidale and Wollomombi, and between Armidale and Hillgrove. Student pickups commence at around 7:30am for arrival in Armidale at 8:15am, and in the afternoons travel commences at approximately 3:45pm with the last stops at around 4:30pm.

Gara Road provides direct access to approximately 17 rural properties and 12 dwellings. Silverton Road provides access to approximately 11 rural properties and 6 dwellings. The rural properties have regular roadside mail deliveries. Heavy vehicles are typically related to primary production including carting of livestock, and fuel and material deliveries.

A review of the Strava Global Heatmap shown in Figure 2.8 reveals that Waterfall Way has relatively minor use for active modes of transport. While there is some cycling activity, Waterfall Way receives significantly less active transport than other rural roads in the area. Some walking and running activity occurs near the Gara River Rest Area including the reserve north of Waterfall Way, near Gara Dam. Walking is a popular activity on the Threlfall Track within the Oxley River National Park, which is accessed from Castledoyle Road and not impacted by development traffic.

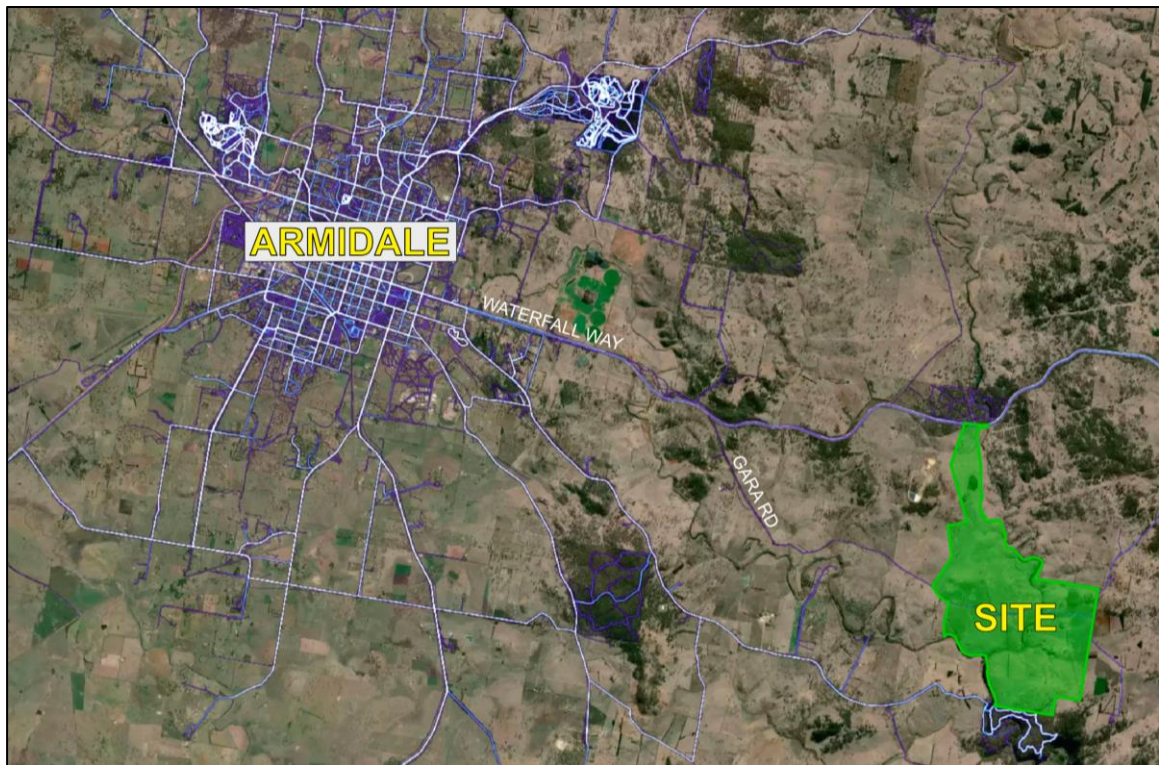


Figure 2.8: Strava Global Heatmap showing all activities (accessed February 2021)

## 2.8 Site Access

The existing primary property access to Lot 2 DP1206469 is located at 1352 Waterfall Way, approximately 106m west of the bridge over the Gara River, as shown in Figure 2.9. The entrance gate is set back into the property to permit long vehicles to park off Waterfall Way without impacting traffic. A secondary access is located 40m west of the primary access, to gain access to a telecommunications facility located within Lot 2 DP1206469.



Figure 2.9: Existing primary property access at 1352 Waterfall Way, Metz

Existing access to the southern side of the development land is gained from Gara Road. Property accesses are located at multiple locations including the approximate chainages listed in Table 2.7, as measured from the Waterfall Way intersection.

Table 2.7: Existing Site Access Points off Gara Road

Approx. Chainage	Access Description
6,590m	rural gate on north side providing property access to Lot 5 DP253346
8,230m	rural gate on south side providing property access to Lot 5 DP253346
8,950m	rural gate on each side providing property access to Lot 5 DP253346
9,125m	access to dwelling and property 'Gara Station', 913 Gara Road
9,200m	rural gate on north side providing property access to Lot 6 DP625427
9,700m	access on south side to dwelling on Lot 6 DP625427, and access extends through to Lot 5 DP253346
9,710m	rural gate on north side providing property access to Lot 6 DP625427

### 3. Proposed Development

#### 3.1 Site Plan

Oxley Solar Development Pty Ltd propose constructing a solar farm located within Lot 5 DP253346, Lot 6 DP625427, Lot 2 DP1206469, and Lots 7003 and 7004 DP1060201 as shown in Figure 3.1, having generation capacity of 225MW (AC). The solar farm will comprise:

- solar arrays with approximately 715,000 panels, as either fixed-tilt or with tracking systems;
- approximately 1km of primary access track from Waterfall Way, as well as internal tracks throughout the site for construction and maintenance purposes.
- an onsite 132kV substation, and two (2) 132/33kV transformers;
- lithium ion battery storage with capacity of up to 30MWh;
- operations and maintenance buildings to house switch gear, control and protection equipment, a site office, staff amenities, and a warehouse.
- steel security fencing up to 2.3m high to the perimeter.

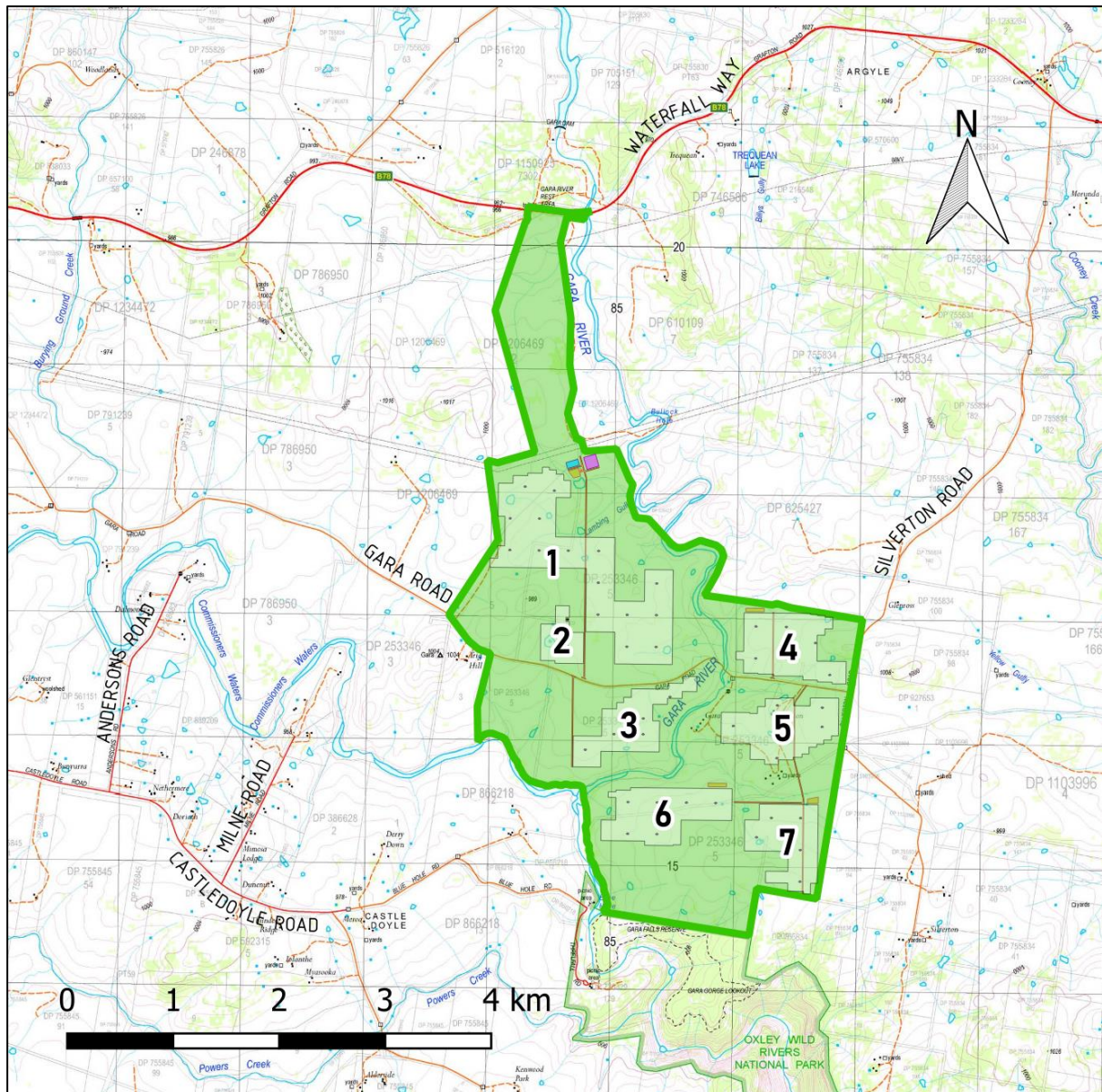


Figure 3.1: Proposed Oxley Solar Farm Development (base map: DFSI Spatial Services, 2021)

### 3.2 Proposed Access and Parking

Primary access to the solar farm will occur from a new property access to be constructed off Waterfall Way, located approximately 130m west of the existing property access and 270m west of the Gara River. The primary access will be used for all vehicle access to the site, including over-mass and over-dimensional vehicles.

All vehicles accessing the solar array areas which are designated '3' to '7' inclusive in Figure 3.1 will be required to travel on sections of Gara Road between approximate chainages 7,710m and 9,730m (measured from Waterfall Way), particularly to cross the Gara River.

Four (4) new access points are proposed to be constructed from Gara Road at those locations shown in Figure 3.2, and these access points will represent the sole points of access from Gara Road for development traffic. It is proposed that Gara Road is upgraded between new access points 1 and 4. No direct site access will occur from Silverton Road.

