

Appendix K Updated Traffic Impact Assessment (TIA)



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TRAFFIC IMPACT ASSESSMENT

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

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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 215MW (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. Revision D of this TIA was included as Appendix J to the Environmental Impact Statement lodged for the Oxley Solar Farm SSD-10346.

This version of the TIA (Revision E) has been updated to reflect changes to the development arising from public and agency submissions. Specific changes considered include:

- a reduced development footprint;
- the assessment of two alternate options for the primary site access via Waterfall Way, both of which are in different locations from the primary site access previously proposed;
- proposed upgrades to the existing causeway on Gara Road across Gara River;
- the report has been updated to consider cumulative traffic impacts from additional major developments in the vicinity.

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 issues and responses is included in Appendix C.

Further consultation occurred with Armidale Regional Council after publication of the EIS while investigating improved options for the primary site access off Waterfall Way, and considering upgrades to the causeway on Gara Road to improve amenity and accessibility. This correspondence is also 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 up to 267 hectares over the total proposal site area of approximately 1,048 hectares within the following six (6) separate allotments:

Allotments used for solar farm operational components	Lot 5 DP253346 (914 Gara Road, Metz)
	Lot 6 DP625427 (972 Gara Road, Metz)
	Lot 2 DP1206469 (1352 Grafton Road, Metz)
Allotments used for primary site access from Waterfall Way	Lot 1 DP1206469 (1238 Grafton Road, Metz)
	Lot 7003 DP1060201 (part of the 'Commissioners to Gara' TSR)
	Lot 7004 DP1060201 (part of the 'Gara to Commissioners' TSR)

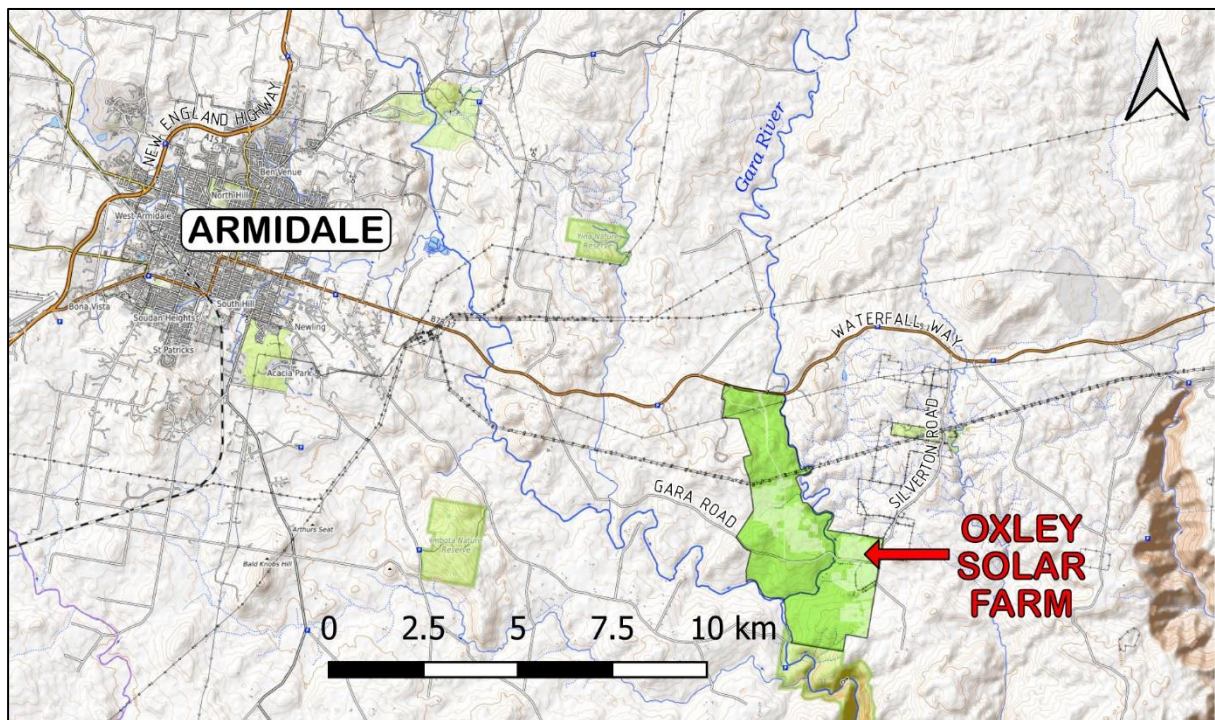


Figure 2.1: Locality Plan (base map: Open Topo Map, 2022)

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 Waste Facility 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. The location of other major energy-related development projects in the region are shown in Figure 2.2 and listed in Table 2.1.

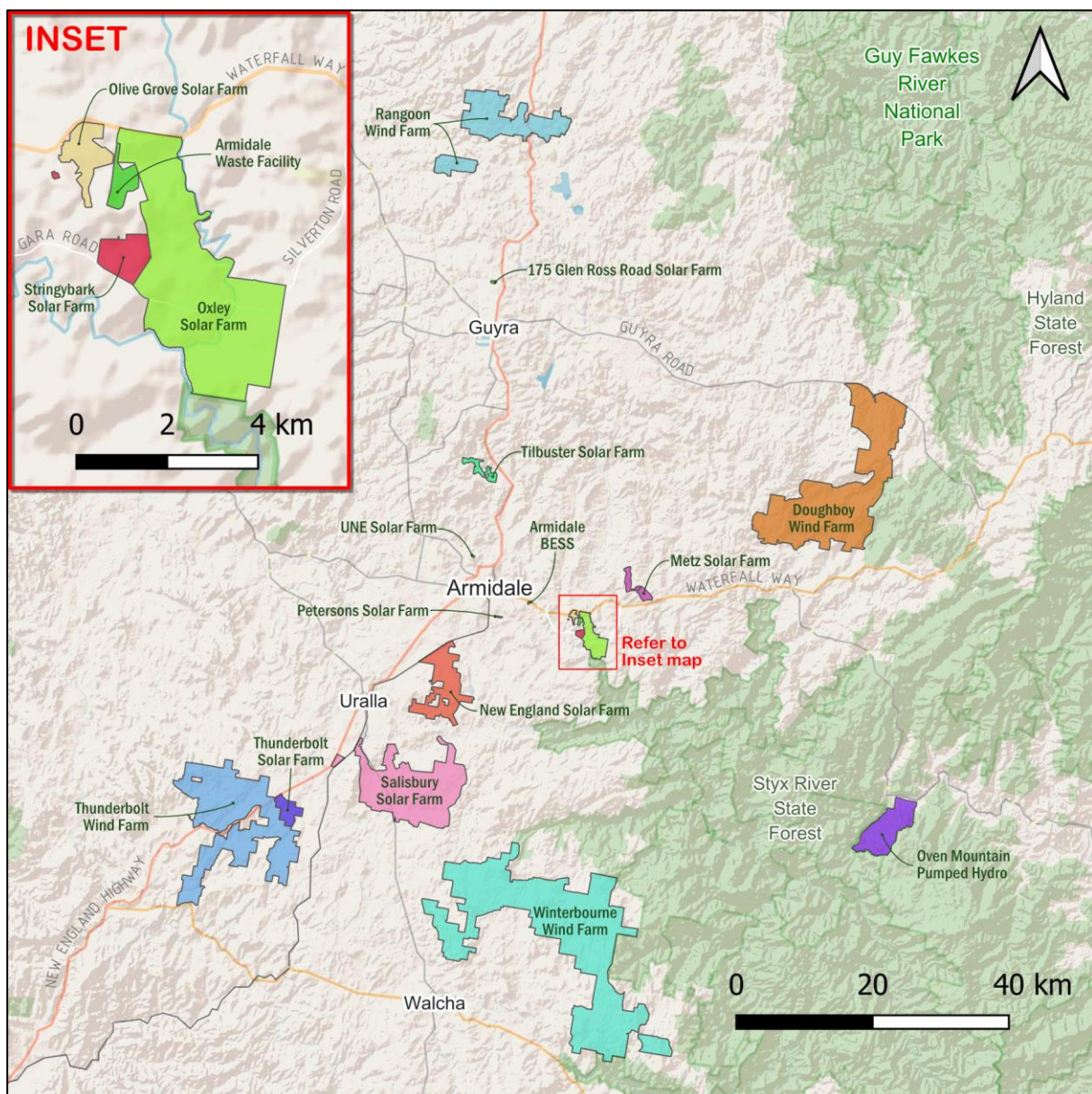


Figure 2.2: Nearby Major Developments (base map: ESRI OSM & Relief, 2022)

Table 2.1: Nearby Approved or Proposed Energy-Related Developments

Name	Reference	Status
Stringybark Solar Farm	PPSNTH-6	Determined
Olive Grove Solar Farm	PPSNTH-30	Determined
Metz Solar Farm	SSD-7931	Final Commissioning
Tilbuster Solar Farm	SSD-9619	Determined
Petersons Solar Farm	PPSNTH-20	Determined
UNE Solar Farm	PPS-2017NTH021	Operational
New England Solar Farm	SSD-9255	Under Construction
Oxley Solar Farm	SSD-10346	Response to Submissions
Salisbury Solar Farm	SSD-10347	Not available
175 Glen Ross Road Guyra	PPSNTH-34	Determined
Doughboy Wind Farm	SSD-9161599	Preparing EIS
Oven Mountain Pumped Hydro Storage	SSI-12422997	Preparing EIS
Rangoon Wind Farm	SSD-10476	Preparing EIS
Winterbourne Wind Farm	SSD-10471	Preparing EIS
Thunderbolt Solar Farm	SSD-11029111	Preparing EIS
Thunderbolt Wind Farm	SSD-10807896	Response to Submissions
Armidale Battery Energy Storage System (BESS)	SSD-23515853	Preparing EIS

2.4 Surrounding Road Network

2.4.1 Waterfall Way (incorporating Grafton Road)

The name 'Waterfall Way' refers to a 185km scenic drive between the Pacific Highway (HW10) at Raleigh and the New England Highway (HW9) at Armidale. Waterfall Way is a classified (State) road, managed and financed by Transport for NSW (TfNSW), who reference this route as (Main Road) MR76.

The gazetted name for that section of Waterfall Way east of Canambe Street in Armidale, and south of the Guyra Road and Waterfall Way intersection near Ebor, is 'Grafton Road'.

Waterfall Way incorporates Grafton Road, as well as many other roads and streets between the New England Highway and the Pacific Highway, and is the term generally used throughout this report except for addressing or other purposes where 'Grafton Road' strictly applies.

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).

There is an existing eastbound overtaking lane on Waterfall Way of length 920m located 2km east of Gara River at Argyle, and a westbound overtaking lane 640m in length at Four Mile Creek, Hillgrove.

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 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 2.2. Images of Gara Road are shown in *Appendix B*.



Figure 2.4: Gara Road

Table 2.2: 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 2.3. Images of Silverton Road are shown in *Appendix B*.

Table 2.3: 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 2.4. A schedule of the primary haulage route is....


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




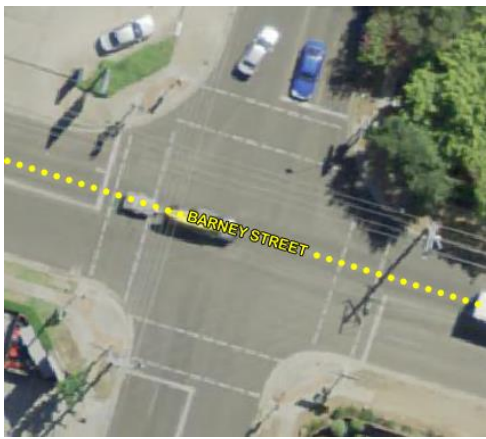
Segment	Road Name	Start Point	End Point
1	Uralla Road	New England Highway	Miller Street
2	Kentucky Street	Miller Street	Dangar Street
3	Dangar Street	Kentucky Street	Barney Street
4	Barney Street	Dangar Street	Canambe Street
5	Grafton Road (Waterfall Way)	Canambe Street	Oxley Solar Farm Property Access





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 2.5. The yellow dotted line in the image shows the route taken by heavy vehicles travelling to the site. Those rows in Table 2.5 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 2.5: Key Intersections Along Haulage Route from New England Highway

Intersection	Description	Image
New England Highway and Uralla Road	Two-lane roundabout. Haulage route requires a right turn towards Armidale CBD, and a left turn on the return journey.	

Intersection	Description	Image
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 the site, and a right turn upon the return journey.	
Dangar Street and Barney Street, Armidale	Single lane roundabout. Haulage route requires a right turn on the outward leg, and a left turn on the return leg.	
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.	

Intersection	Description	Image
Barney Street and Canambe Street	Single lane roundabout. Haulage route requires travel straight through the roundabout with no turn.	
Grafton Road and Gara Road	T-intersection. Haulage route requires travel straight through on Waterfall Way (the priority road).	
Grafton Road and Armidale Waste Facility Access Road (Option 2)	Existing T-intersection. Haulage route requires a CHR-S right-turn into the existing landfill access, and a BAL left turn during egress.	
Grafton Road and New Site Access (Option 1)	New T-intersection to be constructed on Waterfall Way, comprising an Austroads CHR-S right turn treatment into a new two-lane access through a Travelling Stock Reserve (TSR), and a with a BAL left turn during egress.	

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.

