



# Proposed Solar Farm, Orange Grove Road, Gunnedah

pitt and sherry (Operations) Pty Ltd

Traffic Impact Assessment  
and Management Plan

March 2018

**SECA**solution 

# Solar Farm Project, Gunnedah NSW

## Traffic Assessment Report

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## 1 Introduction

Seca Solution have been commissioned by Pitt and Sherry (Operations) Pty Ltd to review the traffic impacts associated with the construction and operational phase of a new Solar Farm development and to determine traffic management measures associated with the construction activities for the project. The project involves construction, operating and eventually decommissioning of a 150 megawatt (MW AC) solar farm to the north-east of Gunnedah in NSW.

The following works and infrastructure would be required to support the construction and operation of the solar farm:

- Construction of access roads including:
  - A main access road for all access and egress for the site and substation off Orange Grove Road
- Installation of Electrical infrastructure including:
  - A 132kV Substation including one transformer and associated 132kV switchgear.
  - New transmission line (powerlines and poles for a distance of approximately 1.2 kms)
  - Inverters to convert DC to AC.
  - Cabling and other electrical infrastructure (e.g. security systems).
- Ancillary works at Gunnedah Substation and the existing 132kV transmission line adjacent the site.
- A maintenance compound and buildings.
- Fencing, landscaping and environmental works.

Power generated by the facility will be transmitted via existing 132kV transmission lines, in an easement owned by TransGrid south of the Gunnedah Solar Farm Site along Orange Grove Road, to the local energy grid via the Gunnedah substation which is located 2.3km south of the Site on the Oxley Highway. A tee in connection will be used to connect the new substation on Site to the existing TransGrid 132kV transmission line via approximately 1.2 kms of new overhead powerlines and poles.

The operational life of the solar farm is expected to be 25 years at which point the panels are either replaced and operations continue or removed, and the site is decommissioned and rehabilitated.

An estimated 470,000 PV panels would be installed on a single axis tracker system across the Site.

Construction of the site will take approximately 12 months.

As part of the development consent and prior to work on site a Traffic Management Plan will need to be prepared to the satisfaction of the road authorities (Gunnedah Shire Council and the Roads and Maritime Services (RMS)). The busiest period associated with the development with regards to traffic is during construction, with the operational phase of the project only requiring between 6-10 staff on site for the majority of the time. Seca Solution has prepared this Construction Traffic Management Plan (CTMP) for the project to ensure traffic issues can be safely and efficiently managed during the construction activities on site.

This CTMP has been developed for the construction activity for the project and the potential decommissioning element for the project, which may occur in 25 years' time. The potential decommissioning of the project site will require a similar level of activity, although will probably require less staff and would be completed over a shorter timeframe. The requirements and protocols for the decommission stage of the project will be as per the construction phase, although it is acknowledged these may need to be reviewed and altered in 25 years to suit the road conditions at that time as well as the work requirements.



The site is located within the locality of Gunnedah and is shown in Figure 1-1 and 1-2 below.

The site is currently arable land.