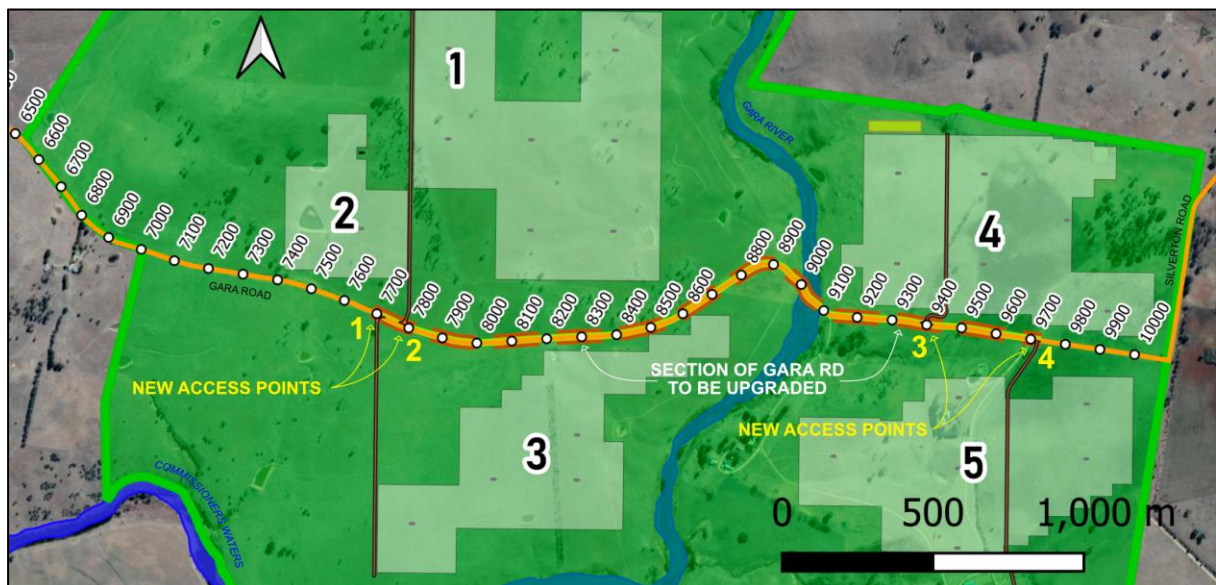


Figure 3.2: Location of Proposed Property Access Driveways off Gara Road

All site staff and construction workers will be instructed not to access the site from Waterfall Way via either Gara Road or Silverton Road. These roads may receive occasional light vehicle use, for example from visitors travelling to the site or from interested members of the public.

Internal roads, parking and manoeuvring areas will be designed and constructed consistent with the provisions of AS/NZS2890.1 and AS2890.2 to ensure there is adequate width for passing and swept path available for the maximum dimension service vehicle to enter and exit the development in a forward direction, and having a pavement suitable for the design mass loadings.

It is proposed that safe, all-weather set-down and pick up areas will be provided for bus passengers, and off-street parking provision for 30 light vehicles.

### 3.3 Consideration of Alternative Site Access Locations

The preferred option for the primary site access was to retain and upgrade the existing property access at 1352 Waterfall Way, located approximately 150m west of the Gara River. This access is located near an existing unformed 20m wide Crown road reservation running in a north-south direction through Lot 2 DP1206469. Constraints with this access location include:

- Sight distances conforming with Austroads standards are not available to the west due to a crest. Available safe intersection sight distance is approximately 230m;
- Existing traffic safety barriers extend along the southern side of Waterfall Way, from the bridge over Gara River to immediately east of the property access;
- Traffic safety barriers on the northern side of Waterfall Way would be an obstacle to the design of an Austroads channelised right-turn treatment, as necessary to account for the restricted sight distance to the west.

Alternative sites for a new access were reviewed as shown in Figure 3.3.

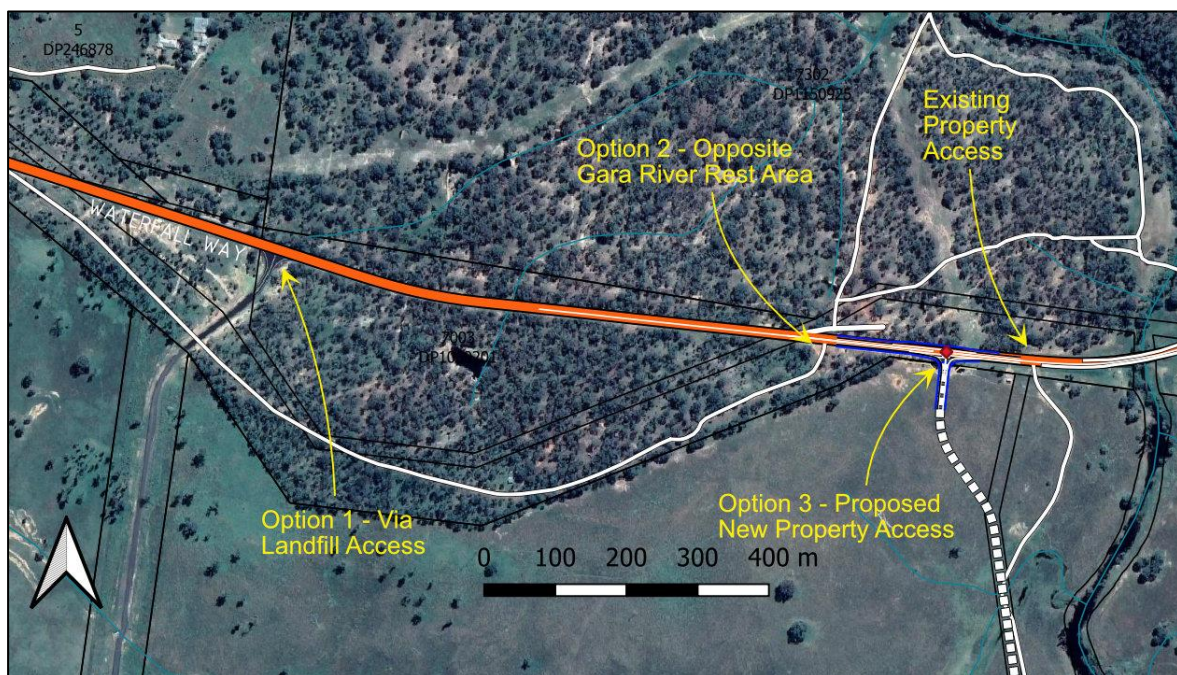


Figure 3.3: Alternative Access Options Considered from Waterfall Way

#### 3.3.1 Option 1 - Via the Armidale Regional Landfill Access to Lot 1 DP1206469

A benefit of this option is that a BAL / CHR intersection treatment conforming with Austroads standards and offering good sight distances was constructed off Waterfall Way in approximately 2016, designed for long term use over a 50-year time horizon. Constraints with this access location include:

- A new access road would be required of length over 1.2km through adjoining land (Lot 2 DP1206469), held under separate ownership. The terrain is either steep and hilly to the north, or boggy and flood-prone in flatter areas.
- The upgrade of an existing gravel track along the southern side of the Crown land would be the most favourable alignment for extending an access to the road reservation within the

eastern part of Lot 2, though would require construction of over 850 metres of new road within mature woodland of high conservation value, as well as a further 400 metres of new track within the privately owned Lot 2.

### **3.3.2 Option 2 - Opposite the Gara River Rest Area within Lot 7003 DP1060201**

Unlike the existing property access, this option offers good sight distance to the west, however vertical curvature on Waterfall Way prevents adequate sight distances to the east. Approximately 220m safe intersection sight distance is available. Works are also constrained by access to the rest area, potentially creating confusion for motorists, and this site would require more extensive vegetation removal than the preferred option.

### **3.3.3 Option 3 – 130m west of the Existing Property Access**

GIS visibility analysis and GPS lane survey demonstrated that this site affords the optimum sight distances, which comply with minimum Austroads requirements for a 100km/h speed limit. The site allows for a relatively short Right of Carriageway through Lot 2 DP1206469 to meet up with the Crown road reserve, which will contain the majority of the internal solar farm access road, and permits widening on the northern side of Waterfall Way with good separation to the traffic safety barriers near the Gara River bridge. Subject to detailed design, the internal access road may continue within a Right of Carriageway through Lot 2 instead of traversing the Crown road reserve.

Constraints at this site include:

- Some tree clearing and pruning is required for mature trees within the fenced road area for the new internal road and to ensure sight lines are clear;
- Embankments particularly on the northern side of Waterfall way would require more extensive earthworks than some alternative sites;
- A Right of Carriageway would be required to permit legal access through to the existing Crown road reservation within Lot 2 DP1206469.

Upon consideration of all alternatives, the preferred option is to locate a new primary site access 130m west of the existing property access, and close the existing property access. The access would be contained within a Right of Carriageway 25 metres wide where it passes through Lot 2 DP1206469, between Waterfall Way and the existing unformed Crown road.

## **3.4 Sight Distances at Property Access Points off Waterfall Way**

The three (3) forms of intersection sight distances required within Section 3 of the *Austroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections* have been evaluated for existing and proposed property entrances. Available and required sight distances at the existing and proposed property entrances from Waterfall Way are summarised in Table 3.1.

Vertical sight distances are based on a GPS survey of the westbound lane centreline of Waterfall Way. Available horizontal sight distances have been estimated from aerial imagery and a site visit, and assume removal and/or lopping of minor obstructing vegetation. All sight distances will require verification during the detailed design phase.

### **3.4.1 Approach Sight Distance (ASD)**

It can be noted from Table 3.1 that the desirable Approach Sight Distances (ASD) are not available to car drivers on the Waterfall Way approaches to either the existing or proposed new property access. The provision of ASD on the major approach ensures that motorists can observe the intersection and any markings, and slow from full design speed to make the turn.

Section 3.2.1 of the Austroads Guide to Road Design (AGRD) Part 4A acknowledges that provision of ASD to intersections on major roads may have cost and other implications, in which case Stopping Sight Distance (SSD) is the minimum sight distance which should be achieved on the major road approaches to the intersection. Stopping sight distances are achieved when the Extended Domain Design (EDD) normal day base case is considered, using a coefficient of deceleration of 0.46, suitable for sealed roads in normal road conditions including when roads are wet.

Section 3.4 of AGRD Part 4A notes that ASD needs to be provided at other than domestic property accesses if adequate perception of the access is not provided through other means.

### **3.4.2 Safe Intersection Sight Distance (SISD)**

The provision of Safe Intersection Sight Distance (SISD) will allow motorists on Waterfall Way or exiting the development to observe approaching vehicles moving into a collision situation, and decelerate to a stop before reaching the collision point.

A GIS visibility analysis is demonstrated in Figure 3.4, where the unshaded areas represent available sight distances between the intersection and the existing ground surface. Vehicles on the bridge over Gara River can also be sighted. Table 3.1 demonstrates that SISD is available on both approaches to the proposed new property entrance. SISD is not available on the western approach to the existing property access due to vertical geometry constraints.