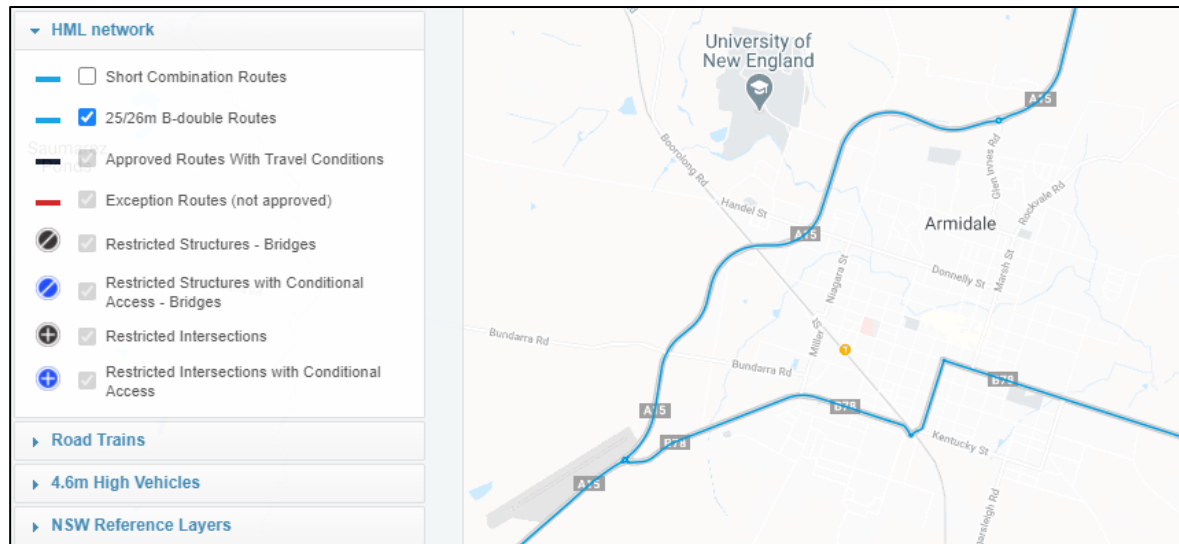


Figure 2.7: Currently Approved Restricted Access Vehicle HML 25/26m B-Double Routes

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 the 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 2.6 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 2.6: 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
Traffic Count (both directions)	1,391	1,450	1,295	1,326
Light Vehicles	92%	93%	94%	94%
Heavy Vehicles	8%	7%	6%	6%

Edwards Coaches operate two (2) school bus services on Waterfall Way, collecting and dropping off children 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.

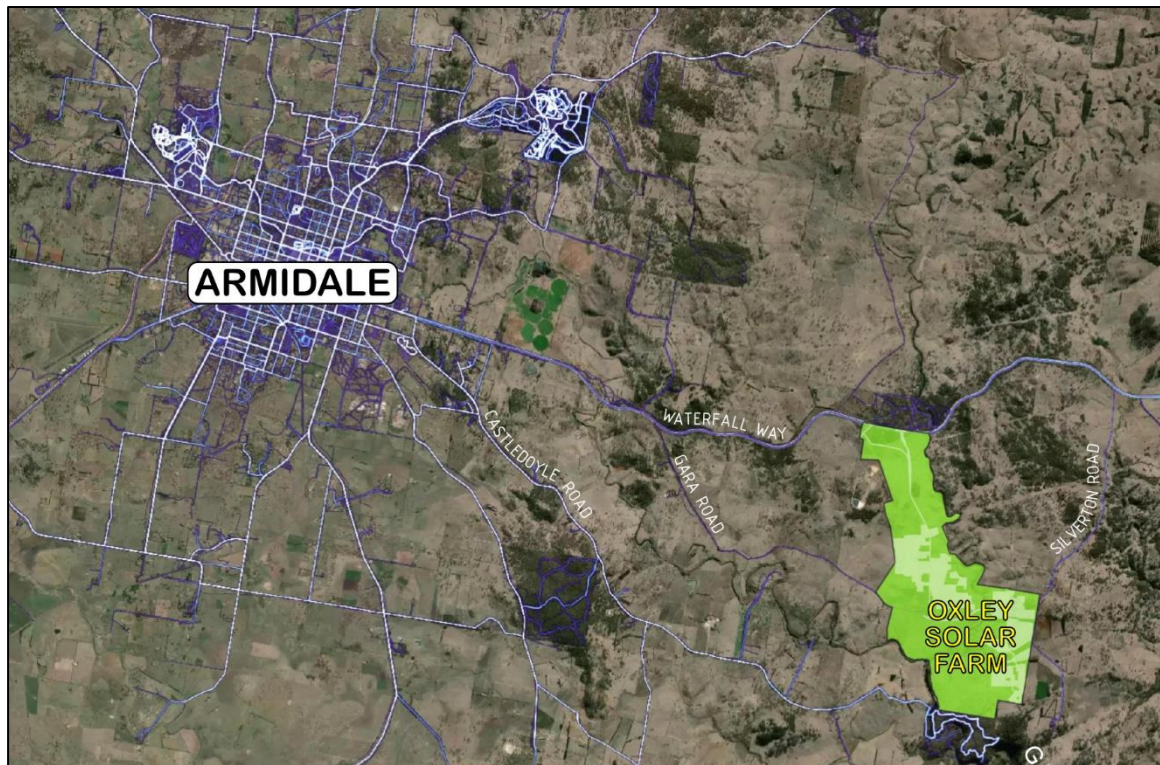


Figure 2.8: Strava Global Heatmap showing all activities (accessed February 2021)

2.8 Existing Site Access

The existing primary property access to Lot 2 DP1206469 is located at 1352 Grafton Road, Metz, approximately 106m west of the bridge over the Gara River and immediately after the end of the safety barrier as shown in Figure 2.9.



Figure 2.9: Existing primary property access at 1352 Grafton Road, Metz

A secondary access is located 40m west of the primary access, to gain access to a telecommunications facility located within Lot 2 DP1206469.

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, Lots 1 and 2 DP1206469, and Lots 7003 and 7004 DP1060201 as shown in Figure 3.1, having generation capacity of 215MW (AC). The solar farm will include:

- solar arrays with approximately 385,280 panels, either fixed tilt or with a tracking system;
- a single primary access track from Waterfall Way (either Option 1 or Option 2), as well as internal gravel tracks generally 7m wide for construction and maintenance purposes.
- an onsite 132kV outdoor substation, and two (2) 132/33kV transformers;
- lithium-ion battery storage with inverters having capacity of about 50MWh;
- 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 with anti-climb topping.

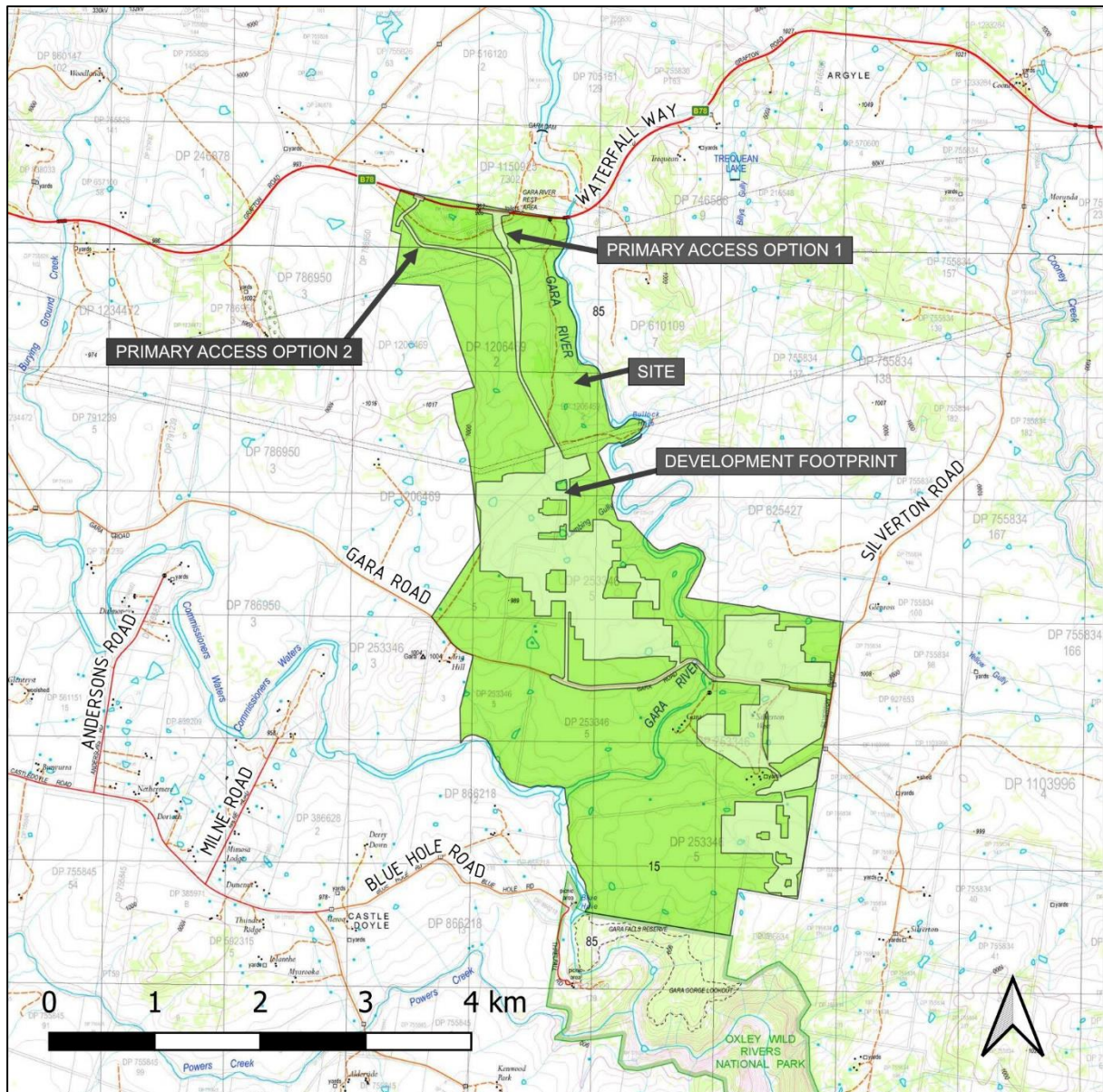


Figure 3.1: Proposed Oxley Solar Farm Development (base map: DFSI Spatial Services, 2022)

3.2 Proposed Access and Parking

Primary access to the solar farm will occur from a single new property access from Waterfall Way (Grafton Road). Two alternate access options are presented and assessed, being either:

- Option 1 – a new T-intersection to be built 450m west of the existing property access; or
- Option 2 – via the existing access road to the nearby Armidale Regional Landfill.

Only one of the two options will be ultimately developed, with the decision subject to resolution of site-specific issues including any possible Native Title claim. The primary access will be used for all vehicle access to the site, including heavy vehicles, light vehicles, over-mass and over-dimensional vehicles.

The primary access will cross an intermittent natural drainage line approximately 600m south of and parallel to Waterfall Way. A culvert crossing is proposed generally similar in design to the culvert installed for the adjoining Armidale Regional Landfill access as approved in modification 06_0220 MOD 1. Solar farm construction and operational access will not be necessary during intense storm events, which are only of relatively short duration given the small catchment size, and the culvert will be designed to ensure accessibility during the design 20% Annual Exceedance Probability (AEP) storm event. The culvert crossing will incorporate design measures such as rock armoured of the downstream embankment batters to prevent erosion and scouring during any overflow events.

Four (4) 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, including a causeway crossing of the Gara River. No direct site access will occur from Silverton Road.

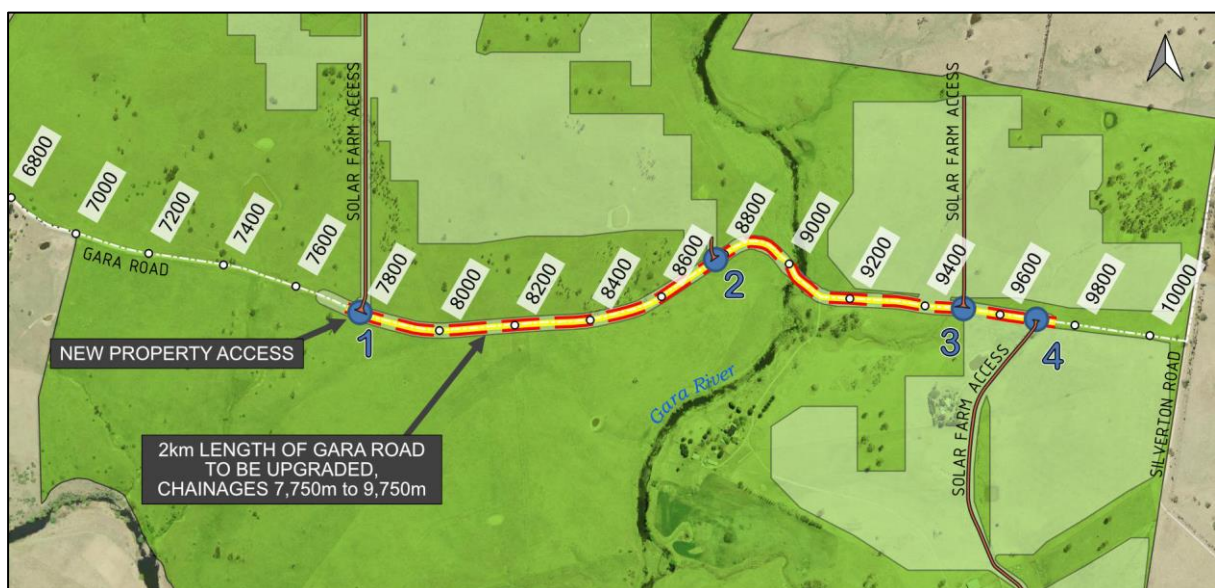


Figure 3.2: Location of Proposed Property Access Driveways off Gara Road

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

Various options were considered for the primary site access from Waterfall Way, as identified by the letters A to D inclusive in Figure 3.3 which represent existing (A & D) or potential (B & C) intersection locations along Waterfall Way.