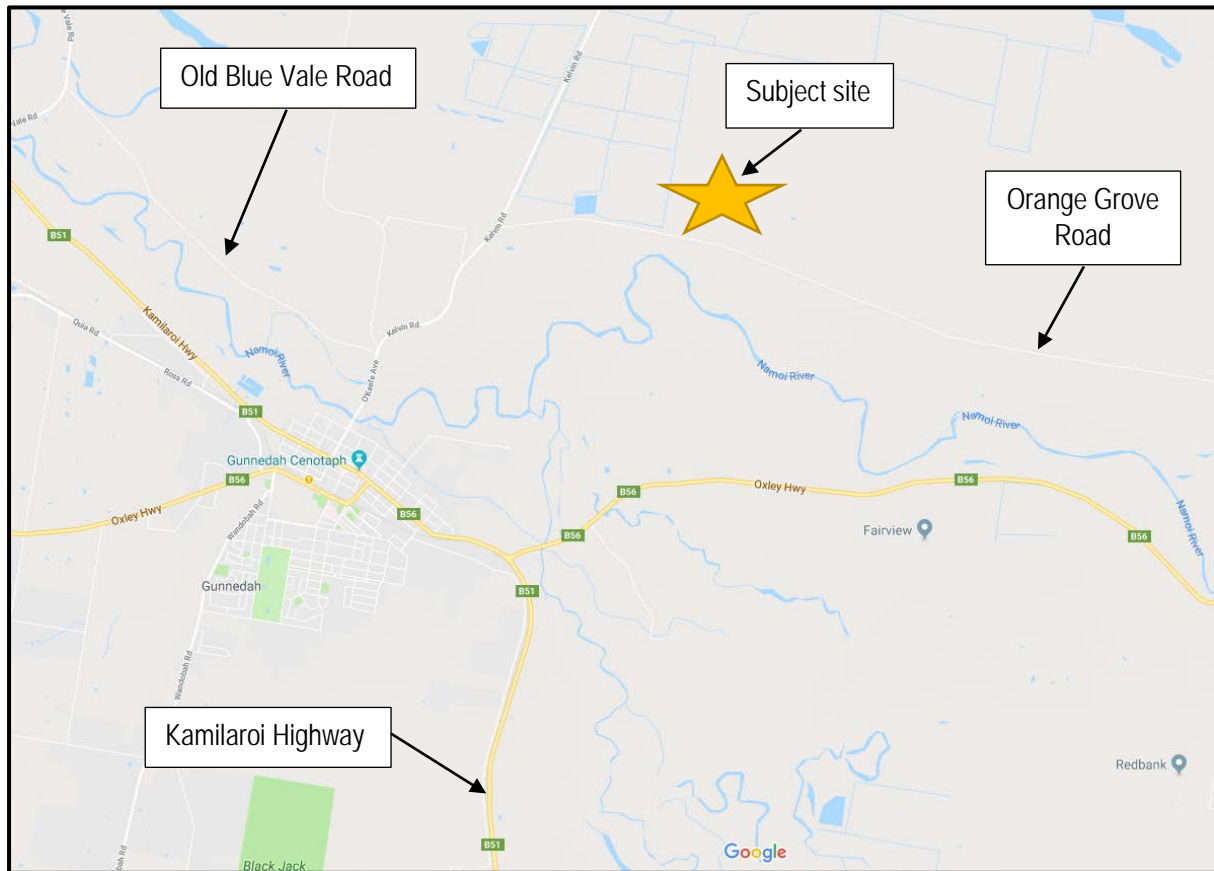


Figure 1-1 – Site Location within the greater road network

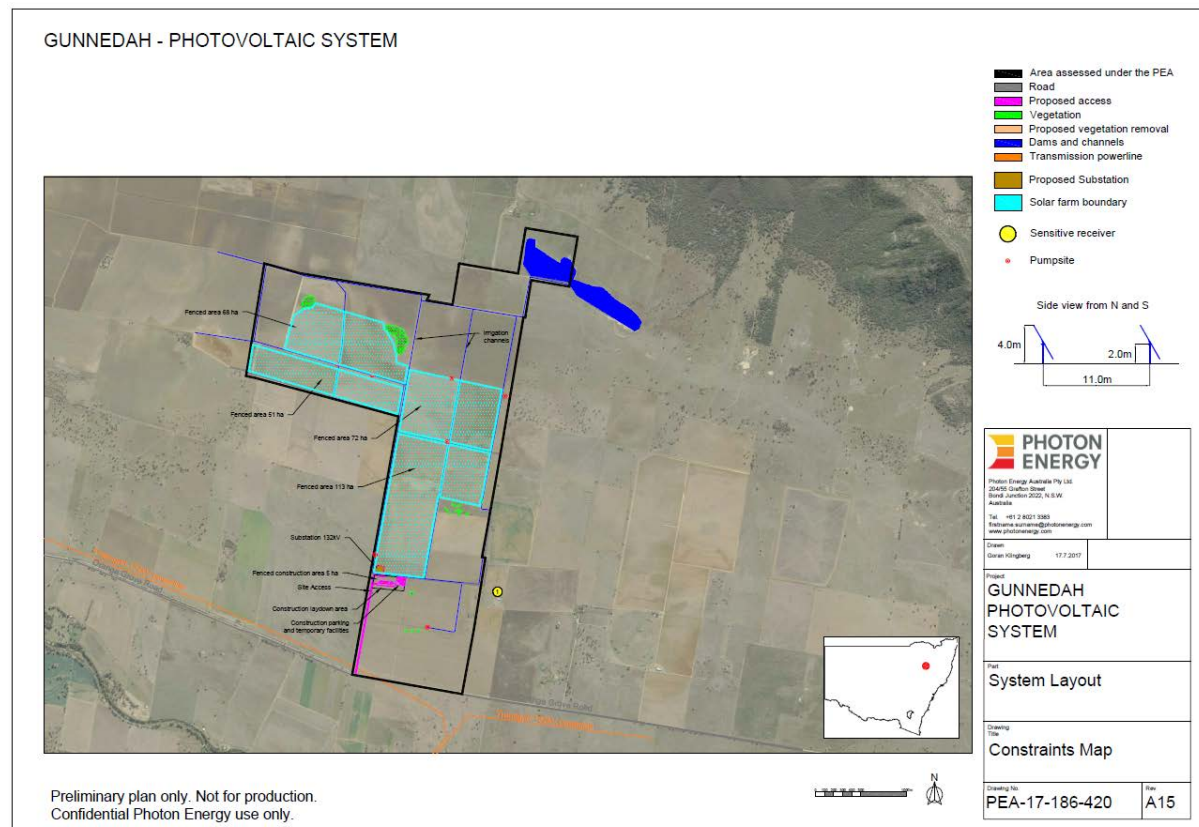


Figure 1-2 – detailed site location

The site has road frontage to Orange Grove Road only.

## 1.1 Consultation and Authority Requirements

As part of the project, there has been consultation with the Department of Planning and Environment by the project manager and SEARs have been issues. A summary of the SEARs as they relate to traffic and access issues is presented below and the response is provided within this table.

SEARs issue	Response / Section of report
The total impact of the existing and proposed development on the road network and 10 year horizon	The major impact of the project is during the construction phase which will be over approximately 12 months. The impact of this construction phase has been assessed based on current traffic flows. For the 10 year horizon the traffic will be that associated with the on-going maintenance / operation of the facility. 6-10 staff will be located on the site once the facility is operational. <b>Refer Section 3.1.1</b>
The volume and distribution of traffic	The volume of traffic has been assessed for both the construction and operational phase. <i>Construction:</i> Up to 100 light vehicles at peak construction activities and 10 heavy vehicle inbound movements per day and similar outbound. <i>Operational:</i> 10 light vehicles per day inbound and outbound. Infrequent heavy vehicle for specific maintenance work only