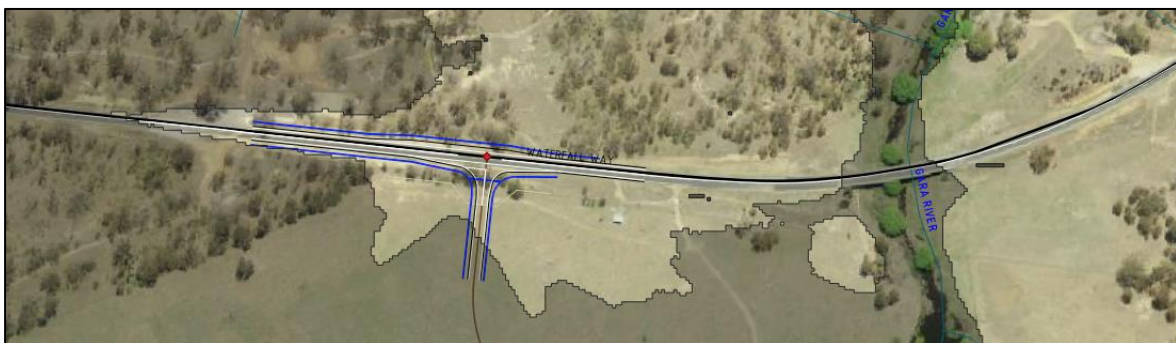


Figure 3.4: Visibility from Proposed New Waterfall Way Property Access (1.1m to 1.25m)

### **3.4.3 Minimum Gap Sight Distance (MGSD)**

Minimum Gap Sight Distance (MGSD) is based on the traffic gap that drivers are prepared to accept when manoeuvring at intersections. A critical acceptance gap of 5 seconds can be achieved at both the existing and proposed access points from Waterfall Way.

Table 3.1: Estimated Sight Distance Availability and Requirement at Existing and Proposed Property Access Driveways off Waterfall Way

		EXISTING ACCESS – UNFORMED PUBLIC ROAD & FARM GATE, 1352 WATERFALL WAY				PROPOSED NEW PROPERTY ACCESS ~1340 WATERFALL WAY			
		WESTERN SIDE		EASTERN SIDE		WESTERN SIDE		EASTERN SIDE	
Road Geometry		Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
<b>Approach Sight Distance (ASD)<sup>1</sup></b> 1.1m to 0.0m (Cars)	Available	<b>183m</b>	>500m	>500m	<b>350m</b>	<b>102m</b>	>500m	>500m	<b>340m</b>
	Required	185m	✗ (nearly)	158m	✓	181m	✗	152m	✓
<b>Stopping Sight Distance (SSD)</b> 1.1m to 0.2m (Cars)	Available	<b>188m</b>	>500m	>500m	<b>350m</b>	<b>165m</b>	>500m	>500m	<b>340m</b>
	Required	164m	✓	151m	✓	160m	✓	147m	✓
<b>Approach Sight Distance (ASD)<sup>1</sup></b> 2.4m to 0.0m (Trucks)	Available	<b>232m</b>	>500m	>500m	<b>350m</b>	<b>152m</b>	>500m	>500m	<b>340m</b>
	Required	224m	✓	181m	✓	218m	✗	172m	✓
<b>Safe Intersection Sight Distance<sup>2</sup></b> Car on major road impacting with egressing vehicle	Available	<b>235m</b>	>500m	>500m	<b>350m</b>	<b>324m</b>	>500m	>500m	<b>340m</b>
SISD to rear of turning car	Available	<b>229m</b>	>500m	--	--	>500m	>500m	--	--
1.1m to 1.25m	Required	278m	✗	255m	✓	270m	✓	249m	✓
<b>Safe Intersection Sight Distance<sup>2</sup></b> Truck on major road impacting with egressing vehicle	Available	<b>285m</b>	>500m	>500m	<b>350m</b>	>500m	>500m	>500m	<b>340m</b>
SISD to rear of turning car	Available	<b>227m</b>	>500m	--	--	>500m	>500m	--	--
2.4m to 1.25m	Required	314m	✗	278m	✓	301m	✓	269m	✓
<b>Minimum Gap Sight Distance</b> 1.1m to 0.65m (Cars), t <sub>a</sub> = 5s	Available	<b>201m</b>	>500m	>500m	<b>350m</b>	<b>214m</b>	>500m	>500m	<b>340m</b>
	Required	139m	✓	139m	✓	139m	✓	139m	✓

1. Approach Sight Distance (ASD) is based on vehicles travelling on Waterfall Way approaching the rural property access. Assumptions include an 85th percentile speed of 100km/h, reaction time of 2.0 seconds (for an alert driver anticipating slowing for the access), and coefficient of deceleration of 0.36 (cars) and 0.29 (trucks). Stopping Sight Distance (SSD) is based on a reaction time of 2.5 seconds and coefficient of deceleration of 0.46.
2. Safe Intersection Sight Distance (SISD) is based on an observation time of 3 seconds, reaction time of 2.5 seconds, and coefficient of deceleration of 0.36 (cars) and 0.29 (trucks).
3. The limiting available sight distance considering both vertical and horizontal geometry is highlighted in **bold** font;

### 3.5 Sight Distances at Property Access Points off Gara Road

Four (4) new property access points are proposed off Gara Road, at approximate chainages 7,710m, 7,780m, 9,450m and 9,730m when measured from the Waterfall Way intersection. The angle in which proposed internal tracks approach Gara Road are summarised in Table 3.2.

Table 3.2: Original Proposed Site Access Points off Gara Road

Approximate Chainage	Approach Angle
7,710m	66°
7,780m	69°
9,450m	88°
9,730m	64°

Ideally internal roads would intersect perpendicular (i.e. at 90°) to Gara Road, however all intersection angles should be between 70° and 110° to ensure drivers of heavy vehicles are able to have unobstructed visibility of traffic on the public road before entering.

Sight distances at proposed access locations were reviewed based on a site inspection and GIS visibility analysis using a NSW Department of Finance, Service and Innovation (DFSI) two-metre digital elevation model of the site. Assuming a design speed of 80km/h for Gara Road, Table 3.3 details both the required and available sight distances in each direction, and with ticks and crosses to denote whether minimum sight distances are likely to be achieved at each proposed access.

Table 3.3: Existing Site Access Points off Gara Road

Approx. Chainage (m)	Sight Distance Type	Required Sight Distances <sup>1</sup>		Approximate Available Sight Distance/s			
		West	East	West		East	
7,710	SISD	193m	191m	>400m	✓	296m	✓
	ASD	111m	119m	75m	✗	143m	✓
	MGSD	111m	111m	>400m	✓	224m	✓
7,780	SISD	199m	191m	238m	✓	354m	✓
	ASD	111m	117m	176m	✓	493m	✓
	MGSD	111m	111m	192m	✓	479m	✓
9,450	SISD	189m	200m	84m	✗	>550m	✓
	ASD	118m	123m	64m	✗	>550m	✓
	MGSD	111m	111m	72m	✗	>550m	✓
9,730	SISD	192m	193m	381m	✓	>300m	✓
	ASD	110m	125m	373m	✓	>300m	✓
	MGSD	111m	111m	366m	✓	>300m	✓

<sup>1</sup> Based on 2s reaction time, 85<sup>th</sup> percentile speed of 85km/h and coefficient of deceleration 0.36.

Austrroads sight distances are not achieved west of the third proposed Gara Road property access, at approximate chainage 9,450m, being limited by a crest on the western approach. If this third access is relocated approximately 50m to the west (at chainage 9,400m), then available sight distances can be achieved to the east and west.

Approach sight distances are based on vehicles travelling on Gara Road. Section 3.4 of the Austroads guide acknowledges that ASD criteria often cannot be achieved on roadways having tighter horizontal and vertical alignments. At other than domestic accesses, ASD is not required where other means are provided to provide perception of the access to motorists.

To account for more accurate ground measurements and other site-specific considerations required for detailed road design, it is recommended that detailed design plans be required to demonstrate that Austroads intersection sight distances can be achieved at each proposed access location, to the satisfaction of the roads authority.

Sight distances are limited in some location for travel on Gara Road. Road upgrades will be required in locations where Intermediate Stopping Sight Distance is not achieved, being twice the Stopping Sight Distance (SSD), and representing that distance which will allow two vehicles approaching each other at design speed to both stop prior to collision.

## 4. Development Traffic Impacts and Mitigation

### 4.1 Traffic Generation

#### 4.1.1 Pre-Construction Phase

Pre-construction works are expected to include the construction of a site access road, installation of fencing, salvage of site artefacts, geotechnical investigation and drilling, surveying, and preparation of construction compounds and site facilities. Only minor traffic generation is expected, well within the capacity of existing roads.

#### 4.1.2 Construction Phase

Construction of the Oxley Solar Farm is anticipated to take between 12 and 18 months, with commencement planned in the third quarter of 2023.

A workforce of up to 300 staff will be on site during the peak construction phase of approximately 6 to 9 months, accommodated in Armidale and surrounding areas. A shuttle bus system is proposed to transport most personnel on 25-seat buses, with up to 20 trips per day (i.e. 40 daily vehicle movements) in addition to 30 daily light vehicle trips (i.e. 60 daily vehicle movements) for other site workers.

Work hours will generally be from 7:00am to 6:00pm Monday to Friday, and 8:00am to 1:00pm on Saturdays. Any work outside this time if required will be undertaken with prior approval from relevant authorities unless emergency works are required.

Subject to detailed design, the approximate quantity of materials to be used in the construction is shown in Table 4.1.

**Table 4.1: Estimated Material Usage in Solar Farm Construction**

Resource	Estimated Quantity
Gravel	75,000m <sup>3</sup>
Sand	8,500m <sup>3</sup>
Concrete	420m <sup>3</sup>
Solar Panels	715,680
Water	Up to 130ML non-potable and 0.4ML potable supply

Concrete, gravel, sand and water are expected to be sourced from the local area. Photovoltaic panels, inverters and transformers will be manufactured overseas and intended to be freighted to the site from a NSW port (either Sydney or Newcastle).

Plant to be used during construction includes:

- Small pile driving rig
- Crane
- Drum roller
- Padfoot roller
- Wheeled loader
- Dump truck
- 30T excavator
- Grader
- Chain trencher
- Water truck
- Telehandler
- Forklift

The estimated traffic generated for specific construction tasks is shown in Table 4.2.

Table 4.2: Estimated Type and Volume of Traffic for Specific Tasks

Item	Type of vehicle	Estimated number of vehicles during construction
<b>Equipment</b>		
Solar Panels	B Double	518
PCU's	Semi-Trailer	85
Switchboards	Semi-Trailer	2
Transformer and 200 Tonne Crane	Oversize vehicles	5
Total cables	Semi-Trailer	120
30 MWh battery storage	Semi-Trailer	30
Steel posts, tables and brackets	Semi-Trailer	415
<b>Buildings</b>		
Control room	Semi-Trailer	3
Warehouse	Semi-Trailer	1
Offices	Semi-Trailer	6
Water tanks	Semi-Trailer	4
<b>Fences</b>		
Posts and wire mesh	Semi-Trailer	5
Earthworks and grader	Semi-Trailer	3
<b>Heavy Machinery</b>		
Telehandler	Semi-Trailer	30
Tractors/bulldozers	Semi-Trailer	3
Miscellaneous trucks	Standard truck	1,600
Water Tankers	20kL Tanker	5,605
<b>Construction personnel</b>		
Construction workers	Shuttle buses	6,000
	Cars	7,000

Estimates of total traffic volumes and peak hour trips within the construction phase are detailed in Table 4.3.

Table 4.3: Estimated Construction Traffic Volumes and Peak Daily Trips

Vehicle Type	Estimated Number of Vehicle Trips	Estimated Peak Maximum Daily Number of Trips (one-way)	TOTAL BY VEHICLE TYPE
Semi-Trailers	707	23	66 Heavy Vehicles
B Double	518	2	
Oversized vehicles	5	1	
Standard trucks	1,600	5	
Water tankers	5,605	15	
Buses	6,000	20	
Cars	7,000	30	30 Light Vehicles
<b>TOTAL</b>	<b>21,435</b>	<b>96</b>	<b>96 Total Vehicles</b>

Traffic generation will be at a maximum during the peak construction phase, which will govern the design of property entrances and local road upgrades.