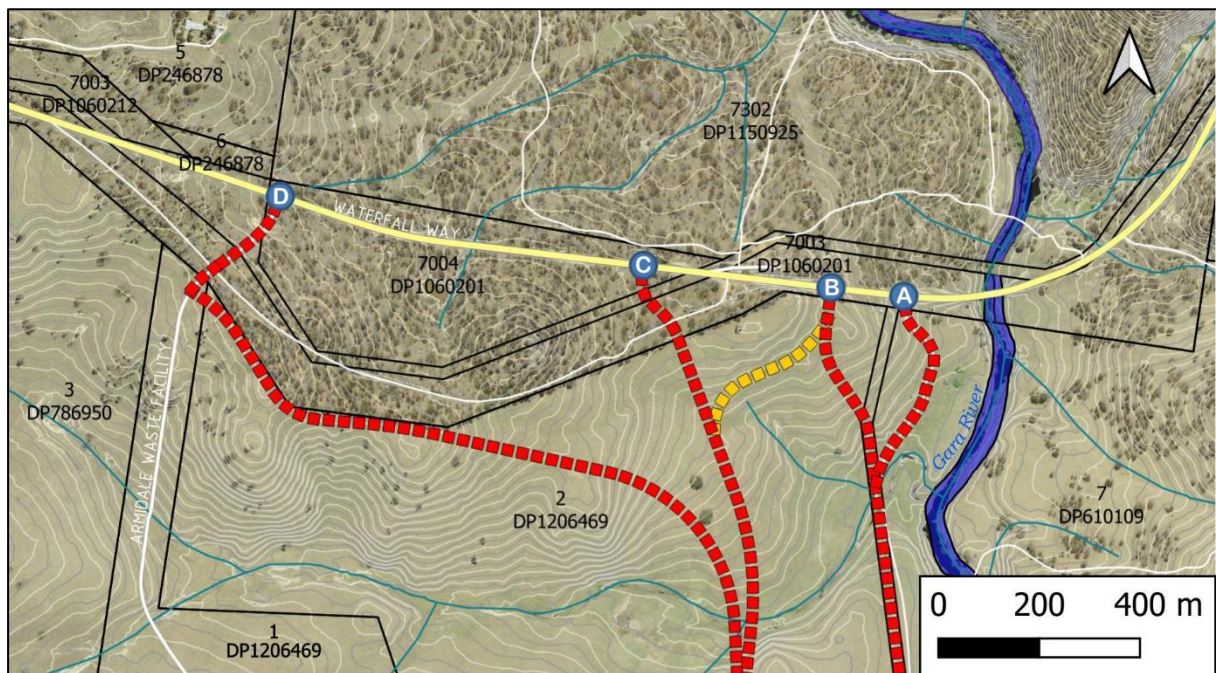


Figure 3.3: Alternative Access Options Considered from Waterfall Way

An elevation profile of Waterfall Way showing potential access locations is displayed in Figure 3.4 below, from west to east, with a ten (10) times vertical exaggeration.

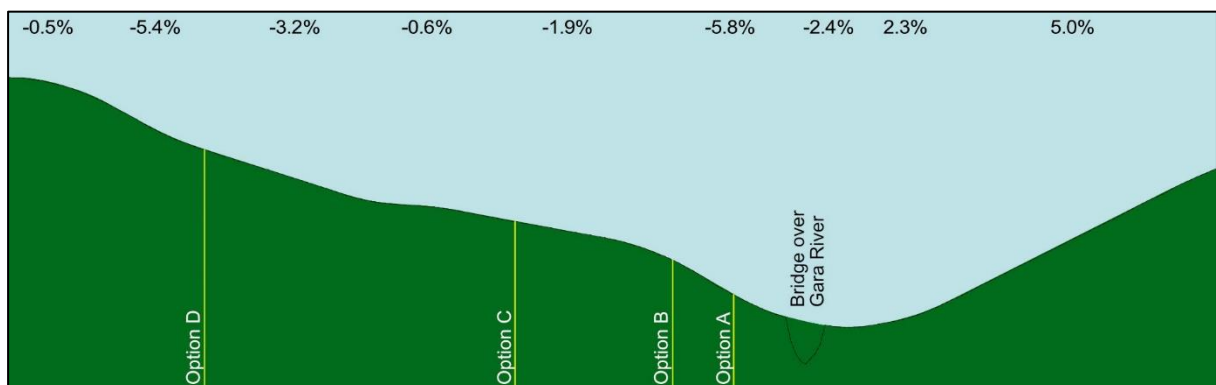


Figure 3.4: Longitudinal section along the centreline of Waterfall Way (Grafton Road)

3.3.1 Option A – Existing Property Access to 1352 Grafton Road

The existing property access at 1352 Grafton Road is located approximately 150m west of the Gara River, as observed in Figure 2.9. This access nearly coincides with an unformed 20m wide Crown road reservation running in a north-south direction through Lot 2 DP1206469. Constraints with this property access include:

- Safe Intersection Sight Distance (SISD) and Approach Sight Distance (ASD) cannot be achieved to the west due to a change in vertical grade along Waterfall Way. Available SISD for cars is 235m and the grade-corrected requirement is 280m.
- 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. Improving intersection geometry would require modification of safety barriers and increased motorist hazard.
- Steep gradients and traffic safety barriers on the northern side of Waterfall Way would be an obstacle to the implementation of a channelised right-turn treatment, as needed to account for the restricted sight distance to the west, without significant earthworks in an environmentally sensitive area.
- An area south of Waterfall Way along the access route commencing at point 'A' was assessed as a 'No Go' area following environmental assessment.

Option A was removed from further consideration.

3.3.2 Option B – New Property Access 125m West of the Existing Property Access

Option B comprises a new property access located approximately 130m west of the existing property access, near the intercept of straight sections of road to the east and west.

Constraints with this access include:

- Safe Intersection Sight Distance (SISD) is just achievable for motorists travelling east, though Approach Sight Distance (ASD) is obstructed for car drivers by the sharp change of grade located west of the potential access.
- 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 require more extensive earthworks than alternative sites to permit an Austroads CHR-S right-turn treatment.
- An area south of Waterfall Way along the access route commencing at point 'B' was assessed as a 'No Go' area following environmental assessment.

Option B was removed from further consideration.

3.3.3 Option C – New Property Access 450m West of the Existing Property Access

This option includes a new T-intersection located near the middle of a straight length of road.

Constraints with this access include:

- A new intersection requires construction at significant cost.
- Access would be required through Crown land including Lots 7003 and 7004 DP1060201 to reach the development site. Lots 7003 and 7004 are Travelling Stock Reserves (TSR) managed by the Northern Tablelands Local Land Services (LLS). Conditional approval may be issued by the LLS for vehicle access.

- The Crown land could be subject to a Native Title claim.
- Removal of native vegetation including mature trees would be required through the TSR. Some culturally important items were identified near the route during environmental assessment which would require care during design and construction to avoid any impacts.

This option remains viable and is referenced from this point in the TIA, and elsewhere in the Environmental Impact Statement, as the **Option 1** primary access.

3.3.4 Option D – Utilisation of the Existing Armidale Waste Facility Access

Option D utilises the existing BAL / CHR-S intersection treatment which was constructed in approximately 2016 to access the new Armidale regional landfill at 1238 Grafton Road, within Lot 1 DP1206469. This access was designed for long-term use over a 50-year time horizon and complies with all Austroads sight distance criteria including SSD, ASD, SISD and MGSD in each direction based on a vehicle operating speed of 100km/h, conservative reaction time of 2.5 seconds, and coefficient of deceleration of 0.36 (or 0.29 for trucks).

Constraints with this access location include:

- The internal access road only has width suited for two-way traffic for a length of 100m from the Waterfall Way intersection. Widening of the access would be required through a section of TSR within Lot 7003 DP1060201, and for a short distance within Armidale Regional Council's land at Lot 1 DP1206469;
- Security fencing and landfill access systems require modification to ensure no unauthorised landfill access;
- A significantly longer internal access road would require construction within Lot 2 DP1206469;
- Some culturally important items were identified near the route during environmental assessment which would require care during design and construction to avoid any impacts.

This option remains viable and is referenced from this point in the TIA, and elsewhere in the Environmental Impact Statement, as the **Option 2** primary access.

3.4 Available Sight Distances for Access Points off Waterfall Way

Those intersection sight distance requirements specified within Section 3 of the *Austroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections* have been evaluated in a desktop study for the Option 1 and Option 2 access points, and are summarised in Table 3.1.

The sight distance criteria assessed includes Stopping Sight Distance (SSD), Approach Sight Distance (ASD), Safe Intersection Sight Distance (SISD), and Minimum Gap Sight Distance (MGSD), for travel on the major road (Waterfall Way).

Vertical sight distances are based on a profile fitted to a longitudinal section extracted along the centreline of Waterfall Way from the NSW 2m Digital Elevation Model (DEM). Horizontal sight distances have been determined from aerial imagery and a site visit. 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 desirable Austroads Approach Sight Distances (ASD) are available at both the proposed new access located 450m west of the existing property access, and at the Armidale Waste Facility 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.

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. SISD is available for both cars and trucks at either proposed access.

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 readily achieved at both proposed access points from Waterfall Way.

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 7,780m, 8,770m, 9,500m and 9,700m when measured from the Waterfall Way intersection. The development footprint allows the access at 9,500m to be relocated west to approximately 9,400m if necessary to improve sight distances. All intersection angles with Gara Road should be between 70° and 110° to ensure drivers of heavy vehicles are able to have unobstructed visibility of traffic on the public road.

A profile of Gara Road centreline displaying the relative location of proposed access points is shown in Figure 3.5, derived from site photogrammetry by Jacobs, and with a ten (10) times vertical exaggeration.

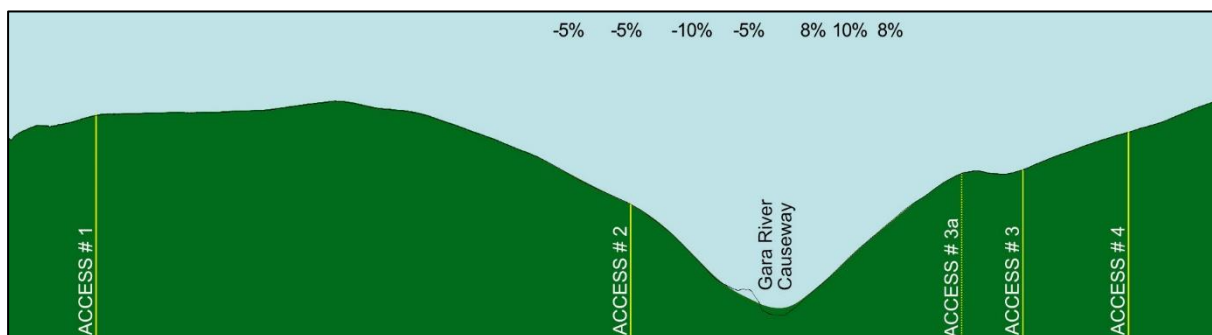


Figure 3.5: Longitudinal section along the centreline of Gara Road

The profile centreline varies slightly from the existing centreline in the vicinity of the Gara River causeway to account for a proposed minor upgrade of this causeway to make it suitable for two-way traffic and increase the causeway level above normal water levels in Gara River. The proposed causeway upgrades are described further in Section 4.8 of this report.

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

		OPTION 1 – NEW PROPERTY ACCESS 450m WEST OF THE EXISTING PROPERTY ACCESS TO 1352 GRAFTON ROAD, METZ				OPTION 2 – ARMIDALE WASTE FACILITY, EXISTING PROPERTY ACCESS TO 1238 GRAFTON ROAD, METZ			
		WESTERN SIDE		EASTERN SIDE		WESTERN SIDE		EASTERN SIDE	
Road Geometry		Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
Stopping Sight Distance (SSD) 1.1m to 0.2m (Cars)	Available	230m	490m	250m	>500m	265m	>500m	>500m	350m
	Required	185m	✓	175m	✓	195m	✓	170m	✓
Approach Sight Distance (ASD)¹ 1.1m to 0.0m (Cars)	Available	240m	490m	305m	>500m	305m	>500m	>500m	350m
	Required	185m	✓	175m	✓	195m	✓	170m	✓
Approach Sight Distance (ASD)¹ 2.4m to 0.0m (Trucks)	Available	>500m	490m	335m	>500m	390m	>500m	>500m	350m
	Required	215m	✓	195m	✓	230m	✓	195m	✓
Safe Intersection Sight Distance² Car on major road impacting with egressing car	Available	>500m	490m	320m	>500m	330m	>500m	>500m	350m
	Required	270m	✓	260m	✓	280m	✓	255m	✓
Safe Intersection Sight Distance² Car on major road impacting with egressing truck	Available	>500m	490m	360m	>500m	>500m	>500m	380m	350m
	Required	295m	✓	280m	✓	315m	✓	280m	✓
Minimum Gap Sight Distance 1.1m to 0.65m (Cars), $t_a = 5s$	Available	>500m	490m	285m	>500m	300m	>500m	>500m	350m
	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 2.5 seconds (unaltered driving conditions/high speed rural intersection), and coefficient of deceleration of 0.36 (cars) and 0.29 (trucks).
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).

Available and required sight distances at proposed access locations off Gara Road are shown in Table 3.2, adjusted for approach gradient and are based on a reaction time of 2.5 seconds, 85th percentile speed of 80km/h, and coefficient of deceleration of 0.36. Tick symbols indicate where available sight distances exceed the required distances, and cross symbols indicate non-conformance.

Table 3.2: Proposed Site Access Points off Gara Road (80km/h operating speed)

Access No.	Approx. Chainage (m)	Sight Distance Type	Required Sight Distances		Approximate Available Sight Distance/s			
			West	East	West		East	
1	7,780	SISD	190m	195m	225m	✓	455m	✓
		ASD	125m	130m	170m	✓	105m	✗
		MGSD	111m	111m	180m	✓	455m	✓
2	8,770	SISD	205m	180m	345m	✓	150m	✗
		ASD	140m	115m	245m	✓	65m	✗
		MGSD	111m	111m	65m	✗	115m	✓
3a	9,425	SISD	185m	200m	200m	✓	>500m	✓
		ASD	115m	130m	50m	✗	35m	✗
		MGSD	111m	111m	113m	✓	>500m	✓
3	9,500	SISD	195m	200m	105m	✗	>500m	✓
		ASD	130m	135m	80m	✗	>500m	✓
		MGSD	111m	111m	80m	✗	>500m	✓
4	9,700	SISD	190m	205m	345m	✓	>400m	✓
		ASD	120m	135m	340m	✓	>400m	✓
		MGSD	111m	111m	330m	✓	>400m	✓

Important Austroads sight distances including Safe Intersection Sight Distance (SISD) and Minimum Gap Sight Distance (MGSD) are achieved at proposed access locations 1, 3a and 4. Access locations 2 and 3 exhibit substandard sight distances due to local topography and access is not recommended in these locations. Access number 3 can be replaced by access 3a as foreshadowed in the environmental assessment. Restricted movements could be considered at access number 2 during construction of the solar farm when traffic will be operating under a Traffic Management Plan, if suitable alternative access locations cannot be identified in consultation with Armidale Regional Council as the roads authority.