	<p><i>Distribution:</i> Heavy vehicles via the designated heavy vehicle route to connect with Kamilaroi Highway to north-west of Gunnedah and light vehicles via Chandos Street / O'Keefe Avenue.</p> <p><b>Refer Section 2.3, 2.4 3.1.1</b></p>
Intersection sight distances at key intersections on the haulage route	<p>Sight distances have been assessed on site during the site visit along the haulage route between the Kamilaroi Highway and the site access.</p> <p><b>Refer Section 1.4.1/2/3/4</b></p>
Existing and proposed site access arrangements	<p>A new access will be provided for the construction work direct off Orange Grove Road with appropriate road frontage upgrade to provide sealed road. Existing gated access will remain.</p> <p><b>Refer Section 1.5</b></p>
Servicing and parking	<p>Once operational the servicing demands will be met with between 6-10 staff located on site.</p> <p>All parking will be contained on site within a temporary parking area adjacent to the site office.</p> <p><b>Refer Section 2</b></p>
Impact on public transport (public and school bus routes) and consideration of walking and cycling	<p>Existing school bus run on Kelvin Road will have minimal interaction with construction traffic. Drivers will be advised of presence of school bus run and will drive in accordance with all road rules.</p> <p>Location of the site is relatively remote and no footpaths available for walking to the site. Cycling to the site is an option as site is within 20 minutes of centre of Gunnedah. Cyclists can ride on the road due to low traffic flows and can park bikes on site as required.</p> <p><b>Refer Section 3.1.1, 3.1.3</b></p>
<p>Transport Management Plan to manage impacts of construction and operational traffic. Include any Traffic Control Plans. A Driver Code of Conduct:</p> <ul style="list-style-type: none"> <li>a) Map of primary access routes</li> <li>b) Safety initiatives for transport through residential and school zones</li> <li>c) Consideration of coordination of construction traffic with seasonal agricultural haulage</li> <li>d) Induction process for vehicle operators</li> <li>e) Complaint resolution and discipline process</li> <li>f) Any community consultation measures during peak construction</li> </ul>	<p>Map of route for heavy vehicles provided –</p> <p><b>Refer Section 3 Figure 3.1.</b></p> <p>All drivers will sign code of conduct which specifies all road rules must be obeyed including driving through school zones - <b>Refer Appendix A</b></p> <p>Given the volume of vehicle movements associated with the construction phase of the project no coordination with agricultural haulage is considered necessary - <b>Refer Section 3.1.1</b></p> <p>All staff and delivery drivers will be inducted to site and sign a driver code of conduct – Refer Appendix A</p> <p>The contractor on site shall establish a complaint handling process and resolution process.</p> <p>During construction activities all properties along the local haulage route from the Kamilaroi Highway will be notified via a letter drop of on-going construction work on a fortnightly basis – <b>Refer Appendix A.</b></p>
Road Safety Audit at any specific locations identified as safety concern on haulage route	<p>No specific road safety issues were identified along the haulage route.</p>

### *RMS Consultation*

Consultation has been held via a phone conversation with Andrew McIntyre, manager Land Use Assessment, Western Region with regard to a number of solar farms proposed to be constructed across rural NSW. The relevant outcome of the discussion with Andrew McIntyre are provided below:

- The critical phase for the assessment is the construction activities as this involves heavy vehicle access to the site along regional and local roads as well as a high number of workers;
- Consideration to the movement of staff to and from the site must be given. In remote areas where the solar farms are constructed, there are a large number of staff who can be fly in and fly out locating for temporary work from the established east coast centres such as Sydney and Newcastle. This requires staff to drive a long distance home after working on the site for long hours for a week or more – consideration to controls for staff driving home after working on site should be considered;
- Provide details on the access routes to the site for heavy vehicles and the size / number of heavy vehicle movements associated with the construction and operation of the site;
- Provide details on the operational characteristics of the project – it is recognised that the staff levels and traffic volumes for the operational stage of the project are low;
- Provide comment with regard to the decommissioning stage of the project and the potential traffic impacts;
- Prepare a driver code of conduct for the project to control vehicle access and maintain safety;
- Assess impacts on road safety, including pedestrians and cyclists and any bus routes impacted
- Review alternative transport options for the site including pedestrians, cyclists and bus use
- Provide details on any road upgrades identified as part of the project and include a Road Safety Audit as required

### *Consultation with Gunnedah Shire Council*

Consultation with Gunnedah Shire Council has been held with the project team and the following issues have been discussed with Council in relation to traffic:

- Photon and p&s met with the Chief Engineer on Tuesday 16<sup>th</sup> January 18 and discussed the potential transport route. This included using Old Blue Vale Rd, Kelvin Rd and Orange Road. It was agreed in principle that the gravel part of Orange Grove Rd to the property would have some work completed before construction commences to minimise dust and damage to the road.
- Council are unable to provide any resources to work on the road. They suggested several contractors who know Council standards and may be able to complete the work. It was agreed more discussion was required before construction.
- School bus times were also discussed. Photon will investigate the feasibility of minimising truck access to the site between 0800- 0900 and 1500-1600 during school days to avoid bus pick up and drop off times.