#### **4.1.3 Operation Period**

Up to 5 full time equivalent staff are anticipated to be on-site during the operation phase, during standard working hours of 7:00am to 6:00pm from Monday to Friday, and 8:00am to 1:00pm on Saturdays. Occasionally there may be a need to work outside these hours, for example emergency repair or site security response, however such movements would be kept to a minimum. Operational activities include solar panel maintenance, performance monitoring, routine maintenance and repairs.

The estimated traffic generation is 5 light vehicle trips (representing 10 movements) and up to 2 heavy vehicle trips (4 movements) on each working day, with most movements occurring early in the morning and late in the afternoon.

Contractors will attend the site for specific major tasks, such as replacement and renewal of batteries within the energy storage system after nominally 15 years.

TransGrid will be responsible for operation and maintenance of the 132kV substation, and are likely to maintain this site in conjunction with maintenance of the TransGrid Armidale substation located on the eastern side of Armidale approximately 10km from the development site.

#### **4.1.4 Decommissioning**

The Oxley Solar Farm has a design life expectancy of 30 years, though targeted renewals may occur to prolong operations. Once operation is no longer viable, all above-ground infrastructure would be removed over a period of approximately 9 months, so that the site can be returned to primary production use.

Traffic generation during decommissioning and rehabilitation is anticipated to be less than during the construction phase.

## **4.2 Haulage Routes**

Solar panels and specialist electrical equipment including inverters and the substation are expected to arrive from overseas manufacture in either Sydney or Newcastle ports, and be freighted to the site by road transport.

The haulage route will be on state roads between Armidale and the site, via Waterfall Way and the new highway access to be constructed west of the Gara River.

## **4.3 Combined Traffic from Other Proposed Developments**

Figure 4.1 shows traffic generating developments in the vicinity of the Oxley Solar Farm, which include:

- Metz Solar Farm – 215MW solar farm with access from Waterfall Way east of the Oxley Solar Farm entrance;

- Olive Grove Solar Farm – 30MW solar farm with access from Waterfall Way and Bayley Park Road, west of the Oxley Solar Farm entrance;
- Stringybark Solar Farm – 30MW solar farm with access from Gara Road.
- The Armidale Regional Landfill

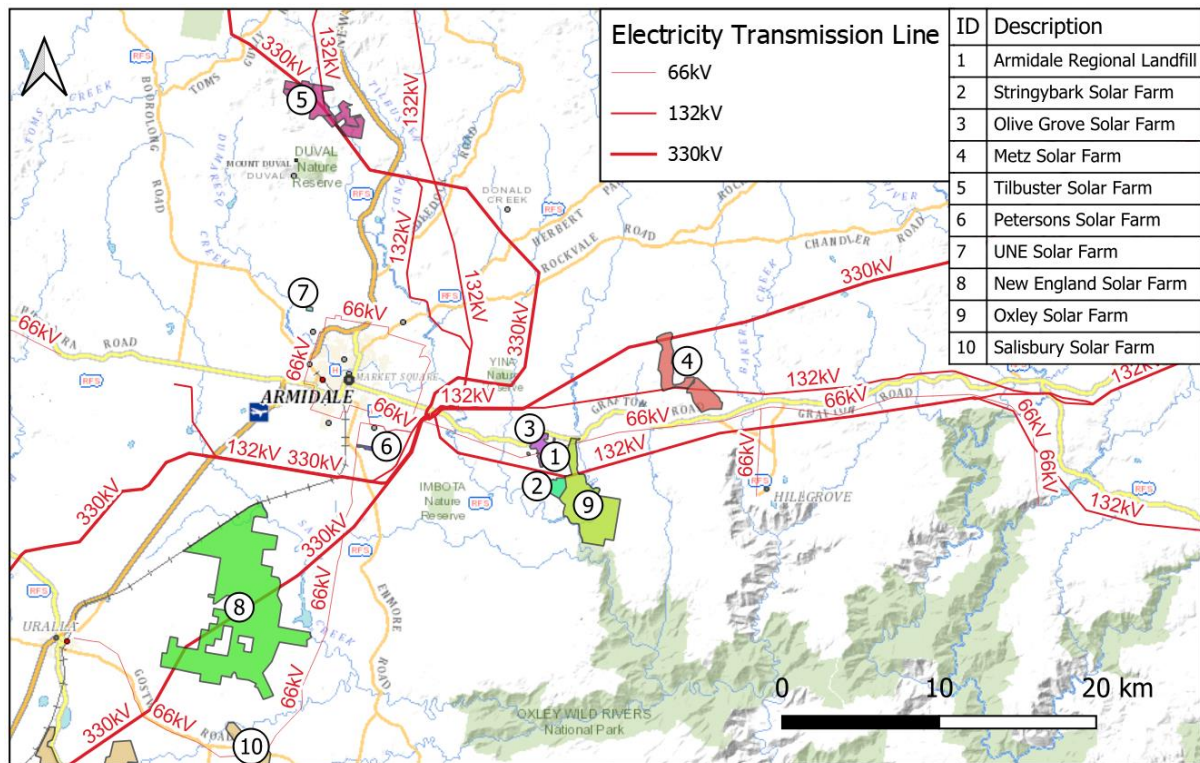


Figure 4.1: Major Regional Developments (base map: DFSI Spatial Services, 2020)

The Armidale Regional Landfill 12km from Armidale was officially opened in October 2020 and has capacity to accept up to 15,000 tonnes of general solid waste per annum over its 50-year design life. The new landfill will not be open to the public for domestic self-haul waste deliveries. All waste will be transferred from existing waste management facilities in Armidale and Guyra using heavy vehicles.

The Tilbuster, New England and Salisbury Solar Farms will have separate access from the New England Highway, and are not expected to create adverse combined traffic impacts in the event that construction periods overlap.

#### 4.3.1 Intersection of Waterway Way and the Oxley Solar Farm property access

Of the major developments, only the Metz solar could result in increased traffic at the site of the new Oxley Solar Farm traffic entrance off Waterfall Way. The Metz Solar Farm traffic assessment prepared by TTM Consulting Pty Ltd in 2017 notes that overall daily traffic movements during peak construction will be 75 light vehicles and 27 heavy vehicles. Average monthly truck movements are estimated to be 13 trucks per day over the 10-month construction period. Construction has commenced for the Metz Solar Farm, including road upgrades and the electrical substation, though progress later stalled. Ownership of the development has since transferred, and it is assumed that peak construction will be complete by 2022, preceding work on the Oxley solar farm.

#### **4.3.2 Intersection of Waterfall Way and Gara Road**

In addition to traffic generated by the Metz solar farm, there is potential for cumulative traffic impacts from the approved Stringybark and Olive Grove solar farms, and from the Armidale Regional Landfill which was officially opened during October 2020.

The Stringybark Solar Farm is anticipated to take 9 months to construct by a workforce of 50 staff, most of whom will arrive in three mini buses. Average construction traffic is estimated at 11 light vehicles and 5 heavy vehicles entering the site each day, with vehicle origin being 100% from the west and all using the Waterfall Way / Gara Road intersection to access the site. During the operational phase there is estimated to be up to 2 light vehicles per day accessing the site, with all inbound movements originating from the west. Construction is assumed to commence in 2021.

The Olive Grove Solar Farm will have a new direct access off Waterfall Way, east of the Gara Road and Waterfall Way intersection. Up to 60 workers are anticipated during construction, arriving at the site in four mini buses. Average daily construction traffic includes 13 light vehicles and 6 heavy vehicles. Operational traffic is estimated at up to 2 light vehicles per day.

Both the Stringybark and Olive Grove Solar Farms are of smaller scale, each 29.9MW, and already have development approval so are likely to precede construction of the Oxley Solar Farm. The combined construction traffic for these two farms during 2021 is expected to be 24 light vehicles and 11 heavy vehicles per day, and subsequent operational traffic will be up to 4 light vehicles daily.

#### **4.4 Traffic Distribution and Assignments**

Construction and site workers are likely to be travelling daily from Armidale, arriving on site between 6:30am and 8:00am in cars/utilities or with a shuttle bus service, and departing the site between 4:00pm and 6:00pm. All vehicle movements into the site will comprise a right-turn into the development, and egress will comprise a left-turn onto Waterfall Way.

Most components for the solar farm will be pre-fabricated and imported, landing at a port in either Sydney or Newcastle, after which the components will be freighted to the site. All inbound freight will travel on state roads and enter the Oxley Solar Farm from the new property access to be constructed off Waterfall Way.

The haulage route is already approved for Restricted Access Vehicles including B-Doubles up to 25/26m in length operating on the General Mass Limits (GML) and Concessional Mass Limits (CML) networks, and 4.6m high vehicles.

During peak construction periods, traffic generation is estimated to be approximately 96 total daily trips (one-way), including heavy vehicles (66 trips/day) and light vehicles (30 trips/day). Most light vehicle movements are assumed to occur within a two-hour period near the start and end of each day. Heavy vehicle movements are expected to be distributed throughout the day, with average generation of 6 vehicles per hour.

**Table 4.5: Estimated Hourly Trip Generation at Waterfall Way Access (Construction)**

Time Period	Heavy Vehicles		Light Vehicles		Total Vehicles	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
6am – 7am	6	0	18	0	24	0
7am – 8am	6	6	5	0	11	6
8am – 9am	6	6	1	0	7	6
9am – 10am	6	6	1	1	7	7
10am – 11am	6	6	1	1	7	7
11am – 12pm	6	6	1	1	7	7
12pm – 1pm	6	6	1	1	7	7
1pm – 2pm	6	6	1	1	7	7
2pm – 3pm	6	6	1	1	7	7
3pm – 4pm	6	6	0	6	6	12
4pm – 5pm	6	6	0	9	6	15
5pm – 6pm	0	6	0	9	0	15
<b>TOTAL</b>	<b>66</b>	<b>66</b>	<b>30</b>	<b>30</b>	<b>96</b>	<b>96</b>

Existing traffic on Waterfall Way adjacent the proposed site access was measured to be 1,597 vehicles per day, combining eastbound and westbound directions. Assuming typical 1.04% compound traffic growth on Waterfall Way, and allowing 102 vehicles per day in 2022 to account for the Metz Solar Farm construction and an additional 10 vehicles per day thereafter associated with operational activities for the Metz Solar Farm, estimated traffic over the next ten (10) years at Gara River is shown in Table 4.6.

**Table 4.6: Estimated Daily Traffic Volumes (both directions), Waterfall Way**

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Daily Traffic</b>	1597	1614	1834	1667	1684	1701	1719	1736	1754	1772	1790	1809
<b>AM Peak Hour</b>	141	142	162	147	149	150	152	153	155	156	158	160
<b>PM Peak Hour</b>	159	161	183	166	168	169	171	173	175	176	178	180

Along Waterfall Way adjacent the site, the AM peak period was measured to occur between 11:15am and 12:15pm, and the PM peak period is between 3:15pm and 4:15pm.