Approach Sight Distances (ASD) based on vehicles approaching the Gara Road access points are achieved at most access points. Section 3.4 of the Austroads guide acknowledges that ASD criteria often cannot be achieved on roadways having tighter horizontal and vertical alignments, and at other than domestic accesses, ASD is not required where other means are provided to provide perception of the access to motorists. For this development it is considered that the fencing, signage and intersection upgrades and lower speed environment during construction will provide suitable indication of the approaching property intersections to motorists.

After road upgrades have been completed to Gara Road the operating speed of vehicles is expected to increase, especially after the removal of any temporary construction-related

traffic controls. Table 3.3 below shows a review of available and required sight distances based on a vehicle operating speed of 100km/h on Gara Road:

Table 3.3: Proposed Site Access Points off Gara Road (100km/h operating speed)

Access No.	Approx. Chainage (m)	Sight Distance Type	Required Sight Distances		Approximate Available Sight Distance/s			
			West	East	West		East	
1	7,780	SISD	255m	265m	225m	✗	455m	✓
		ASD	175m	180m	170m	✗	105m	✗
		MGSD	139m	139m	180m	✓	455m	✓
2	8,770	SISD	280m	245m	345m	✓	150m	✗
		ASD	200m	160m	245m	✓	65m	✗
		MGSD	139m	139m	65m	✗	115m	✗
3a	9,425	SISD	245m	270m	200m	✗	>500m	✓
		ASD	165m	190m	50m	✗	35m	✗
		MGSD	139m	139m	113m	✗	>500m	✓
3	9,500	SISD	265m	275m	105m	✗	>500m	✓
		ASD	180m	195m	80m	✗	>500m	✓
		MGSD	139m	139m	80m	✗	>500m	✓
4	9,700	SISD	255m	280m	345m	✓	>400m	✓
		ASD	170m	195m	340m	✓	>400m	✓
		MGSD	139m	139m	330m	✓	>400m	✓

Since the western approach to the first Gara Road access (no. 1) will not be widened and sealed, approaching vehicles are not expected to be travelling faster than 80km/h allowing SISD to be achieved west of access 1.

It is recommended that alternate access locations be explored during the detailed design phase for access points 2 and 3 and/or improvements to the horizontal and vertical geometry of Gara Road so as to maximise available sight distances, or alternatively higher order intersection treatments investigated to provide equivalent safety outcomes.

Sight distances are limited in some locations 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.

Prior to any road improvements on Gara Road, detailed design plans will be required to demonstrate that Austroads intersection sight distances can be achieved at each proposed access location, or other alternative arrangements made such as temporary traffic control, to the satisfaction of Armidale Regional Council as the roads authority.

The development of a Construction Traffic Management Plan (CTMP) is recommended to ensure that all traffic and transport risks are identified and appropriately managed during the construction phase.

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 site access tracks, 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	21,300m ³
Sand	10,000m ³
Concrete	900m ³
Solar Panels	385,280
Water	Up to 100ML non-potable and 0.4ML potable supply

Concrete, gravel, sand and non-potable water are expected to be sourced from the local area. Potable water would be sourced from a commercial water supplier. 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
- Excavator (30T)
- Grader
- Chain trencher
- Water truck
- Telehandler
- Forklift
- Skidsteer

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
Equipment		
Solar Panels	B Double	735
PCU's	Semi-Trailer	55
Switchboards	Semi-Trailer	2
Transformer and 200 Tonne Crane	Oversize vehicles	5
Total cables	Semi-Trailer	110
50 MWh battery storage	Semi-Trailer	50
Steel posts, tables and brackets	Semi-Trailer	495
Buildings		
Control room	Semi-Trailer	3
Warehouse	Semi-Trailer	1
Offices	Semi-Trailer	6
Water tanks	Semi-Trailer	4
Fences		
Posts and wire mesh	Semi-Trailer	5
Earthworks and grader	Semi-Trailer	3
Heavy Machinery		
Telehandler	Semi-Trailer	30
Tractors/bulldozers	Semi-Trailer	3
Miscellaneous trucks	Standard truck	1,670
Water Tankers	20kL Tanker	6,590
Construction personnel		
Construction workers	Shuttle buses	5,840
	Cars	7,040

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)	ESTIMATED PEAK DAILY ONE-WAY TRIPS BY VEHICLE TYPE
Semi-Trailers	767	23	66 Heavy Vehicles
B Double	735	2	
Oversized vehicles	5	1	
Standard trucks	1,670	5	
Water tankers	6,590	15	
Buses	5,840	20	
Cars	7,040	30	30 Light Vehicles
TOTAL	22,647	96	96 Total Vehicles

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, with the possible exception of site access tracks and the onsite substation, would be removed over a period of approximately 9 months to revert the site back to primary production use.

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

4.2 Transport Routes

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

The transport route will be on state roads between Armidale and the site, via Waterfall Way (Grafton Road) to the primary property access point. A small length of Gara Road, which is managed by Armidale Regional Council, would be used to transport materials to the southern and eastern parts of the site. Refer also to section 2.5 and Appendix D of this TIA.

4.3 Traffic Generation for Nearby Major Developments

Major planned or recently constructed developments in the vicinity of the Oxley Solar Farm are shown in Figure 4.1, and those developments which are likely to generate additional traffic on Waterfall Way are summarised in Table 4.4.

Table 4.4: Traffic Generating Developments Impacting Waterfall Way (Grafton Road)

Project	Planning Reference	Status
Metz Solar Farm	SSD-7931	Determined
Olive Grove Solar Farm (30MW)	PPSNTH-30	Determined
Stringybark Solar Farm (30MW)	PPSNTH-6	Determined
Armidale Regional Landfill	MP06_0220	Determined
Oven Mountain Pumped Hydro Storage (600MW)	SSI-12422997	Preparing EIS
Doughboy Wind Farm	SSD-9161599	Preparing EIS
Armidale Battery Energy Storage System (BESS)	SSD-23515853	Preparing EIS

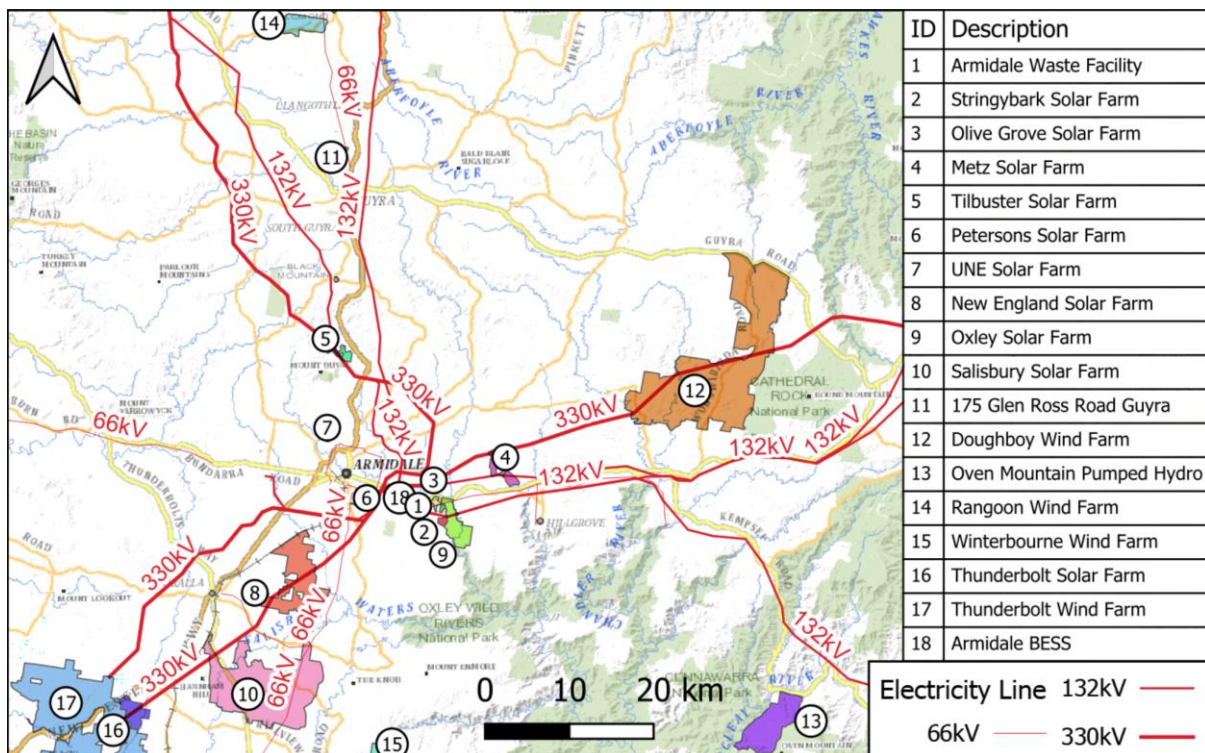


Figure 4.1: Major Regional Developments (base map: DFSI Spatial Services, 2022)

4.3.1 Metz Solar Farm

Construction of the 115MW Metz Solar Farm is in progress with completion expected in 2022, prior to the commencement of the Oxley Solar Farm. Operational traffic associated with the Metz Solar Farm will result in a minor increase to through-traffic on Waterfall Way past the Oxley Solar Farm access, forecast in the Traffic Assessment at up to 8 vehicles per day in each direction, and this additional ongoing traffic is considered for the Oxley Solar Farm intersection warrants.

4.3.2 Olive Grove Solar Farm

The 30MW Olive Grove Solar Farm site access is located east of Gara Road and west of the Oxley Solar Farm access. Since traffic generation will primarily occur between Armidale and the Olive Grove solar farm site access, this development is not likely to impact Austroads intersection warrants for the Oxley Solar Farm.

4.3.3 Stringybark Solar Farm

The 30MW Stringybark Solar Farm will primarily generate additional traffic on Waterfall Way between Armidale and Gara Road, and on Gara Road between Waterfall Way and the site access. Some additional traffic will also be generated on Waterfall Way east of Gara Road and terminating at the substation access point. Traffic generated by the Stringybark Solar Farm will not pass the primary Oxley Solar Farm access and so is not expected to have any impact on intersection warrants for the Oxley Solar Farm.

4.3.4 Armidale Regional Landfill

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 does not accept domestic self-haul waste deliveries. Instead, all waste is transferred from existing waste management facilities in Armidale and Guyra, or delivered directly by kerbside waste collection trucks. For the purpose of this assessment and based on discussion with staff at Armidale Regional Council, peak traffic of 20 vehicles are estimated to enter and exit the landfill daily, assumed to be a peak of 2 vehicles per hour.

4.3.5 Oven Mountain Pumped Hydro Storage

The Oven Mountain Pumped Hydro Storage (OMPHS) project comprises the construction of two reservoirs, tunnels and an underground power station, enabling water from the lower reservoir to be pumped into the upper reservoir using excess power from other renewable energy projects. Water would be released from the upper reservoir to generate up to 600MW of hydro power during periods of peak electricity demand.

The OMPHS Scoping Report dated January 2021 notes that due to the remoteness of the site, temporary camp accommodation will be required for the construction workforce. The primary transport route could be from either Armidale or Kempsey. In the former case, the route would be via Waterfall Way and the Armidale-Kempsey Road. Local materials will likely be sourced for concrete aggregate and dam fill, but supplementary materials such as fly-ash and cement dust will need to be transported to site. Construction may overlap with the Oxley Solar Farm. For the purpose of this traffic assessment, construction traffic on Waterfall Way during the peak construction period between 2023 and 2025 is estimated at 60 vehicles per day.

4.3.6 Doughboy Wind Farm

The 600MW Doughboy Wind Farm will be located east of the Oxley Solar Farm site. The Doughboy Wind Farm Scoping Report dated September 2020 states the primary heavy vehicle access to the site will be via the New England Highway, Waterfall Way (Grafton Road) and Kilcoy Road. Overlength and overmass vehicles may travel via Guyra Road and Wongibinda Road. Potential materials for the project construction include 60 wind turbines, a 100MW

energy storage battery, operations building, concrete batch plant facilities, rock crushing equipment, gravels, and water.

The Scoping Report does not provide estimates of additional traffic generated on Waterfall Way, and no detailed traffic assessments are yet available on the NSW Major Projects website within the NSW Planning Portal. Construction may overlap with the Oxley Solar Farm. For this assessment, it is assumed that peak traffic generation will be 275 trips daily, being the average generation stated in traffic assessments for the much larger 119-turbine White Rock Wind Farm (MP10_0160) and 159 turbine Sapphire Wind Farm (MP09_0093). Peak construction is assumed to occur over a 3-year period commencing in 2024.

4.3.7 Armidale Battery Energy Storage Scheme (BESS)

The Armidale Battery Energy Storage Scheme is located adjacent the Armidale 330kV transmission substation, and will have 150MW batter power and 300MWh battery storage, capable of powering more than 20,000 homes. The construction period is 12 months with completion in a single stage.

4.3.8 Other Regional Energy Projects

The Tilbuster, New England, Thunderbolt and Salisbury Solar Farms, and the Rangoon and Thunderbolt Wind Farms, are all accessed via the New England Highway and are not expected to create any adverse impacts or significant traffic generation on Waterfall Way. The Winterbourne Wind Farm is located well clear of the Oxley Solar Farm and is not expected to have any traffic impacts on Waterfall Way.

4.4 Combined Traffic from Other Proposed Developments

Since many developments are still in the planning stage, with no traffic impact assessments yet published, there is some uncertainty about the timing of developments and the impacts of combined development traffic. Traffic assessments for these developments will need to consider traffic generation from the Oxley Solar Farm and other regional energy projects.

There is potential for the peak construction period of the Oxley Solar Farm to overlap with the peak construction period for the Oven Mountain Pumped Hydro Storage and Doughboy Wind Farm projects. Combined traffic for the Oven Mountain and Doughboy Wind Farms is estimated at 335 vehicles per day in the assumed peak construction period between 2023 and 2025, and 36 vehicles per day thereafter for operational activities.