## 2 Existing Road Network and Local Characteristics

**Orange Grove Road** is a local road (managed by Gunnedah Shire Council) which runs parallel to the southern border of the Site. The north, east and west boundaries of the Subject lands are defined by neighbouring agricultural lots with some sections of unnamed, unsealed rural roads. Orange Grove Road connects with Kelvin Road to the west of the site via a simple give way controlled intersection with Kelvin Road being the priority road. Orange Grove Road is generally sealed (refer Photo 2 below) and provides a width of approximately 6 metres allowing for 2-way traffic movements as required. Adjacent to the subject site the road is unsealed (refer Photo 1 below). It operates under the speed limit of 100 km/h although the current vehicle speeds would be slightly lower than this due to the un-sealed road surface.



*Photo 1 – View along Orange Grove Road showing existing unsealed section adjacent to the subject site*



*Photo 2 – View along Orange Grove Road to the west of the subject site where the road has a sealed pavement and edge marker posts*

**Kelvin Road** to the west of the site is a sealed two-way road with an overall width of 7 metres (refer Photo 3 below). It intersects with Orange Grove Road via a simple give way controlled intersection with Kelvin Road being the priority road. In this location Kelvin Road provides a straight alignment and ensures that good visibility is available for drivers turning in and out of the side road. Kelvin Road runs in a north south direction and connects with O’Keefe Avenue to the south for direct access into the centre of Gunnedah. **O’Keefe Avenue** provides a sealed pavement allowing for 2-way traffic movements and connects with **Chandos Street** at the bridge crossing over the Namoi River on the northern edge of Gunnedah (refer Photo 4 below). It is noted that whilst there is no weight limit imposed on the bridge over the Namoi River, there is a warning sign due to the restricted width to advise drivers to be wary of approaching heavy vehicles. The width of this bridge would not permit two heavy vehicles to pass.

These roads all operate under the posted speed limit of 100 km/h.





Photo 3 – Typical cross section for Kelvin Road to the south of Orange Grove Road



Photo 4 – Section of Chandos Street to the immediate north of the Namoi River bridge. Note 50 km/h urban area speed limit is located here.

As part of the project, it is proposed that all heavy vehicles will avoid travel via Chandos Street / O'Keefe Avenue but will use Old Blue Vale Road and Blue Vale Road to connect with the Kamilaroi Highway.



**Old Blue Vale Road** connects with Kelvin Road at its eastern end and Blue Vale Road at its western end. Old Blue Vale Road allows for 2-way traffic movements although it is noted that the sealed width allows for a single vehicle only and as such opposing vehicles must put two wheels on the dirt to the side of the seal when passing (refer Photo 5 below). There are a number of rural residents located along this road as well as Gunnedah airport at its eastern end (which connects to Kelvin Road). During the site work, a number of heavy vehicles were observed on this road, associated with farm activities and an industrial type user located on the southern side of the road.



*Photo 5 – Typical cross section of Old Blue Vale Road*

Old Blue Vale Road connects with Kelvin Road via a simple give way controlled T intersection with Kelvin Road being the priority road. This intersection is located on a straight section of road allowing for good visibility for drivers turning in and out of the side road. It is noted that there is poor delineation in this location and drivers cut the corner when turning left out of Old Blue Vale Road (refer Photo 6 below). This intersection also requires maintenance due to loose gravel on the road causing a safety concern.



*Photo 6 – View on Old Blue Vale Road at eastern end showing poor road maintenance at Kelvin Road intersection.*

At its western end, Old Blue Vale Road connects with Blue Vale Road via a simple give way controlled intersection with Blue Vale Road being the priority road. This intersection is well laid out and provides good visibility in both directions for drivers exiting the side road. It is noted that there is no dedicated sheltered right turn lane on Blue Vale Road (requiring a vehicle to stop in the through traffic lane on Blue Vale Road) for the traffic turning onto Old Blue Vale Road in this location.