#### 4.4.1 Intersection of Waterway Way and the Oxley Solar Farm Property Access

The Oxley Solar Farm morning construction peak traffic period of 6:00am to 7:00am will be out of phase with the peak for pre-development traffic which occurs between 11:15am to 12:15pm, resulting in minimal change to forecast peak daily traffic. The afternoon construction peak traffic period between 4:00pm and 6:00pm will partially coincide with the existing peak hour period of 3:15pm to 4:15pm. The associated traffic assignments are documented in Figure 4.2 and Table 4.7.

Figure 4.2: Traffic Directions at Waterfall Way Property Access

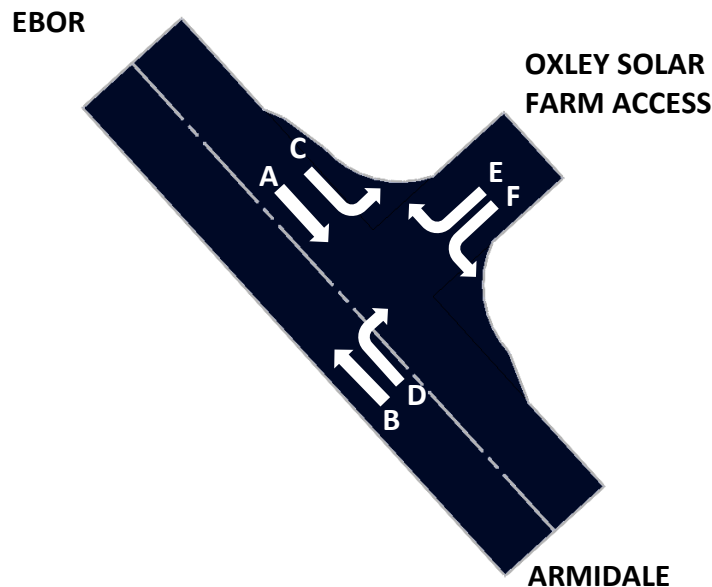


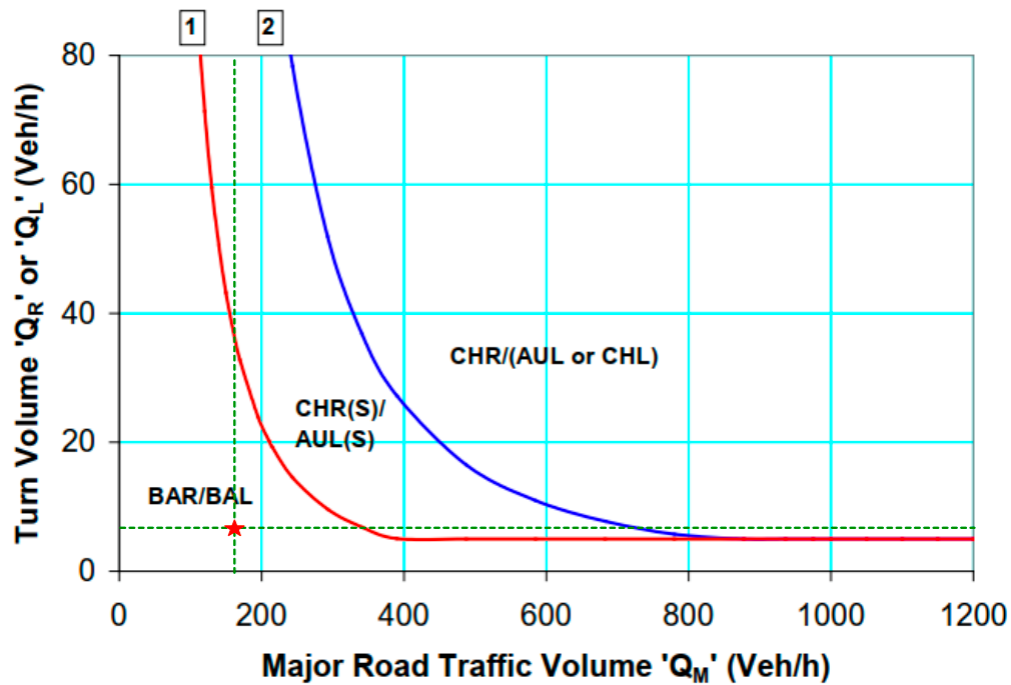
Table 4.7: Peak Hour Traffic Volumes at Oxley Solar Farm Access, Waterfall Way

ARROW	PRE-DEVELOPMENT (2021)		CONSTRUCTION PHASE (2023)		OPERATION PHASE (2030)	
	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak
A	71	80	74	83	79	89
B	71	80	74	83	79	89
C	0	0	0	0	0	0
D	0	0	7	7	1	1
E	0	0	0	0	0	0
F	0	0	7	11	1	1

Overall, traffic generated by the Oxley Solar Farm development is expected to result in a short-term increase to peak traffic flows on Waterfall Way.

Design parameters for the intersection warrants within the *Austroads Guide to Road Design, Part 4*, Appendix A, based on a left-turn entry to the site at the time of the Waterfall Way morning peak hour (11:15am to 12:15pm) during the construction phase are:

- Major road traffic volume  $Q_M = 148$  veh/h (peak hour, both directions)
- Turn volume  $Q_R = 7$  veh/h (inbound right-turn traffic)

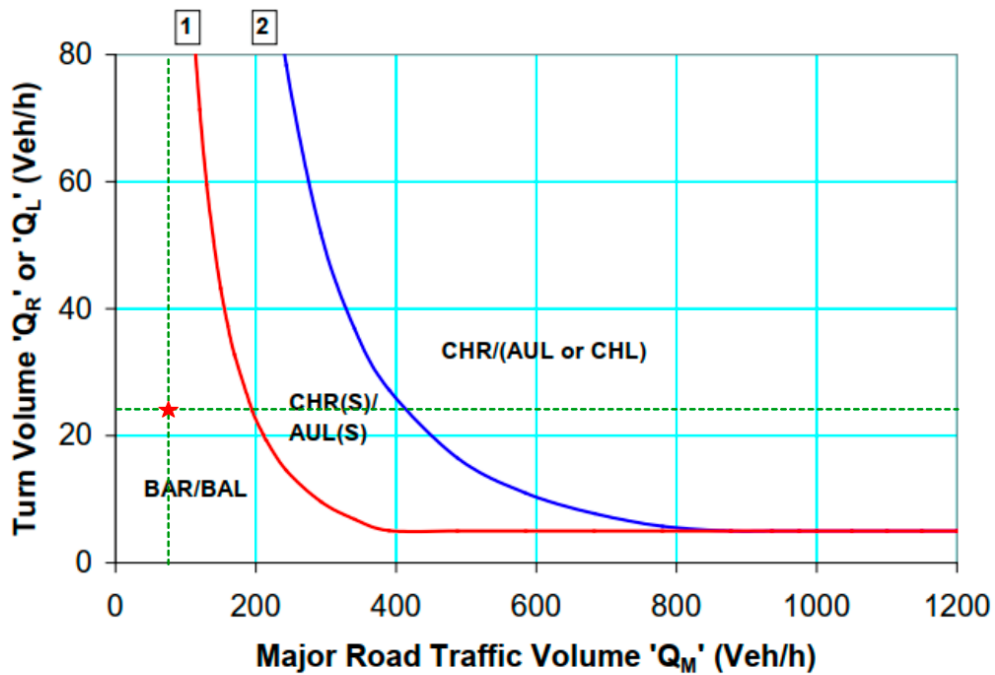


(a) Design speed  $\geq 100$  km/h

Figure 4.3: Austroads Intersection Warrant – Waterfall Way Morning Peak Hour

During the peak hour for construction traffic (6:00am to 7:00am), the equivalent intersection warrant is shown in Figure 4.4 based on the following parameters:

- Major road traffic volume  $Q_M = 75$  veh/h (peak hour, both directions)
- Turn volume  $Q_R = 24$  veh/h (inbound right-turn traffic)



(a) Design speed  $\geq 100$  km/h

Figure 4.4: Austroads Intersection Warrant – Oxley Solar Farm Morning Peak Hour

Peak hour traffic on Waterfall Way past the property entrance in the year 2031, at the end of the 10 year planning horizon, is estimated to be 160 vehicles per hour due to natural growth rate, as well as operational traffic from the Metz Solar Farm. Turning traffic during the operational phase is estimated to be one (1) vehicle per hour during the morning peak. Overall the construction phase represents the time of highest traffic impact on Waterfall Way.

The Austroads intersections warrants shown in Figures 4.3 and 4.4 suggest a BAR/BAL intersection treatment is appropriate based on peak forecast traffic generation, considering both the Oxley Solar Farm construction and Waterfall Way peak hour periods. Section A.9 notes that higher order turn treatments should be considered if the turn from a major road is associated with some geometric minima such as limited sight distance or steep grade. At the proposed access location, safe intersection sight distance is available in each direction, and average downwards gradient on the eastbound approach is 3.7%. It is recommended that a combination of rural style BAR/BAL turn treatments represent the minimum intersection treatment for a new property access to the Oxley Solar Farm.

#### **4.4.2 Intersection of Waterfall Way and Gara Road**

All development traffic will access the Oxley Solar Farm site via the proposed new property access directly off Waterfall Way, and will not increase turning traffic at the intersection of Waterfall Way and Gara Road.

Morning and afternoon peak traffic generation associated with construction of the Oxley Solar Farm development will occur before and after the existing peak traffic on Waterfall Way. The Oxley Solar Farm is likely to increase traffic on Waterfall Way past the Gara Road intersection by seven (7) vehicles per hour during the existing peak hour periods for Waterfall Way and Gara Road. This represents a negligible increase and it is not considered that any upgrades to the Waterfall Way and Gara Road intersection occur as a result of the Oxley Solar Farm development.

It is noted that the approved Stringybark Solar Farm will use Gara Road for light and heavy vehicle access to the site, and a consent condition requires that the Waterfall Way and Gara Road intersection is upgraded to incorporate Austroads rural-style BAL and BAR turning treatments, without impacting the heritage culvert located in the vicinity. Additionally, this consent requires targeted safety improvements along Gara Road to install signage, improve sight distances and mitigate two other safety hazards.

### **4.5 Impact of Generated Traffic**

#### **4.5.1 Waterfall Way**

The estimated additional peak traffic volume generated during construction of the solar farm is 96 vehicles per day, representing an increase in daily traffic movements on Waterfall Way of approximately 12% during the construction period. Most of the increased traffic generation will occur in early morning and late afternoon periods, resulting in very minor increases to peak hourly traffic volumes on Waterfall Way.

The peak hourly traffic generation is estimated at 24 vehicles per hour in the predicted morning construction peak hour between 6:00am and 7:00pm, however this is out of phase with the existing morning peak period on Waterfall Way of 11:15am to 12:15am. During the morning peak, traffic is only expected to increase by 7 vehicles per hour or 5%, which is still below existing peak afternoon traffic figures on Waterfall Way.

In the existing afternoon peak hour on Waterfall Way between 3:15pm and 4:15pm, the peak traffic of 161 vehicles per hour will be supplemented by up to 15 vehicles per hour from the Oxley Solar Farm. This represents an increase of 9% on the afternoon peak traffic, which is considered to be well within the existing capacity of Waterfall Way.