The Metz Solar Farm is expected to be complete prior to the start of the Oxley Solar Farm, and only operational traffic movements of 16 vehicle trips per day generated by this development.

In the worst case, the primary property access for the Oxley Solar Farm will be co-located with the Armidale Regional Landfill access, resulting in estimated peak hour traffic turning at the access of up to 16 vehicles per hour.

4.5 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 for the Oxley Solar Farm 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 OSF 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
TOTAL	66	66	30	30	96	96

Existing traffic on Waterfall Way adjacent the proposed site access was measured to be 1,597 vehicles per day in 2020, combining eastbound and westbound directions. Assuming typical 1.04% compound traffic growth on Waterfall Way, and cumulative impacts from nearby major developments as listed in Section 4.4.1, the estimated traffic over the next ten (10) years at the primary property access is shown in Table 4.6.

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

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Daily Traffic	1834	1998	2015	2032	1751	1768	1786	1804	1822	1841	1859	1878
AM Peak Hour	144	145	147	148	150	152	153	155	156	158	160	161
PM Peak Hour	162	164	166	167	169	171	173	174	176	178	180	182

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 Landfill / 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

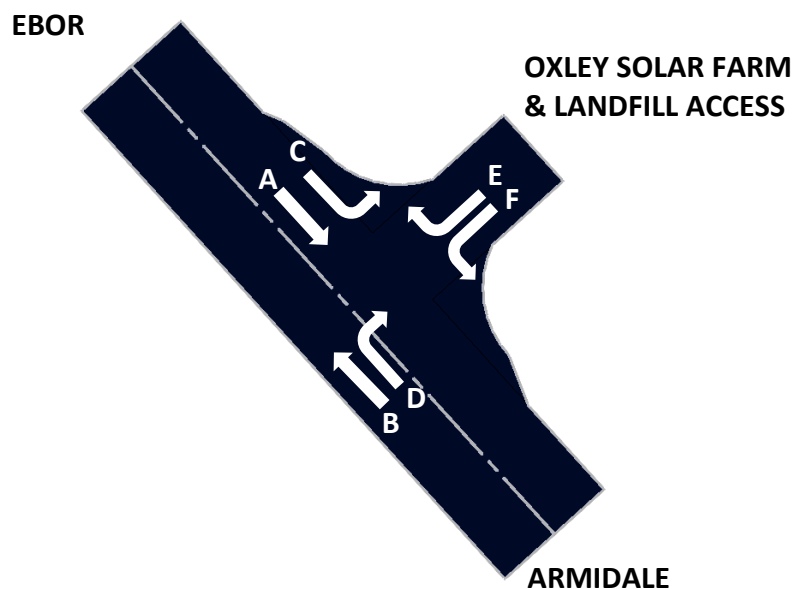


Table 4.7: Peak Hour Traffic Volumes at Oxley Solar Farm Site Access, Waterfall Way

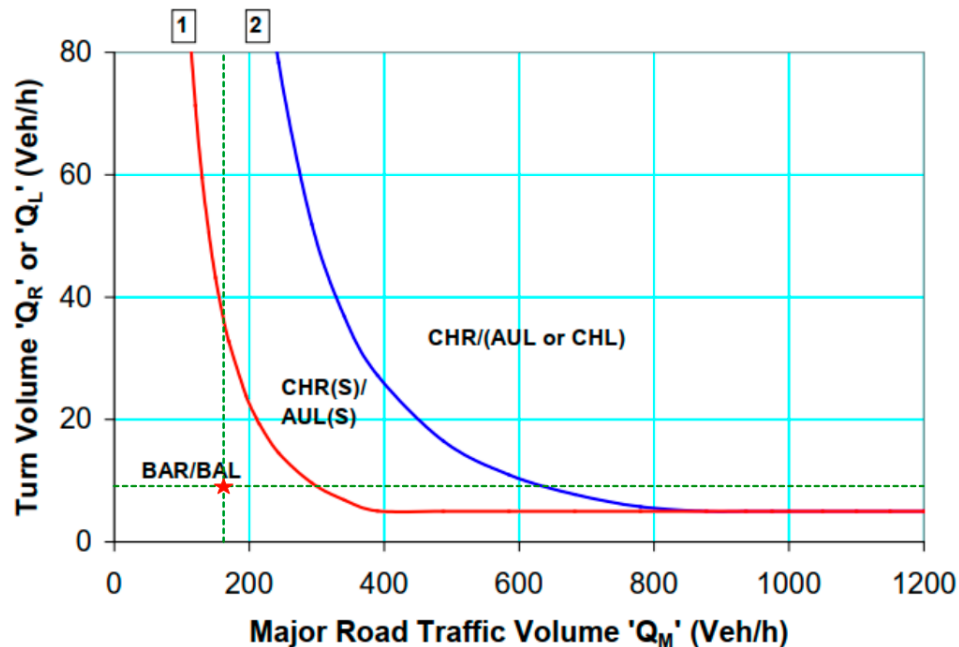
ARROW	PRE-DEVELOPMENT (2022)		CONSTRUCTION PHASE (2023)		OPERATION PHASE (2033)	
	AM peak	PM peak	AM peak	PM peak	AM peak	PM peak
A	81	91	88	99	83	93
B	81	91	88	99	83	93
C	0	0	0	0	0	0
D	2	2	9	9	3	3
E	0	0	0	0	0	0
F	2	2	9	18	3	3

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 $Q_M = 187$ veh/h (peak hour, both directions)
- Turn volume $Q_R = 9$ veh/h (inbound right-turn traffic)

Figure A 10: Warrants for turn treatments on the major road at unsignalised intersections



(a) Design speed ≥ 100 km/h

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

The traffic figures used in Figure 4.3 represent the worst case of the two Waterfall Way primary site access options, being co-located with the landfill access (access Option 2), and will be conservative for access Option 1.

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 $Q_M = 105$ veh/h (peak hour, both directions)
- Turn volume $Q_R = 26$ veh/h (inbound right-turn traffic)

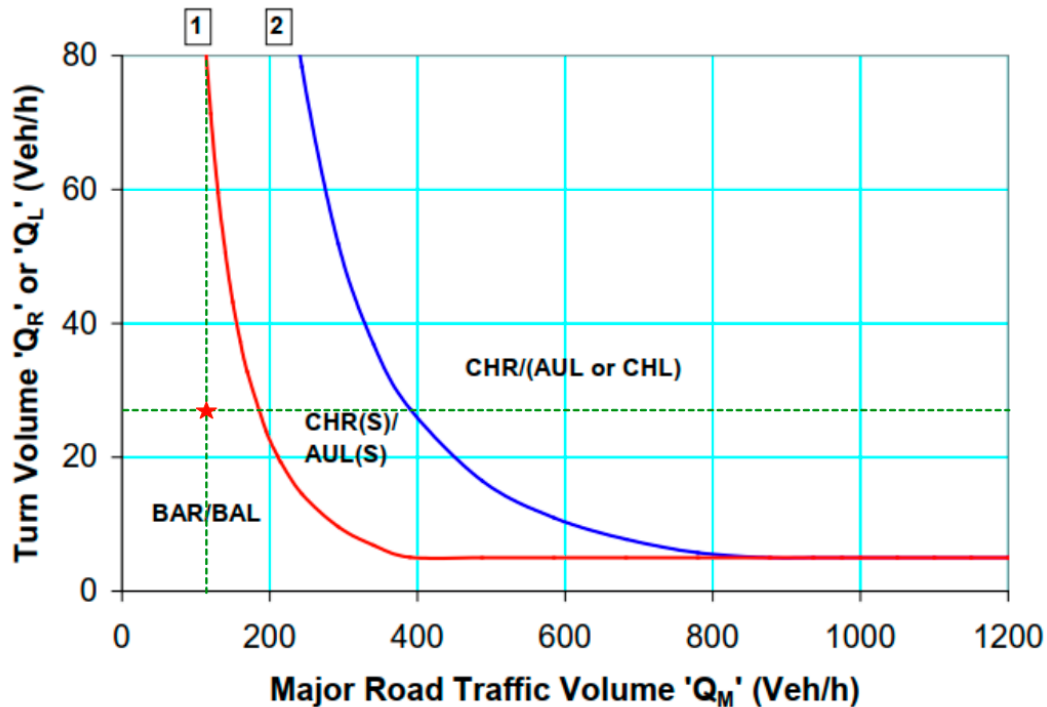
(a) Design speed ≥ 100 km/h

Figure 4.4: Austroads Intersection Warrant – OSF Construction Traffic Peak Hour

Peak hour traffic on Waterfall Way past the property entrance in the year 2033, at the end of the 10 year planning horizon, is estimated to be 182 vehicles per hour due to natural growth rate, as well as operational traffic from the Metz Solar Farm, Doughboy Wind Farm and Oven Mountain Pumped Hydro Storage projects. Turning traffic during the operational phase is estimated to be three (3) 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 only 4.3%. To provide storage length however it is recommended that the intersection treatment match that of the Armidale Regional Landfill, being a CHR-S/BAL rural turn treatment, which has been proven to be safe and effective in operation.

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.

4.6 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 10% 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 dated July 2017 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 with average speeds above 80km/h at all times of the day including peak periods of 8:00am to 9:00am and 3:00pm to 4:00pm, and where the percentage of time spent following other vehicles is less than 25%, represents free-flow traffic conditions 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 7,780m and 9,700m is expected to have increased light and heavy traffic totalling up to 96 vehicles per day during the peak construction period. Additional traffic would increase the generation of dust and rate of gravel loss, 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.

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, except where longitudinal gradients exceed 16% (*refer section D1.27 of the Armidale Regional Council Engineering Code [Specification D1](#), and section 3.09 of the ARC Engineering Code 'Handbook for driveway access to property' supplement to D1*), 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.

4.7 Concept Design for Primary Property Access off Waterfall Way

Two alternate options have been assessed for the primary property access off Waterfall Way, and these are shown in Figure 4.8. Option 1 involves the construction of a new property access, and Option 2 involves the use of the existing Armidale Regional Landfill access.

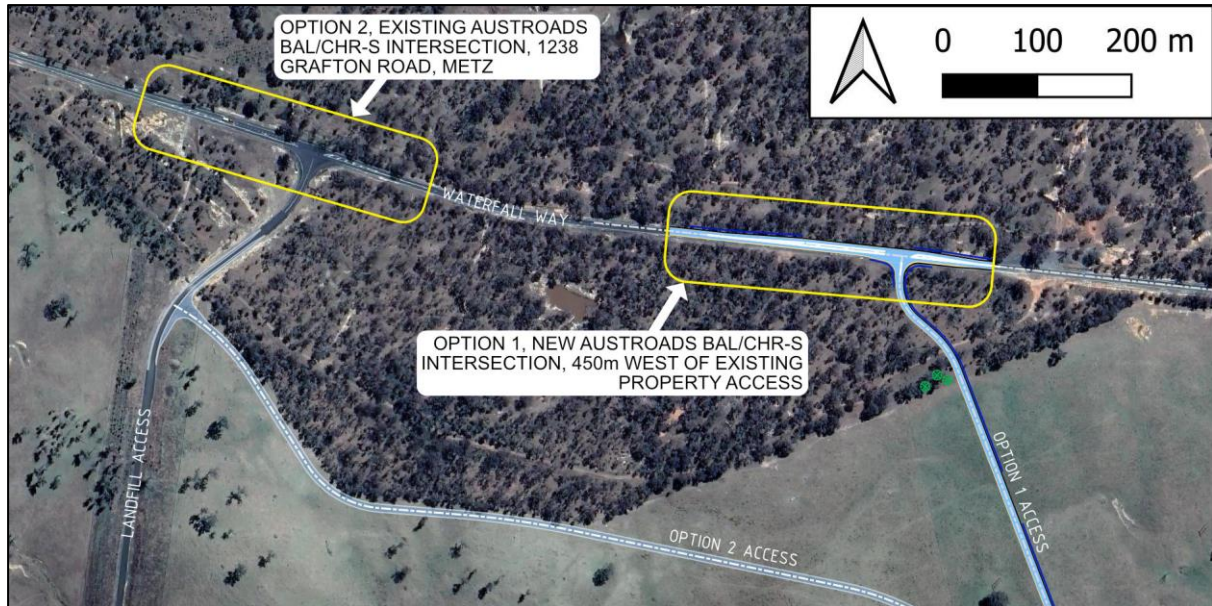


Figure 4.8: Proposed Alternate Locations for New Property Access to Waterfall Way

It is intended that the existing property access at 1352 Grafton Road would be closed and fenced to prevent ongoing access at this point, so that all future access to Lot 2 D{1206469 would occur via the new property access.

Either new access option (1 or 2) will include a minimum 150m length of sealed surface immediately south of Waterfall Way, to avoid the tracking of gravel onto Waterfall Way.

The Option 1 access will include a new Austroads Type BAL and CHR-S intersection, similar in geometry to the existing nearby landfill access. Tree clearing would be required within the Travelling Stock Reserve on the southern side of Waterfall Way to fit the new intersection and access road, and on the northern side of Waterfall Way to permit the new through-lane and table drain formation. A concept diagram for the Option 1 access is shown in Appendix H.

The Option 2 access does not require any works on Waterfall Way since the existing landfill access is already designed as an Austroads Type BAL and CHR-S intersection. Widening of the existing landfill access road would be required between approximately 100m and 300m south of Waterfall Way to create a two-way road suitable for heavy vehicles to pass.

The maximum dimension design vehicle to regularly access the Oxley Solar Farm site is expected to be 25/26 metre length B-Doubles and 25 metre length semi-trailers. 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. Over-dimensional vehicles will also access the site for an estimated 5 trips, which will operate under traffic control arrangements if necessary.

4.8 Improvements to Gara Road and Silverton Road

Improvements will be required to Gara Road between approximate chainages 7.78km and 9.70km, 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 the limited traffic in this section of road, it would be feasible but less desirable for residents and construction traffic to manage the limitations near the Gara River causeway in an approved Traffic Management Plan in lieu of upgrading the causeway.

It is proposed that the section of Gara Road between the eastern and western site access points be widened suitable for two-way traffic to have a bitumen seal of minimum width 6.0m, with 0.5m shoulders on each side.

The affected area also includes a significant single-lane causeway across the Gara River. Sight distances are constrained at this causeway, particularly on the western approach. It is proposed that this causeway is realigned and upgraded for two-way heavy vehicle traffic as shown in the image in Figure 4.7 and concept plan at Appendix G.

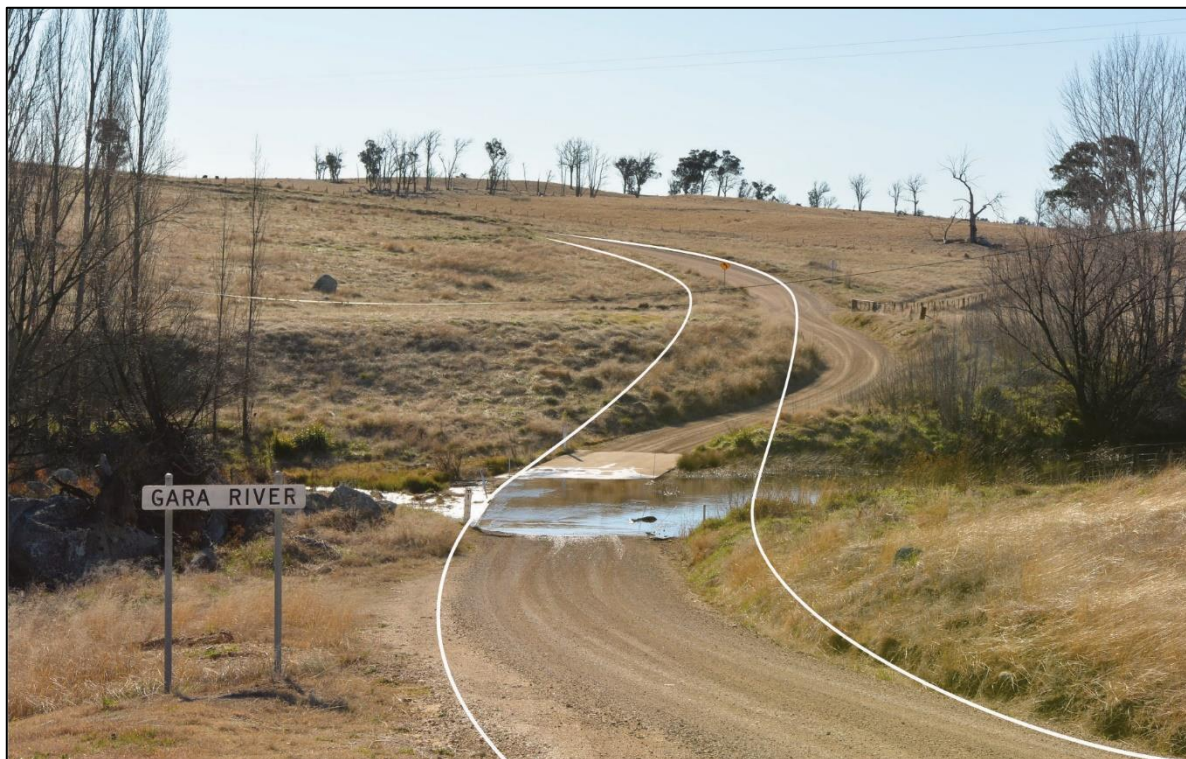


Figure 4.7: Concept of Causeway Upgrading, Gara Road Chainage 9.05km

The proposed causeway upgrading work aims to improve road safety, amenity and flood immunity, avoiding the need for vehicles to queue on approaches under traffic control or for 'wet' causeway crossings, while ensuring the structure requires minimal ongoing maintenance and is commensurate with long term traffic needs.

The concept causeway design in Appendix G proposes realigning approaches, widening the causeway suitable for two-way traffic, and raising the level of Gara Road by approximately 1.3 metres at the causeway. While not aligned to any specific level of flood immunity, this increase is considered appropriate since:

- there is a very large catchment area for the Gara River;
- if the Gara River causeway overtops, then other waterway crossings along Gara Road are also likely to be impassable;
- there is alternate flood-free resident access available via Silverton Road;
- this level would enable 'dry' crossings during most normal flow conditions in Gara River;
- in the event that a large flood were to overtop the Gara River causeway, solar farm construction work would be suspended as the site would be too wet for construction work.

During large storm events, flood depth markers would allow drivers to gauge the depth of floodwaters. Temporary road closures would also occur as deemed necessary by 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.

4.9 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 undertake 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 authorities 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.

Item	Description of Recommended Works
2	<p>The construction and maintenance of a new primary site access from Waterfall Way to Lot 2 DP1206469. Such access will require EITHER:</p> <p>(i) the construction of a new rural style CHR-S / BAL treatment complying with 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> <p>OR</p> <p>(ii) use of the existing Armidale Regional Landfill access at 1238 Grafton Road. The internal landfill access road is to be upgraded through the Travelling Stock Reserve and Lot 1 DP1206469 to a two-way pavement having minimum sealed width of 6.0m and 0.5m gravel shoulders, complying with the Armidale Regional Council Engineering Code.</p> <p><u>Note:</u> Upgrades will be required to security fencing and the access control system to prevent unauthorised landfill access.</p>
3	<p>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 primary access to/from Waterfall Way.</p>
4	<p>Gara Road to be upgraded between the proposed new solar farm site access points at approximate chainages 7.78km and 9.70km to achieve:</p> <p>a) a pavement comprising a minimum 6.0m wide bitumen sealed surface and including 0.5m wide shoulders on each side; and</p> <p>b) the existing causeway crossing of the Gara River is to be upgraded consistent with the concept drawing at Appendix G of this TIA.</p> <p>Any upgrades should be consistent with the Armidale Regional Council Engineering Code and referenced standards, except where expressly varied by Armidale Regional Council (for example, where traffic control measures will be implemented during construction to mitigate any traffic impacts).</p>
5	<p>The design and construction of up to 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° and 110° with Gara Road, and contain the swept path of the maximum dimension design access vehicles.</p>

Item	Description of Recommended Works																				
	<p>Note: Unless other alternate positioning and/or higher order intersection treatments at the Gara Road site access points listed below can demonstrate the achievement of Austroads sight distances and is acceptable to Armidale Regional Council as the roads authority, then:</p> <ul style="list-style-type: none"> a) the site access point at approximate chainage 9,500m as measured from Waterfall Way is to be relocated eastwards to approximate chainage 9,425m; and b) the site access point at approximate chainage 8,770m is to be used for left-turn egress only to Gara Road only due to limited sight distances to the east. 																				
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="320 869 1289 1238"> <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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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 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 so that heavy vehicles travelling in opposite directions may safely pass. Internal access, parking and manoeuvring areas are to be sealed wherever the gradient exceeds 16% to minimise erosion of the pavement.</p> <p>Note: A Right of Carriageway a minimum 25m in width is to be provided in favour of Lot 5 DP253346 over any of the internal access road 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</p>																				

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

5. Conclusion

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

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%)

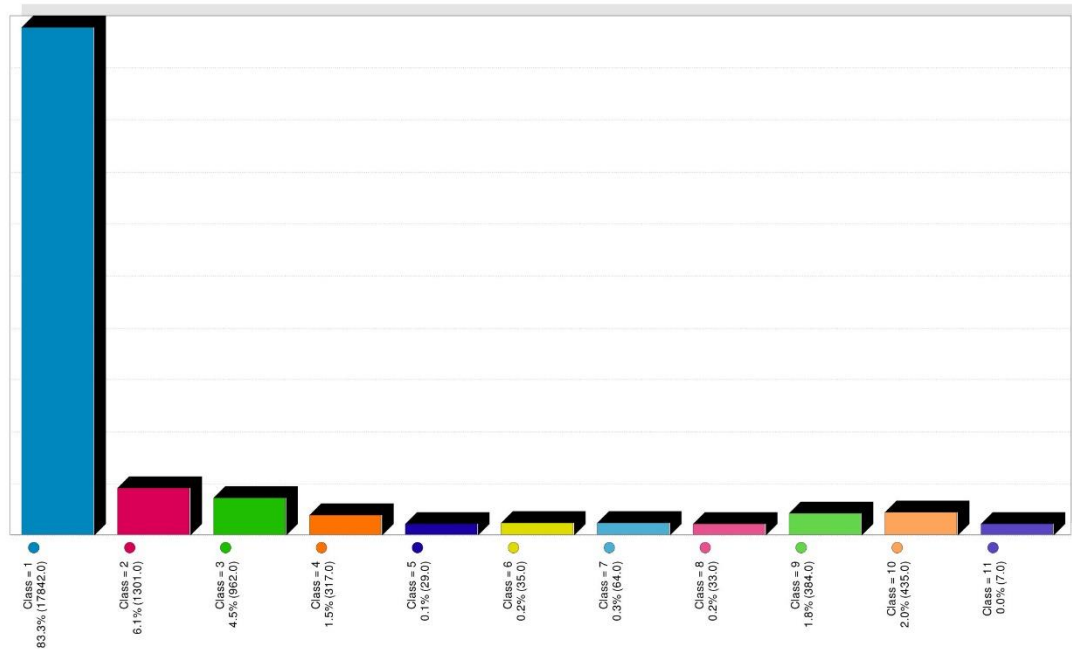
Class 10 - 435 (2.03%)

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	2	3	2	1	0	0	0	0	0
0	0	0	0	0	0	1	2	3	2	2	2	2	2	3	2	2	1	1	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%)

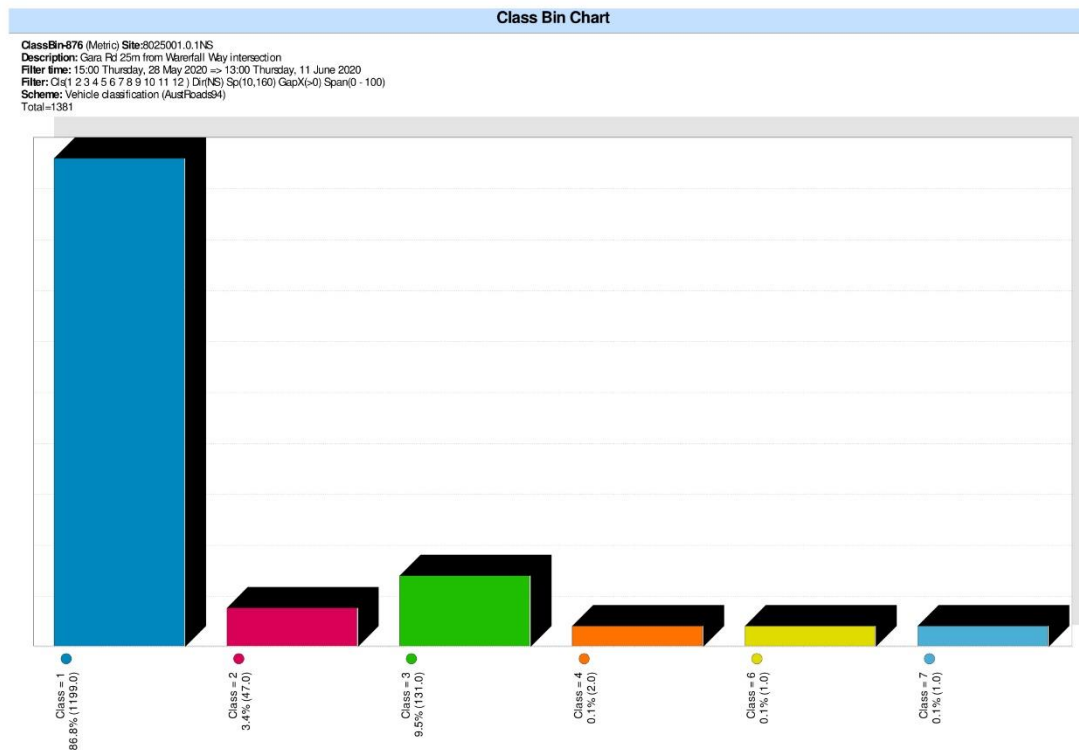
Class 8 - 0 (0.00%)

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	2	1	0	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	2	1	1	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	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	2	2	1	1	2	1	2	1	1	3	2	1	0	0	0	0	0
0	0	0	0	0	0	0	0	1	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	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	0	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

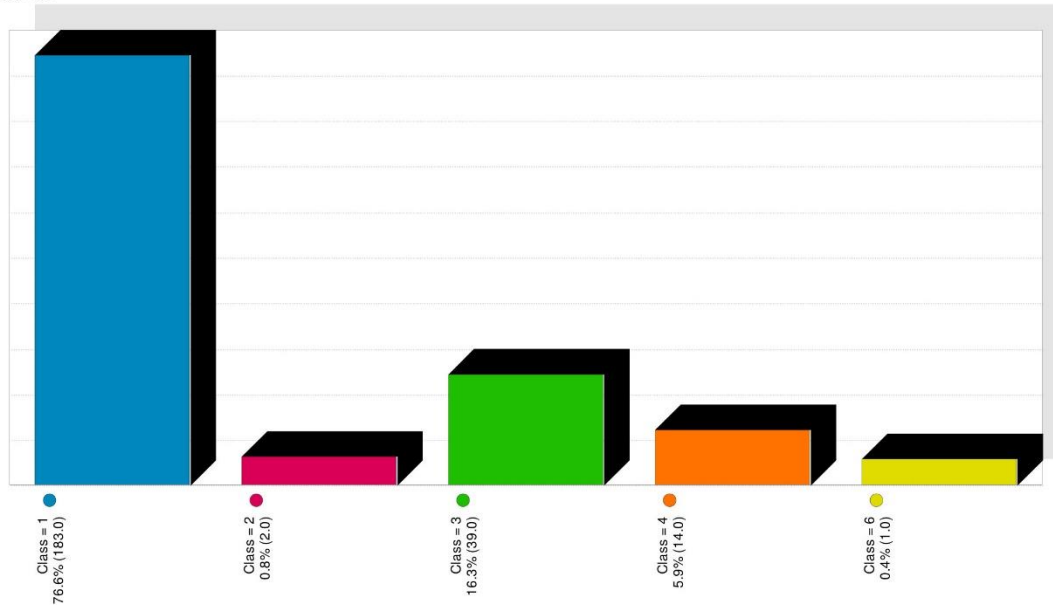
Profile:
Filter time: 13:00 Thursday, 28 May 2020 => 13:00 Thursday, 11 June 2020 (14)
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, South (bound)
In profile: Vehicles = 239

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

Images of Waterfall Way, Gara Road and Silverton Road

Prepared by New England Surveying and Engineering

Waterfall Way (Grafton Road)



Gara Road (Sheet 1)



Gara Road (Sheet 2)



Gara Road (Sheet 3)



Silverton Road (Sheet 1)



Silverton Road (Sheet 2)



Appendix C

Consultation with Transport for NSW and Armidale Regional Council, and Responses to TIA Submissions

Prepared by New England Surveying and Engineering

Summary of Preliminary Transport for NSW (TfNSW) Comments and Responses

Item	Description	Response
1	<i>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.</i>	Noted.
2	<i>A minimum of 20m of Gara Road will require sealing to limit tracking of gravel onto MR76.</i>	Gara Road is already sealed a distance of ~75m from Waterfall Way. The primary access from Waterfall Way will be sealed for a minimum distance of 150m, up to the property boundary.
3	<i>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.</i>	Section 4.4.2 of this TIA assesses cumulative traffic impacts against Austroads intersection warrants.
4	<i>The Appendix that we provide to inform a TIA 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.</i>	The TIA has been prepared based on the issued SEARS. Silverton Road, and most of Gara Road, is not proposed for any regular use by construction or operation traffic.
5	<i>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.</i>	Alternative access options are considered in Section 3.3 of this TIA. Lot 2 DP1206469 has separate ownership, however use of the landfill access has been identified as one of two suitable options for the primary site access.
6	<i>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.</i>	The previous site access is no longer recommended, and two suitable alternatives are proposed having acceptable sight distances. Refer to Section 3.4 of this TIA.
7	<i>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.</i>	Development of a Construction Transport Management Plan has been recommended prior to works, including regulation of arriving heavy vehicles. A CHR-S/BAL intersection treatment is proposed if the existing landfill access is not used.