The Draft Waterfall Way Corridor Strategy notes the result of a Traffic on Rural Roads (TRARR) analysis showing that between Ebor and Armidale, the Waterfall Way corridor performance has a Level of Service rating of A in both directions, at both the AM and PM peak hours and in the day time, and forecast over the period 2015 to 2035 inclusive based on forecast traffic growth. This 'A' rating means that the percentage of time spent following other vehicles is less than 40% indicating that there are adequate overtaking opportunities between Ebor and Armidale.

No impacts are anticipated to the operation of school buses or the very limited active transport uses of Waterfall Way as a result of the proposed development, since peak construction traffic associated with the Oxley Solar Farm development will occur before and after school bus pick-up and drop-off times, development-related traffic will result in relatively minor increases to base traffic flows, and a Construction Traffic Management Plan will be developed and implemented to specifically adopt measures to minimise disruptions to existing road users.

#### **4.5.2 Gara Road**

Just over 100 vehicles per day currently use Gara Road, as measured near the Waterfall Way intersection where traffic figures are the highest. Where Gara Road is within the Oxley Solar Farm extents there is very low existing traffic estimated at up to 10 vehicles per day, with only one residence at 973 Gara Road requiring access through the length of Gara Road used by Oxley Solar Farm traffic.

The eastern section of Gara Road between approximate chainages 7,710m and 9,730m is expected to have additional light and heavy traffic totalling up to 96 vehicles per day, and will require upgrading accordingly suitable for two-way traffic.

In the impacted length of Gara Road, heavy vehicles will need to be able to safely pass, and so road widening will be required. The affected area also includes a significant causeway across the Gara River, as shown in Figure 4.7, where driver sight distances are constrained, particularly on the western approach. During the construction period, this constraint could be managed by either widening, or by implementing suitable storage areas and traffic controls for the duration, ensuring only one vehicle at a time can cross the Gara River.



Figure 4.7: Causeway Crossing of Gara River on Gara Road, Chainage 9.05km

Additional traffic will increase the generation of dust, and mitigation measures should be documented within a Construction Traffic Management Plan. Increased gravel loss will also be expected, and unsealed road condition may deteriorate more rapidly than other less trafficked areas of Gara Road, particularly in extreme weather conditions, requiring more frequent grading maintenance.

During large storm events, the existing causeways on Gara Road will be temporarily impassable to traffic. Causeways currently have flood depth markers in place to allow drivers to gauge the depth of floodwaters. Temporary road closures would occur as deemed necessary by Armidale Regional Council.

#### **4.5.3 Internal Access, Parking, Laydown and Manoeuvring Areas**

Once inside the development, there is ample space to design two-way internal access roads, parking, laydown and manoeuvring areas to cater for demands of the peak construction period.

Based on the estimated peak daily demand being 20 buses and 30 cars, safe set-down and pick-up areas should be designated for bus passengers, and minimum all-weather off-street parking provision provided for 30 light vehicles.

Given the short-term nature of the traffic-generating works and the rural environs, it is considered that unsealed pavements would generally be suitable for internal roads, parking and manoeuvring areas, however sealing may be preferable on any steep slopes or where semi-permanent dust mitigation is desirable. Regular ongoing grading maintenance will be required on all unsealed roads during the construction phase.

Approximately 380m south of Waterfall Way, the proposed internal access road crosses an unnamed waterway having a large catchment area, and a crossing having large waterway area

will be required to ensure appropriate flood immunity, commensurate with the Armidale Regional Council Engineering Code. All necessary environmental and regulatory approvals will be required prior to any creek works.

#### 4.6 Concept Design for New Property Access off Waterfall Way

As noted in Section 3.3, the preferred new access location is approximately 130m west of the existing property access. The location is identified in Figure 4.8.



Figure 4.8: Proposed Location for New Property Access to Waterfall Way

It is intended that the existing access would be closed and fenced to prevent ongoing access at this point. Any entrance gate or stock grid would be recessed into the development so that

a B-Double 26m in length could stand off the road without impacting traffic on Waterfall Way, and the new access sealed for a minimum distance of 30m to prevent tracking of gravel onto Waterfall Way.

A concept diagram showing the proposed access is shown in Figure 4.9.



Figure 4.9: Concept Diagram of New Property Access Arrangement to Waterfall Way

The maximum dimension design vehicle to regularly access the site is expected to be 25/26 metre length B-Doubles and 25 metre length semi-trailers. Over-dimensional vehicles will also access the site for an estimated 5 trips, which will operate under traffic control arrangements. Swept paths have been checked to ensure that intersection geometry can permit the design service vehicles to enter and exit the site without crossing the road centreline, however this will need to be assessed in detail during the design phase.

It is expected that tree clearing would be required for the new access driveway, and also on the northern side of Waterfall Way to permit a table drain and ensure sight distances are achieved. Tree removal may also be required immediately adjacent to Gara River north of the bridge so that these trees do not in future obstruct sight distances.

#### 4.7 Improvements to Gara Road and Silverton Road

Improvements will be required to Gara Road between approximate chainages 7.7km and 9.7km, where it will be necessary for heavy vehicles to travel on Gara Road to access different parts of the Oxley Solar Farm. Such improvements would include localised widening to allow heavy vehicles to pass, four (4) new heavy vehicle property entrances, and upgrading in the vicinity of the Gara River causeway crossing where road width and sight distances are constrained. Given there is little through-access at this part of the road, consideration could be given to temporary traffic control measures to control traffic in the vicinity of the Gara River crossing, in consultation with Armidale Regional Council.

Neither Silverton Road, nor Gara Road west of chainage 7.7km, are proposed for any regular construction or operation traffic associated with the development. All of the construction and operational workforce will be instructed to avoid travel on these sections of road as part of site inductions. Very limited use of these roads may still occur as a result of the Oxley Solar Farm, for example by members of the public interested in observing progress; in the event of flood closures on Gara Road; or for occasional travel directly to or from coastal centres.

Though only limited traffic may be generated on Silverton Road and Gara Road west of chainage 7.7km, motorists may not be familiar with the roads and potential hazards such as

the narrowing of roads at causeways and one-way stock grids. It is recommended that advance warning signage be installed on the approaches to all stock grids and causeways, consistent with AS1742.1 Manual of Uniform Traffic Control Devices, and to the satisfaction of Armidale Regional Council as the roads authority.

#### 4.8 Recommendations

Overall, existing roads are considered to have adequate spare capacity to cater for additional traffic generated by the development, including cumulative traffic arising from other approved developments in the vicinity. The works identified in Table 4.8 are recommended to provide safe and efficient access to the development site and to protect existing infrastructure.

**Table 4.8: Description of Recommended Road and Traffic Works**

Item	Description of Recommended Works
1	The applicant to finalise a dilapidation survey of all proposed haulage routes between the New England Highway and the site, and on Gara Road between chainages 7.7km and 9.7km, prior to the commencement of any site works, with measures to be agreed with the relevant roads authority for a follow-up survey at the completion of construction and the restoration of any damage arising from traffic generated by the development, except for normal wear and tear.
2	<p>The design and construction of a new vehicular access from Waterfall Way to Lot 2 DP1206469, complying with the rural style BAL / BAR treatments specified in the Austroads Guide to Road Design, as amended by Transport for NSW in their supplementary road design guidelines, and designed to accommodate the swept path of the maximum dimension vehicles which will service the site.</p> <p><u>Note:</u> Upgrades to all state roads will require the Developer to formalise a Works Authorisation Deed (WAD) with Transport for NSW.</p>
3	Closure of the existing rural property access from Waterfall Way to Lot 2 DP1206469, including alteration of boundary fencing, after the construction of the replacement access to Waterfall Way.
4	Gara Road should be upgraded suitable to achieve minimum Austroads sight distances and be sufficiently widened to enable two-way heavy vehicle traffic in that section between the proposed new solar farm access locations at approximate chainages 7.7km and 9.7km, except as approved otherwise by Armidale Regional Council (for example, traffic control measures may be implemented during construction on either side of the Gara River crossing to ensure the passage of only one heavy vehicle at a time). Any upgrades should be consistent with the Armidale Regional Council Engineering Code and referenced standards.
5	<p>The design and construction of four (4) new heavy vehicle property accesses between Gara Road and the development site, in a manner consistent with Armidale Regional Council Engineering Code and Austroads guidelines.</p> <p>Each access is to be located so that Austroads sight distance requirements can be achieved, be designed to achieve a maximum intersection angle between 70°</p>

Item	Description of Recommended Works																				
	<p>and 110° with Gara Road, and contain the swept path of the maximum dimension design access vehicles.</p> <p><u>Note:</u> The proposed access north of Gara Road at approximate chainage 9,450m as measured from Waterfall Way should be relocated eastwards to approximate chainage 9,400m, unless other alternate positioning satisfactory to Armidale Regional Council permits adequate sight distances to be demonstrated.</p>																				
6	<p>The design and installation of warning signage at those locations on Gara Road and Silverton Road where the road suddenly narrows as identified in the table below, to provide advance warning to motorists who may be unfamiliar with road conditions. All signage is to comply with the requirements of Australian Standard 1742.1 Manual of Uniform Traffic Control Devices and the Armidale Regional Council Engineering Code.</p> <table border="1" data-bbox="320 728 1289 1099"> <thead> <tr> <th>Chainage</th><th>Constraint to two-way traffic</th></tr> </thead> <tbody> <tr> <td colspan="2">Gara Road</td></tr> <tr> <td>3,255m</td><td>Single lane causeway across Burying Ground Creek</td></tr> <tr> <td>4,285m</td><td>Single lane causeway across an unnamed non-perennial waterway</td></tr> <tr> <td>5,350m</td><td>Single lane causeway across an unnamed non-perennial waterway</td></tr> <tr> <td>9,050m</td><td>Single lane causeway across Gara River</td></tr> <tr> <td colspan="2">Silverton Road</td></tr> <tr> <td>1,450m</td><td>Single lane causeway over unnamed non-perennial waterway</td></tr> <tr> <td>2,075m</td><td>Public gate including single-lane stock grid</td></tr> <tr> <td>5,270m</td><td>Public gate including single-lane stock grid</td></tr> </tbody> </table> <p>Engineering plans for all roadworks are to be prepared by a suitably qualified person and submitted to Armidale Regional Council for approval prior to the issue of Section 138 Roads Act approval for the work.</p>	Chainage	Constraint to two-way traffic	Gara Road		3,255m	Single lane causeway across Burying Ground Creek	4,285m	Single lane causeway across an unnamed non-perennial waterway	5,350m	Single lane causeway across an unnamed non-perennial waterway	9,050m	Single lane causeway across Gara River	Silverton Road		1,450m	Single lane causeway over unnamed non-perennial waterway	2,075m	Public gate including single-lane stock grid	5,270m	Public gate including single-lane stock grid
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Silverton Road																					
1,450m	Single lane causeway over unnamed non-perennial waterway																				
2,075m	Public gate including single-lane stock grid																				
5,270m	Public gate including single-lane stock grid																				
7	<p>That all internal circulation roads, parking and manoeuvring areas are designed and constructed for the design number, dimension and mass of the design service vehicles, and in compliance with the provisions of AS/NZS2890.1 Off Street Parking, AS2890.2 and the Armidale Regional Council Engineering Code. Any internal roads which are not designed for two-way travel should have regular hard-standing provision for heavy vehicles travelling in opposite directions to pass.</p> <p><u>Note:</u> A Right of Carriageway a minimum 20m in width is to be provided in favour of Lot 5 DP253346 where the internal access road passes within Lot 2 DP1206469.</p>																				
8	<p>The development of a Construction Traffic Management Plan (CTMP) by a suitably qualified person to identify and manage impacts of construction and operational traffic on the safety and efficiency of the transport routes. It is recommended that a Road Safety Audit occur prior to development of the CTMP to inform detailed safety measures during the construction phase. Audits should consider the needs of motorists driving after dark and when morning and evening sun angles may impair drivers, given the east-west orientation of roads.</p> <p>The CTMP should also address temporary measures such as:</p>																				