Response to Submissions on the Transport Impact Assessment submitted with the EIS

Agency/Stakeholder	Issue	Agency/Stakeholder comment	Response
TfNSW	Access Road Upgrade	<i>The proposed solar farm will generate movements on the surrounding road network during construction, operation and decommissioning phases of the development. The primary access route to the site is identified in the EIS as being direct from Waterfall Way. This access will require upgrading prior to construction commencement.</i>	The TIA identifies two alternate primary site access options to/from Waterfall Way. Option 1 includes a new access to Lot 2 DP1206469 via the TSR. Option 2 involves the use of the existing property access to the Armidale Regional Landfill. Upgrade requirements for both options are included in the updated TIA.
	TIA Updates	<i>The supporting Traffic Impact Assessment (TIA) needs to further demonstrate that access can be located to meet the requirements of Austroads, Australian Standards and TfNSW Supplements. Waterfall Way in this location has a posted speed limit of 100km/h, as such TfNSW is concerned that the minimum safe intersection sight distance (SISD) is unable to be met. Evidence of the SISD being met in both directions will need to be accepted by TfNSW, alternatively a higher order intersection treatment may be warranted.</i>	Table 3.1 of the TIA details sight distances for the two alternate access options from Waterfall Way, and both options fully conform with all Austroads sight distance requirements including SISD in both directions.
Armidale Regional Council	TIA Updates	<i>The traffic impact report is considered to be a detailed and thorough examination of the traffic impacts of the development. The report makes a series of recommendation in relation to the development and we provide the following comment to those recommendations.</i>	
		Recommendation 1 - <i>the proposed recommendation is agreed but should be strengthened to reflect the authority of council as the road owner.</i>	The recommendation notes that agreement is required from the relevant road authorities for the dilapidation surveys, and so covers TfNSW as the roads authority for state roads and ARC as the roads authority for local roads.
		Recommendation 2 – <i>Council agrees with the proposed alternate access to be constructed connecting to the New England Highway. Council require that it be clearly stated that the access road to the site via this entry is a private</i>	The recommendation has been revised and includes a requirement to both construct and maintain the primary site access.

		<i>access and shall be the responsibility of the property owner to maintain not the road authority, with the exception of the interaction on the New England Highway.</i>	
		Recommendation 4 – <i>agreed with the provision that the section of road between 7.7km and 9.7km be upgraded to a sealed road 6m wide with 0.5m shoulders to a suitable pavement design to suit the long term use of the road by the development. If it is deemed that the interruption of use of the access points due to flooding of the causeway, that upgrading to reduce interruption be considered. i.e. Are alternate evacuation routes available from site.</i>	The recommendation has been revised to reflect the new access locations from Gara Road, and include the requirement for upgrading to include a sealed road 6.0m wide with 0.5m shoulders. The recommendation also includes an upgrade to the Gara River causeway as subsequently discussed with representatives of Armidale Regional Council.
		Recommendation 5 – <i>the proposal is agreed</i>	The recommendation has changed slightly to reflect assessment of the revised access locations.
		Recommendation 6 - <i>the proposal is agreed</i>	Noted – no change to this recommendation.
		Recommendation 7 – <i>this recommendation is agreed but should state all weather sealed access roads and parking areas to prevent discharge of sediment form the site.</i>	The recommendation has been amended to include the sealing of any internal access, parking and manoeuvring areas having a gradient in excess of 16% consistent with the ARC Engineering Code.
		Recommendation 8 – <i>this recommendation is agreed but should also include consultation with RailCorp on the structural status of the bridge on Dangar Street crossing the railway line as the Bridge owner and the bridge being known to have defects.</i>	The recommendation has been amended to include consultation with the owner of the railway bridge to ensure any temporary load restrictions are appropriately considered when formulating the CTMP.

Extract of Correspondence with Armidale Regional Council about Proposed Gara Road Upgrades

Author	Date	Text
Michael Flynn, Development Engineer, Armidale Regional Council	10/03/22	<p>As per the meeting undertaken with yourself and Council officers on Wednesday 23/02/2022 I can confirm that Council is happy with the design concept plans for Gara Road upgrades presented to us and provides the additional comments:</p> <ul style="list-style-type: none"> • Council supports the concept plans for the causeway upgrades and road sealing concept plans for Gara Road; • Council will require the chance to approve any detailed plans relating to the upgrades to public infrastructure along Gara Road. Approvals are to be sought prior to the commencement of any heavy vehicle movements associated with solar panel installation/land preparation for the installation of the panels. Approvals are to be sought through a s138 application; • All upgrades to public infrastructure will be the responsibility of the developer until the construction period is concluded at which time Council will inherit these upgrades as part of their roads asset; • The applicant will be required to submit to Council a dilapidation report pre and post construction period. The dilapidation report is to be undertaken after public infrastructure upgrades are completed and a follow up dilapidation report is to be completed once the construction period is concluded. Any defects to public infrastructure identified in the dilapidation report are to be rectified by the developer prior to Council taking on the upgraded public infrastructure; <p>Council is following up internally the request for utilising the access into the Waste Management Facility by the Oxley Solar Farm development. I will be in touch once Council has made a decision on this aspect of the development.</p>
Mal Donnelly, Project Manager, New England Surveying & Engineering	23/02/22	<p>In follow up to our meeting this morning, my understanding is that Council offer in-principle acceptance of the proposed shared landfill access arrangements and Gara Road causeway upgrade as presented, though subject to the previous development comments and that:</p> <p><u>Landfill Entrance</u></p> <ul style="list-style-type: none"> • the landfill access be locally widened suitable for two-way heavy vehicle traffic between the highway and Oxley Solar Farm intersections (subject to detailed design approval); • the landfill entrance gates be relocated south of the private Oxley Solar Farm entrance, so that there will not be any inter-connection between the two developments. Associated changes would also be required to security fencing, including that any entrance gate to the Oxley Solar Farm be recessed so that vehicles waiting at the gate will not disrupt landfill traffic; • a dilapidation assessment be completed on the shared section of access road and intersection prior to commencement and at the completion of works, and the developer be responsible for returning the infrastructure to the original condition following construction, less routine wear and tear.

		<p><u>Gara Road Upgrade</u></p> <ul style="list-style-type: none">• Gara Road be widened and sealed suitable for two-way heavy vehicle traffic between the property access points used for the Oxley Solar Farm development, and no objection to the proposed low-level causeway upgrade (subject to detailed design approval);• It is recognised that given the low number of residents and alternate public access options via Silverton Road and Gara Road that there is no minimum flood immunity to be achieved in the causeway upgrade, since construction activities will cease during major rainfall events – the objective of having a ‘dry’, low-maintenance crossing suitable for the swept path and loadings of design vehicles and with improved approach geometry complying with Council standards is satisfactory;• a dilapidation assessment be completed on the upgraded length of Gara Road prior to commencement and at the completion of works, and the developer be responsible for returning the infrastructure to the original condition following construction less routine wear and tear;• the road upgrades be generally completed prior to solar farm construction, though this will not unnecessarily restrict pre-construction activities on site (e.g. geotechnical investigation, survey etc.). <p>If you concur we would welcome correspondence along these lines which can accompany the updated Traffic Impact Assessment for this development.</p>
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Appendix D

Schedule of Vehicle Access Routes

Prepared by New England Surveying and Engineering

SCHEDULE OF VEHICLE ACCESS ROUTES

The vehicle access route from the New England Highway to the site, and along Gara Road to link parts of the site, will comprise those segments in the Schedule below and shown in Figure D1.

Segment	Road Name (from SIX Maps)	Start Point	End Point	Length (km)
1	Uralla Road	New England Highway	Miller Street	2.26
2	Kentucky Street	Miller Street	Lambs Avenue	1.30
3	Lambs Avenue	Kentucky Street	Kentucky Street	0.14
4	Kentucky Street	Lambs Avenue	Dangar Street	0.12
5	Dangar Street	Kentucky Street	Barney Street	0.88
6	Barney Street	Dangar Street	Canambe Street	1.52
7	Grafton Road	Canambe Street	Primary property access (refer Appendix E)	Up to 11.93
8	Gara Road	Chainage 7.78km	Chainage 9.70km	1.92

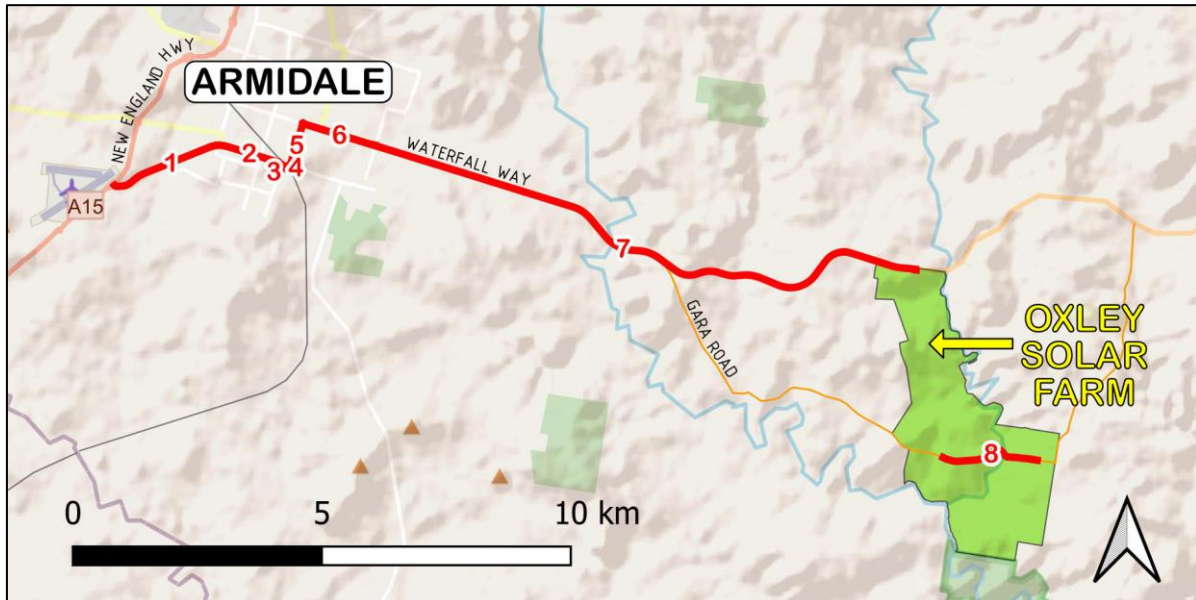


Figure D1: Proposed Vehicle Access Routes from the New England Highway

Appendix E

Schedule of Site Access Points

Prepared by New England Surveying and Engineering

SCHEDULE OF PROPOSED SITE ACCESS POINTS

While two options have been assessed and as suitable for the primary property access, only one access will ultimately be developed from Waterfall Way, to be EITHER a new access located 450m west of the existing property access to 1352 Grafton Road, OR the existing access to the Armidale Regional Landfill at 1238 Grafton Road. Point numbers are shown in Figure E1 below.

Point No.	Name	Description
1	Primary Site Access	EITHER New primary property access located 450m west of the existing property access.
2		OR Existing regional landfill access located at 1238 Grafton Road (to Lot 1 DP1206469).
3	Gara Road Access	New secondary property access at approximate chainage 7.78km
4	Gara Road Access	New secondary property access at approximate chainage 8.77km (Left egress only to Gara Road due to restricted sight distances to the east, subject to Armidale Regional Council approval following detailed design).
5	Gara Road Access	New secondary property access at approximate chainage 9.42km (Access relocated ~75m from original design location to improve sight distances, subject to Armidale Regional Council approval following detailed design).
6	Gara Road Access	Upgraded existing property access at approximate chainage 9.70km

¹ Armidale Regional Council as the Roads Authority may approve minor variations to access locations off Gara Road as part of a Section 138 Roads Act Approval for the works.