Item	Description of Recommended Works
	<ul style="list-style-type: none"> <li>• Traffic Control Plans (TCPs) to address construction related traffic issues at specific locations, including overmass and over-dimension vehicles;</li> <li>• The implementation of speed controls to minimise clear zone safety impacts and loss of areas of high value roadside vegetation during the construction period;</li> <li>• Weekly vehicle movement schedules identifying expected trip generation and any overmass/over-dimension vehicle movements;</li> <li>• An induction process for on-site staff and visitors;</li> <li>• Measures to protect high value roadside vegetation;</li> <li>• Advanced warning signage to ensure drivers have suitable advance warning of upcoming intersections commensurate with travel speed.</li> <li>• Mitigation measures to limit dust generation on unsealed roads, particularly in the vicinity of dwellings;</li> </ul> <p>A Code of Conduct should form part of the CTMP, including detail of:</p> <ul style="list-style-type: none"> <li>• A map of the primary transport routes highlighting critical locations;</li> <li>• Safety initiatives for transport through residential areas, school zones and during school bus operation periods;</li> <li>• Communication protocols to regulate the arrival of heavy vehicles at key intersections and hold points, commensurate with storage capacity;</li> <li>• An induction process for vehicle operators and regular toolbox meetings;</li> <li>• A complaint resolution and disciplinary procedure;</li> <li>• Community consultation measures for the peak construction period;</li> </ul>

## 5. Conclusions

This report has considered the proposed Oxley Solar Farm development in the context of existing road and traffic conditions, additional traffic to be generated by the development during the construction and operational stages, and accounting for future traffic from other approved developments in the vicinity. Overall, it is deemed that subject to the recommended roadworks identified in Table 4.8 of this TIA, that there are no traffic or transport issues which would prevent this development from being conditionally approved.

## Appendix A

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### **2020 Traffic Data for Waterfall Way, Gara Road and Silverton Road**

Prepared by Armidale Regional Council

## Armidale Regional Council Vehicle Counts (Virtual Day)

### Waterfall Way. 100m East of landfill entrance

**Site Location:** -30.453328, 151.786809

**Profile:**

**Filter time:** 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (14)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** East, West (bound)

**In profile:** Vehicles = 21409 / 21603 (99.10%)

**\* Virtual Day - Total=1529, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2	1	1	3	4	14	37	74	113	124	124	133	135	138	138	154	127	96	52	26	16	10	4	3
0	0	0	0	1	2	7	16	27	25	29	30	33	35	36	38	36	27	17	7	5	4	1	1
1	0	0	1	1	4	8	16	29	33	31	34	35	34	34	39	35	26	15	7	4	2	1	1
1	0	0	1	1	4	11	19	30	33	31	35	35	37	33	41	29	24	11	7	4	2	1	1
0	1	0	1	1	5	11	23	28	33	33	34	33	32	35	36	27	20	10	5	4	2	1	1

AM Peak 1130 - 1230 (137), AM PHF=0.97 PM Peak 1500 - 1600 (154), PM PHF=0.94

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 13:00 Thursday, 28 May 2020 => 0:00 Monday, 1 June 2020 (3.45833)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** East, West (bound)

**In profile:** Vehicles = 4635 / 21603 (21.46%)

**\* Virtual Day - Total=1315, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2	1	1	3	5	13	26	64	85	99	99	111	115	113	128	142	114	88	53	24	14	8	5	3
0	0	0	1	0	2	5	14	17	22	22	21	31	29	32	38	32	23	14	7	5	5	1	1
1	0	1	1	1	4	6	14	21	24	22	27	32	24	30	34	26	27	16	7	3	2	1	1
1	0	0	1	3	4	8	18	23	27	23	28	28	34	34	35	33	18	10	6	3	0	2	0
0	1	0	0	1	3	7	18	24	26	32	34	25	26	32	34	24	20	12	5	3	2	2	1

AM Peak 1130 - 1230 (125), AM PHF=0.91 PM Peak 1500 - 1600 (142), PM PHF=0.93

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 0:00 Monday, 1 June 2020 => 13:00 Thursday, 11 June 2020 (10.5417)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** East, West (bound)

**In profile:** Vehicles = 16774 / 21603 (77.65%)

**\* Virtual Day - Total=1597, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
2	1	1	3	3	14	40	77	121	131	130	139	141	148	142	158	132	100	52	27	17	11	4	3
0	1	0	0	1	2	8	17	29	26	31	32	33	37	38	38	38	28	18	7	6	3	1	1
1	0	0	1	1	3	9	16	31	36	34	36	36	38	35	41	38	25	14	8	4	3	1	0
1	0	0	1	1	3	11	20	31	35	33	37	37	38	33	43	28	27	11	8	4	3	1	1
0	1	0	1	1	5	12	24	29	34	33	34	35	34	36	37	28	20	9	5	4	2	1	1

AM Peak 1115 - 1215 (141), AM PHF=0.95 PM Peak 1515 - 1615 (159), PM PHF=0.92

Numbers have been rounded to the nearest integer.

**Armidale Regional Council**  
**Class Bin Chart**

**Waterfall Way. 100m East of landfill entrance**

**Profile:**

**Filter time:** 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (14)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** East, West (bound)

**In profile:** Vehicles = 21409

**Class Bins**

Class 1 - 17842 (83.34%)

Class 2 - 1301 (6.08%)

Class 3 - 962 (4.49%)

Class 4 - 317 (1.48%)

Class 5 - 29 (0.14%)

Class 6 - 35 (0.16%)

Class 7 - 64 (0.30%)

Class 8 - 33 (0.15%)

Class 9 - 384 (1.79%)

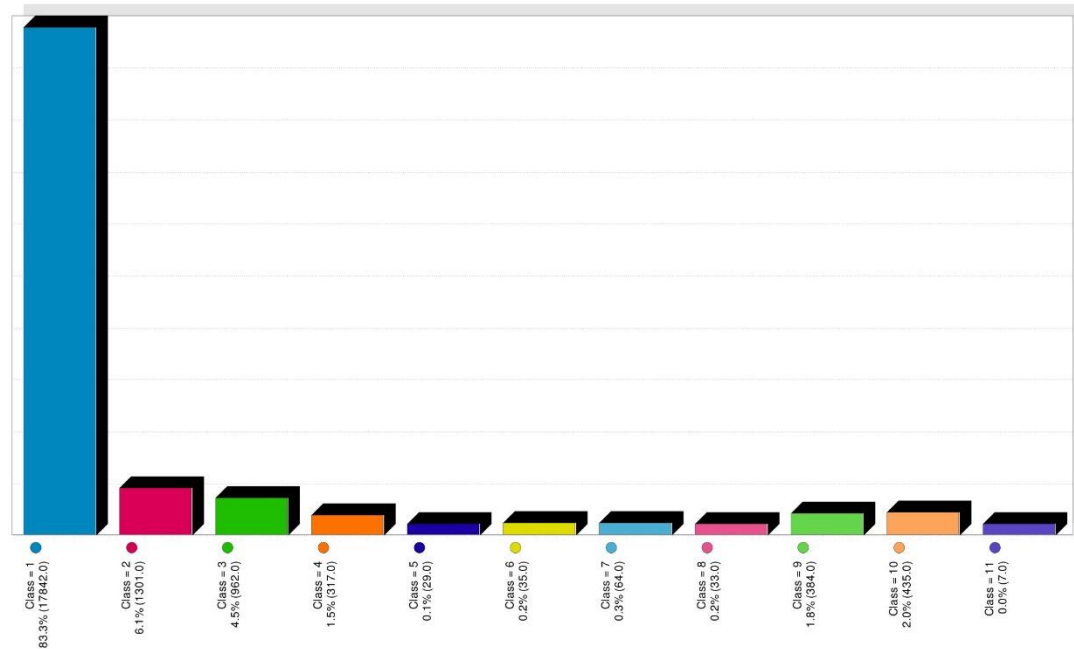
Class 10 - 435 (2.03%)

Class 11 - 7 (0.03%)

Class 12 - 0 (0.00%)

Class Bin Chart

ClassBin-676 (Metric) Site:MR76.0.1EW  
Description: Waterfall Way. 100m East of landfill entrance  
Filter time: 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020  
Filter: Cst(1 2 3 4 5 6 7 8 9 10 11 12) Dir(EW) Sp(10,160) Gap(X(>0) Span(0 - 100)  
Scheme: Vehicle classification (AusRoads94)  
Total=21409



**Armidale Regional Council**  
**Vehicle Counts (Virtual Day)**

**Gara Rd. 25m from Waterfall Way intersection**

**Site Location:** -30.506252, 151.684235

**Profile:**

**Filter time:** 15:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (13.9167)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 1381 / 1388 (99.50%)

**\* Virtual Day - Total=100, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	0	0	0	0	0	2	6	10	8	8	7	8	7	8	9	11	8	4	1	1	0	1	0
0	0	0	0	0	0	1	1	3	2	2	2	2	2	2	2	3	3	2	0	0	0	0	0
0	0	0	0	0	0	1	1	2	2	3	1	2	2	2	2	2	2	1	0	0	0	0	0
0	0	0	0	0	0	1	2	3	1	2	1	1	2	2	3	2	1	0	0	0	0	0	0
0	0	0	0	0	1	2	3	2	2	2	2	2	3	3	2	1	1	0	0	0	0	0	0

AM Peak 0800 - 0900 (10), AM PHF=0.86 PM Peak 1545 - 1645 (12), PM PHF=0.85

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 15:00 Thursday, 28 May 2020 => 0:00 Monday, 1 June 2020 (3.375)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 292 / 1388 (21.04%)

**\* Virtual Day - Total=87, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	1	0	0	0	0	3	5	7	6	7	5	7	7	7	8	8	7	4	2	2	0	1	1
0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	3	2	1	0	0	1	0
0	0	0	0	0	0	1	1	1	1	2	0	2	2	1	2	2	2	1	0	1	0	0	0
0	0	0	0	0	0	2	2	1	1	1	1	1	1	1	2	2	1	1	1	1	0	0	1
0	1	0	0	0	0	1	1	3	2	3	2	2	2	3	3	1	1	2	0	0	0	1	0

AM Peak 0830 - 0930 (8), AM PHF=0.72 PM Peak 1545 - 1645 (9), PM PHF=0.84

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 0:00 Monday, 1 June 2020 => 13:00 Thursday, 11 June 2020 (10.5417)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 1089 / 1388 (78.46%)

**\* Virtual Day - Total=104, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	0	0	0	0	0	2	6	11	9	8	8	8	7	8	9	12	8	4	1	1	1	0	0
0	0	0	0	0	0	1	1	3	2	2	2	3	2	2	2	4	3	2	0	0	0	0	0
0	0	0	0	0	0	0	1	3	2	3	2	3	2	2	2	2	2	1	0	0	0	0	0
0	0	0	0	0	0	0	1	2	3	1	2	1	1	2	2	3	2	1	0	0	0	0	0
0	0	0	0	0	0	1	3	3	2	2	2	2	2	3	3	3	1	0	0	0	0	0	0

AM Peak 0800 - 0900 (11), AM PHF=0.91 PM Peak 1545 - 1645 (13), PM PHF=0.79

Numbers have been rounded to the nearest integer.

**Armidale Regional Council**  
**Class Bin Chart**

**Gara Rd. 25m from Waterfall Way intersection**

**Profile:**

**Filter time:** 15:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (13.9167)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 1381

**Class Bins**

Class 1 - 1199 (86.82%)

Class 2 - 47 (3.40%)

Class 3 - 131 (9.49%)

Class 4 - 2 (0.14%)

Class 5 - 0 (0.00%)

Class 6 - 1 (0.07%)

Class 7 - 1 (0.07%)

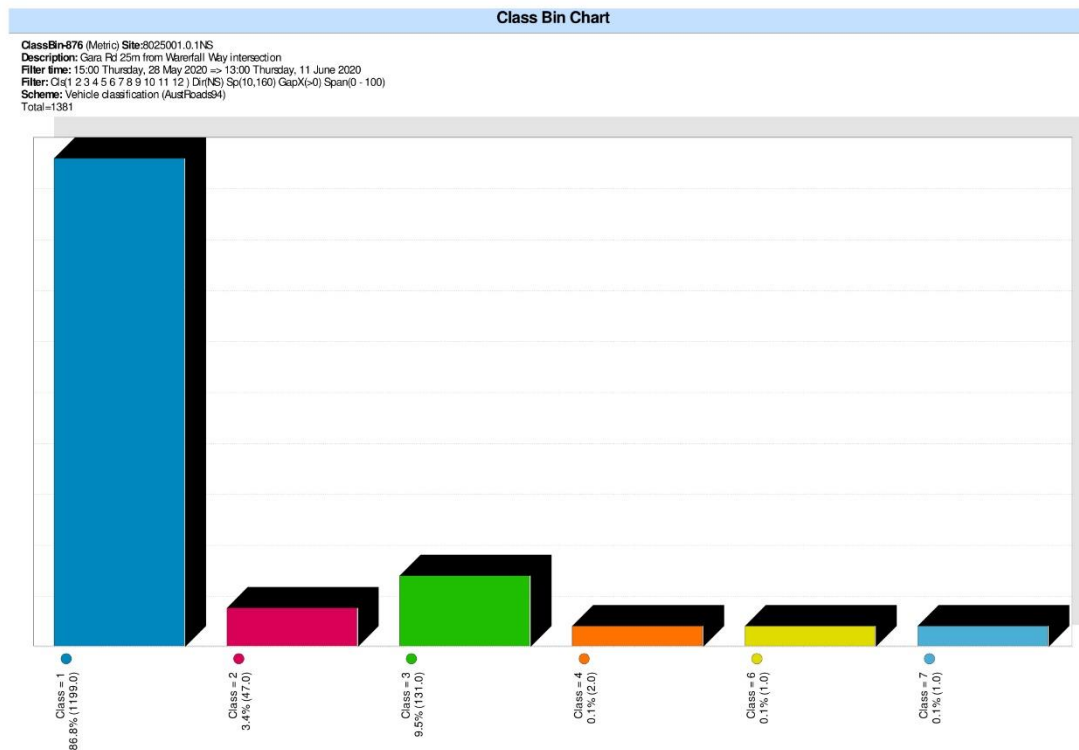
Class 8 - 0 (0.00%)

Class 9 - 0 (0.00%)

Class 10 - 0 (0.00%)

Class 11 - 0 (0.00%)

Class 12 - 0 (0.00%)



**Armidale Regional Council**  
**Vehicle Counts (Virtual Day)**

**Silverton Rd. 100m from Waterfall Way intersection**

**Site Location:** -30.537141, 151.837770

**Profile:**

**Filter time:** 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (14)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 239 / 251 (95.22%)

**\* Virtual Day - Total=17, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	0	0	0	0	0	0	2	2	1	1	2	1	1	1	1	3	2	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0

AM Peak 0745 - 0845 (3), AM PHF=0.38 PM Peak 1600 - 1700 (3), PM PHF=0.82

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 13:00 Thursday, 28 May 2020 => 0:00 Monday, 1 June 2020 (3.45833)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 47 / 251 (18.73%)

**\* Virtual Day - Total=13, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	0	0	0	0	0	0	0	1	0	0	1	2	0	1	1	2	3	2	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0

AM Peak 1100 - 1200 (2), AM PHF=0.58 PM Peak 1530 - 1630 (3), PM PHF=0.50

Numbers have been rounded to the nearest integer.

**Profile:**

**Filter time:** 0:00 Monday, 1 June 2020 => 13:00 Thursday, 11 June 2020 (10.5417)

**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Speed range:** 10 - 160 km/h.

**Direction:** North, South (bound)

**In profile:** Vehicles = 192 / 251 (76.49%)

**\* Virtual Day - Total=18, 15 minute drops**

0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
0	0	0	0	0	0	0	0	2	2	1	1	2	1	2	1	3	2	1	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0

AM Peak 0745 - 0845 (4), AM PHF=0.38 PM Peak 1545 - 1645 (3), PM PHF=0.81

Numbers have been rounded to the nearest integer.

**Armidale Regional Council**  
**Class Bin Chart**

**Silverton Rd 100m from Waterfall Way intersection**

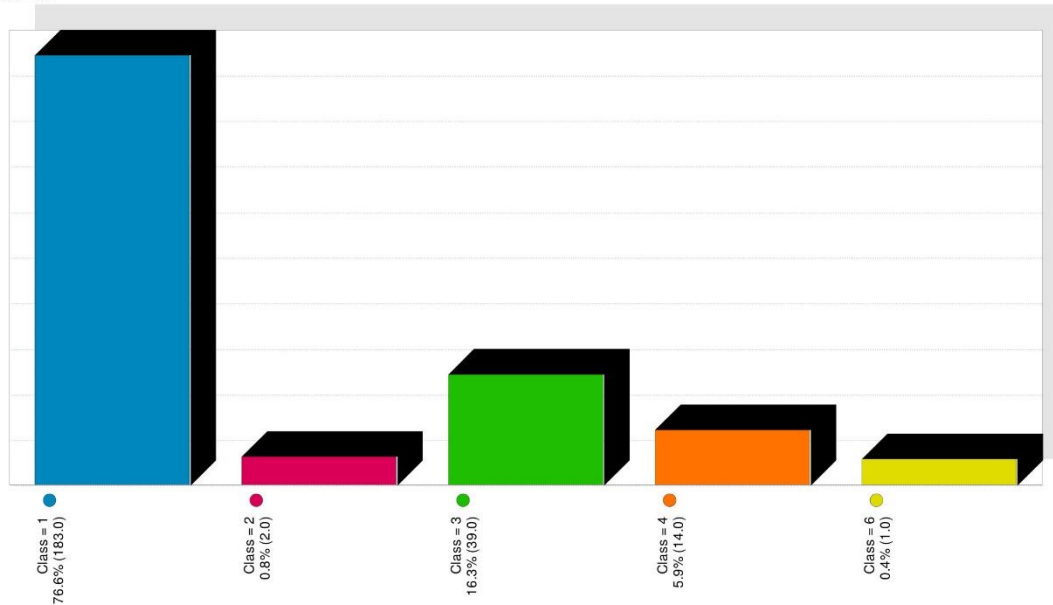
**Profile:**  
**Filter time:** 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (14)  
**Included classes:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12  
**Speed range:** 10 - 160 km/h.  
**Direction:** North, South (bound)  
**In profile:** Vehicles = 239

**Class Bins**

Class 1 - 183 (76.57%)  
Class 2 - 2 (0.84%)  
Class 3 - 39 (16.32%)  
Class 4 - 14 (5.86%)  
Class 5 - 0 (0.00%)  
Class 6 - 1 (0.42%)  
Class 7 - 0 (0.00%)  
Class 8 - 0 (0.00%)  
Class 9 - 0 (0.00%)  
Class 10 - 0 (0.00%)  
Class 11 - 0 (0.00%)  
Class 12 - 0 (0.00%)

**Class Bin Chart**

**ClassBin-873** (Metric) Site:8068001.0.1NS  
**Description:** Silverton Rd 100m from Waterfall Way intersection  
**Filter time:** 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020  
**Filter:** Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NS) Sp(10,160) GapX(>0) Span(0 - 100)  
**Scheme:** Vehicle classification (AustRoads94)  
Total=239



## Appendix B

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### **Images of Waterfall Way, Gara Road and Silverton Road**

Prepared by New England Surveying and Engineering

## Waterfall Way



## Gara Road (Sheet 1)



## Gara Road (Sheet 2)



## Gara Road (Sheet 3)



## Silverton Road (Sheet 1)



## Silverton Road (Sheet 2)



## Appendix C

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### **Preliminary Transport for NSW Comments and Responses**

Prepared by New England Surveying and Engineering

## Summary of Preliminary Transport for NSW Comments and Responses

Item	Description	Response
1	At this point there are no works (excluding line marking) currently programmed for this segment of Waterfall Way. The intersection with Gara Road was sealed in 2015 and is not due for a reseal until 2025.	Noted.
2	A minimum of 20m of Gara Road will require sealing to limit tracking of gravel onto MR76.	Gara Road is already sealed a distance of ~75m from Waterfall Way. The primary access from Waterfall Way will also be sealed for a minimum distance of 30m.
3	The intersection of Waterfall Way [MR76] and Gara Rd is constrained by a culvert and guardrail, and a BAR and BAL treatment was required for another solar farm development at the time.	Section 4.4.2 of this TIA assesses cumulative traffic impacts against Austroads intersection warrants.
4	I have attached the Appendix that we provide to inform a TIA...it is comprehensive and should form the basis of information provided with the application. It should also consider the intersection of Waterfall Way/Gara Rd and Gara/Silverton Rd routes and connections.	The TIA has been prepared based on the issued SEARS. Silverton Road is not proposed for any regular use by construction or operation traffic.
5	The Waterfall Way frontage of the solar farm has 3 existing accesses to the land; one of which is a new sealed intersection to Council's landfill site with a CHR and BALs. Has use of that access been considered? The TIA should address why a fourth access is required and the existing landfill one can't be used given that sight distances comply or exceed 100km/h distances.	Alternative access options have been considered in Section 3.3 of this TIA. Lot 2 DP1206469 has separate ownership.
6	The alignment's sight distance to the west of the proposed access is limited by a crest. This will require a higher order treatment to protect right-turning traffic. Design speed will need to be 100km/h. The throat of the access will likely require BAL treatment.	GPS survey measurements show that Austroads sight distances requirements are achieved based on a 100km/h design speed at the proposed intersection location. Refer to Section 3.4 of this TIA.
7	The concepts for the options do not provide enough detail at this stage to confirm constructability. However, notwithstanding points 3 & 6 above...A CHR(s) designed for B-Doubles to 100km/h standards could be considered adequate. It would require a Vehicle Management Plan to regulate arrivals so as not to overspill the storage.	Development of a Construction Transport Management Plan has been recommended prior to works, including regulation of arriving heavy vehicles. A BAR/BAL intersection treatment is proposed.