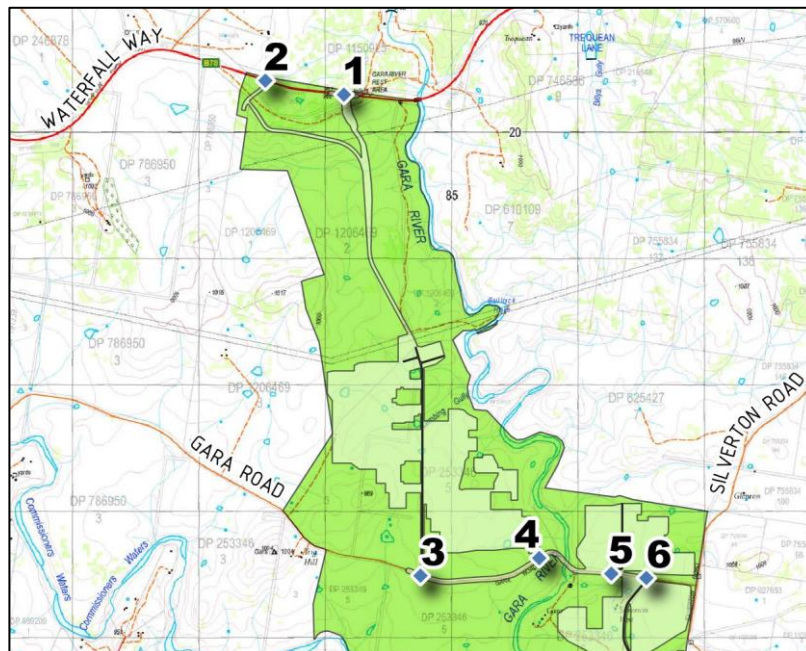


Figure E1: Proposed Site Access Points

Appendix F

Schedule of Proposed Road Works and Upgrades

Prepared by New England Surveying and Engineering

SCHEDULE OF PROPOSED ROAD WORKS AND UPGRADES

Reference	Road / Location	Upgrade Requirements	Standard	Timing
A	Waterfall Way, 450m west of the existing property access to Lot 1 DP1206469	New Primary Property Access (if access Option 1 is pursued)	Austroads Type BAL / CHR-S (refer Appendix G)	Prior to construction of the solar farm ¹
B	Armidale landfill access, chainage 100m to 300m south of Waterfall Way	Construct & seal to a minimum width of 6.0m with 0.5m shoulders each side (if access Option 2 is pursued).	Armidale Regional Council Engineering Code	
C	Gara Road between road chainages 7.78km to 9.70km	Widen and seal to a minimum width of 6.0m with 0.5m shoulders each side.		
D	Gara Road causeway at chainage 9.05km	Upgrade causeway as shown in the concept diagram in Appendix H.		
E	Gara Road Site Access Points at chainages 7.78km, 8.77km, 9.42km and 9.70km	Standard rural property access (to ARC Drawing 030-073)		
F	Gara Road chainages 3.26km, 4.29km, 5.35km and 9.05km and Silverton Road chainages 1.45km, 2.08km and 5.27km.	Install warning signs where pavement narrows at single lane causeways and public gates.	AS1742.1	

¹ Armidale Regional Council as the Roads Authority may approve preparatory site works and services, such as geotechnical investigation and the placement of survey marks, prior to completion of all road works and upgrades.

Appendix G

Concept Design for New Primary Property Access (Option 1)

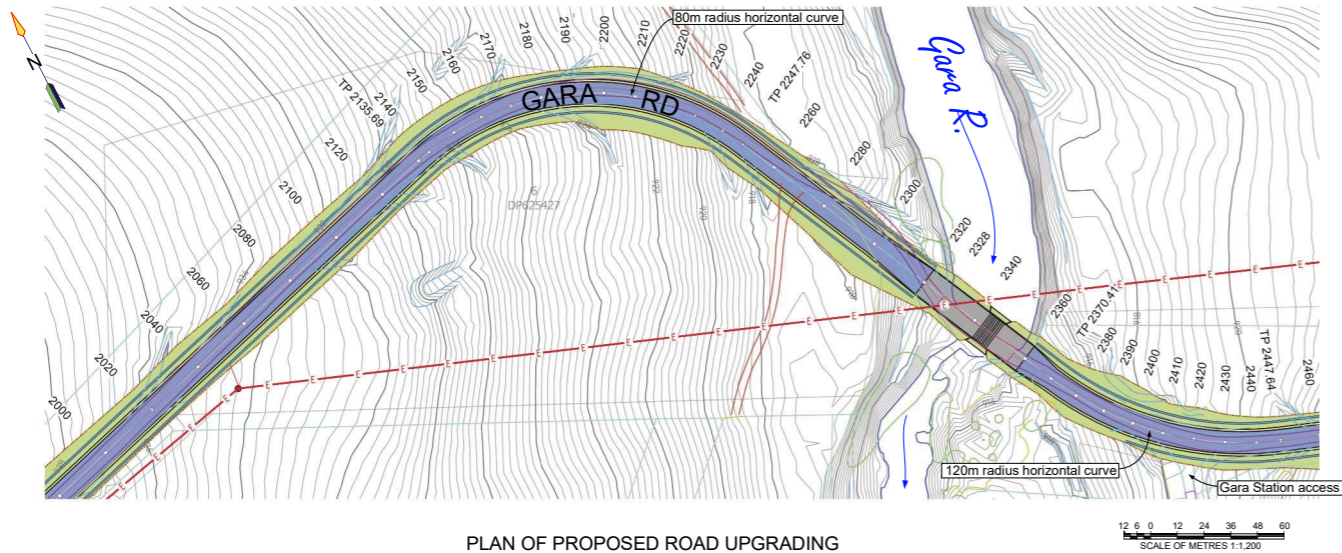
Prepared by New England Surveying and Engineering



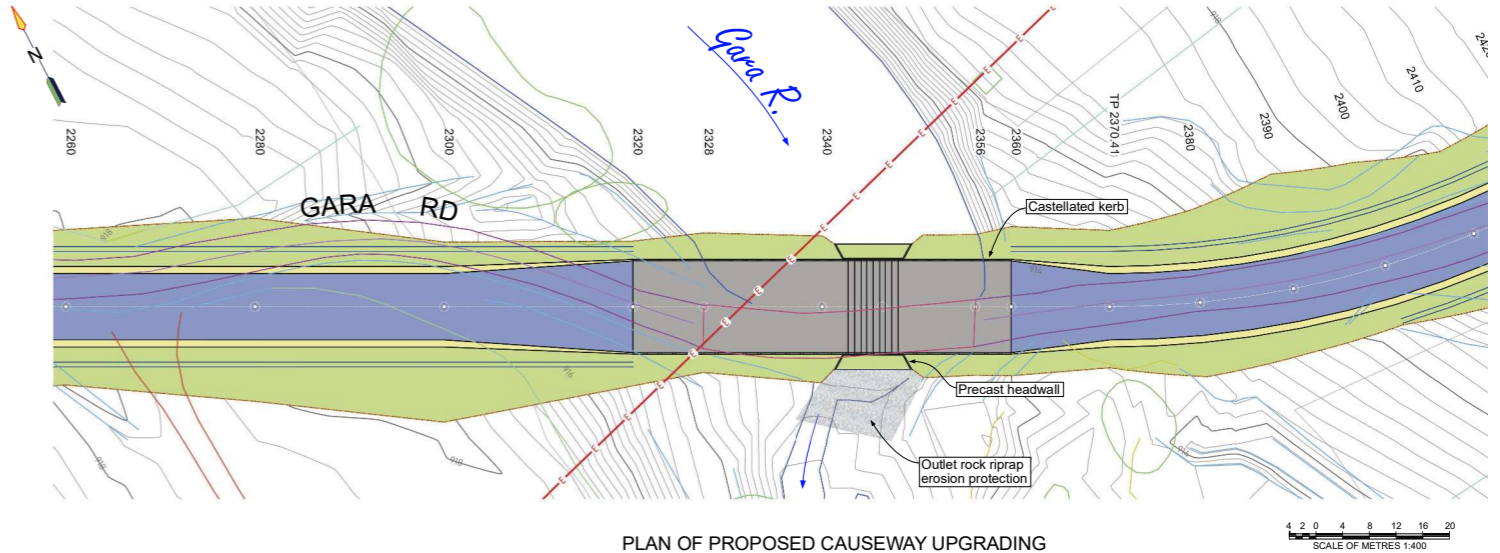
Appendix H

Concept Design for Upgrade of Gara Road Causeway

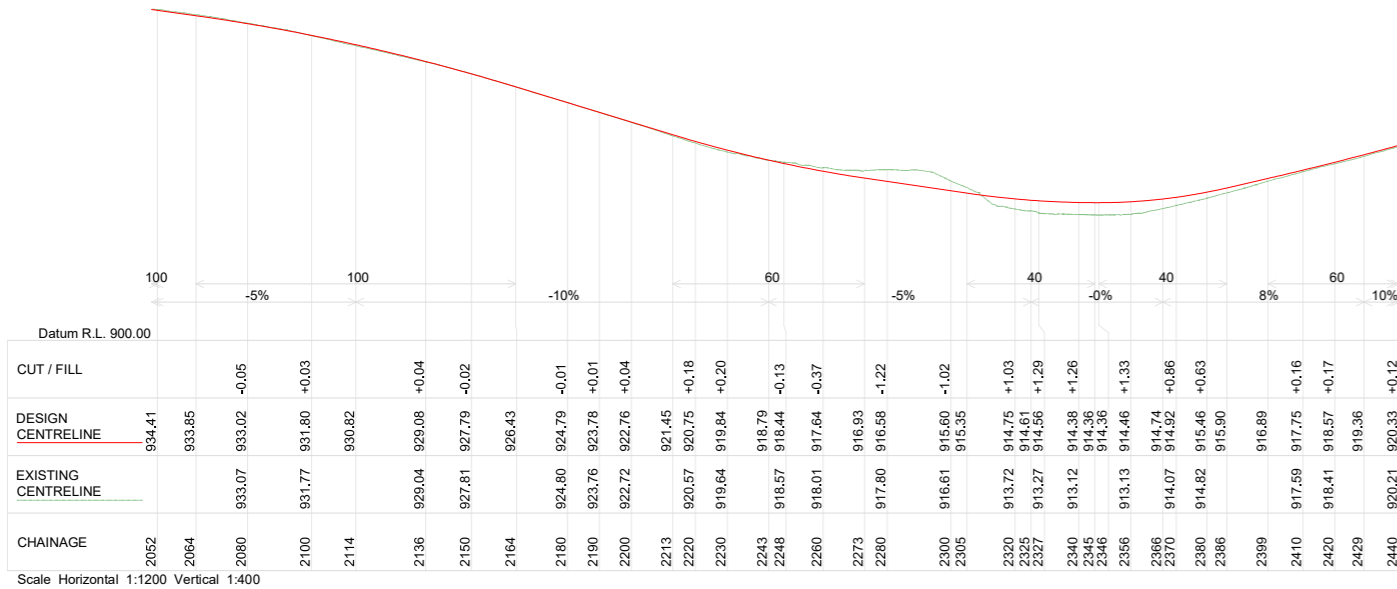
Prepared by New England Surveying and Engineering



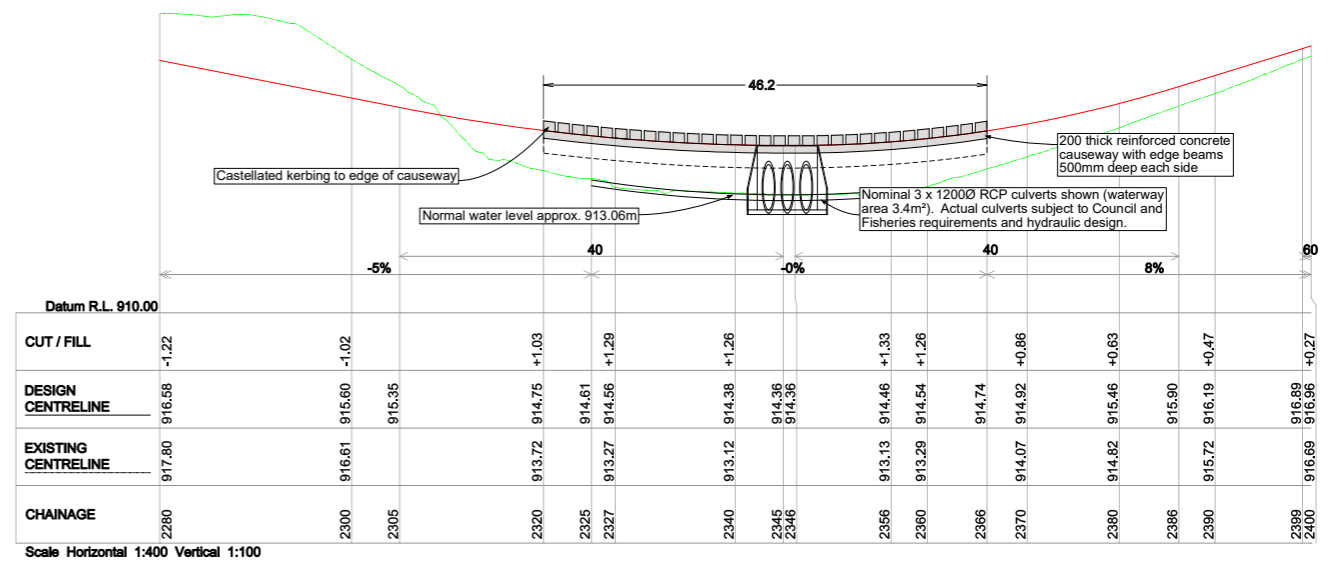
PLAN OF PROPOSED ROAD UPGRADING
Scale 1:1,200



PLAN OF PROPOSED CAUSEWAY UPGRADING
Scale 1:400



LONGITUDINAL SECTION OF GARA ROAD CENTRELINE
Chainage 2052m to 2440m



LONGITUDINAL SECTION OF GARA ROAD CENTRELINE
Chainage 2280m to 2400m



PERSPECTIVE OF DESIGN REALIGNMENT
Not to Scale

CONCEPT DESIGN ONLY - NOT FOR CONSTRUCTION
NOMINAL ARRANGEMENT SHOWN ONLY, SUBJECT TO DETAILED DESIGN
LEVEL INFORMATION IS DERIVED FROM PHOTOGRAMMETRY
ALL DESIGN TO COMPLY WITH AS 5100 (BRIDGE DESIGN)
ROAD TRAFFIC LOADING: SM1600
TRAFFIC BARRIER PERFORMANCE LEVEL: LOW