**Blue Vale Road** is a sealed road allowing for two-way traffic movements. It provides a sealed width of 7 metres and currently carries a high volume of heavy vehicles associated with Whitehaven mining activities to the north of this location. These vehicles are typically 25-metre-long trucks which run along Blue Vale Road, connect with the Kamilaroi Highway to the south, then turn into the loading facility to the south of the Kamilaroi Highway to the east of Blue Vale Road. The intersection of Blue Vale Road and the Kamilaroi Highway is well laid out, allowing for a left turn acceleration lane for the vehicles turning out of Blue Vale Road as well as a sheltered right turn lane for vehicles turning right into Blue Vale Road off the Kamilaroi Highway.

**The Kamilaroi Highway** forms part of the regional and State road network that is a key freight route in NSW and forms part of the road network designated by the Roads and Maritime to carry oversize, over mass vehicles. It provides a single lane of travel in both directions between Blue Vale Road and Gunnedah to the east (refer Photo 7 below). It operates under the posted speed limit of 100 km/h although to the immediate west of the intersection with Blue Vale Road the posted speed limit is 70 km/h adjacent to the heavy vehicle checking station. As part of the regional road network, the Kamilaroi Highway carries a mixture of local and regional traffic with a significant number of trucks including B-double combinations. Based on RMS data from the count station on the Oxley Highway to the east of Gunnedah it is considered that this road would carry a high level (16%) of heavy goods vehicles.





*Photo 7 – View east along the Kamilaroi Highway showing sheltered right turn lane for vehicles turning into Blue Vale Road*

The Kamilaroi Highway runs through the centre of Gunnedah, although there is a sign on the eastern and western approaches to the centre of Gunnedah to direct heavy vehicles away from the centre of town. This heavy vehicle route is used by the majority of the heavy vehicles passing through town and runs along Warrabungle Street / Bloomfield Street / Boundary Road. This alternate route provides a wide sealed pavement of approximately 12 metres and allows for the safe movement of heavy vehicles whilst accommodating local parking demands (refer Photo 8 below). This route ensures heavy vehicles do not need to pass through the centre of Gunnedah.



*Photo 8 – Typical cross section along Bloomfield Street allowing for kerb side parking and two-way heavy vehicle movements*

Staff and local supplies may be sourced from Tamworth and access to Tamworth is provided via the **Oxley Highway**. The Oxley Highway also forms part of the regional and State road network that is a key freight route in NSW and forms part of the road network designated by the Roads and Maritime to carry oversize, over mass vehicles. It generally provides a single lane of travel in both directions (refer Photo 9 below). It operates under the posted speed limit of 100 km/h. As part of the regional road network, it carries a mixture of local and regional traffic with a significant number of trucks including B-double combinations. Based on RMS data from the count station on the Oxley Highway to the east of Gunnedah it carries a high level (16%) of heavy goods vehicles.

## 2.1 Traffic Volumes and Road Operation

Traffic volumes in the immediate vicinity of the subject site are very low, reflective of the rural environment. Orange Grove Road provides access to a number of rural land holdings and does not provide a direct access for through traffic movements nor does it provide access to a town or village. As such the traffic flows on this road are considered to be less than 100 vehicles per day two-way. Kelvin Road similarly carries low traffic flows but does provide local access between Gunnedah and Barraba. Whilst it would carry higher traffic flows than Orange Grove Road it is still considered that it would carry less than 500 vehicles per day two-way.

Old Blue Vale Road also carries very low traffic flows as it provides access to a low number of dwellings along its length and does not provide any through traffic movements. It is considered that the daily traffic flows along this road would be less than 100 vehicles per day.

Observations on site show that Blue Vale Road currently carries a significant number of truck and dog combinations associated with the Whitehaven mining operations, with heavy vehicles observed travelling in both directions hauling coal south and empty trucks heading north. Traffic flows on this road are impacted upon by these trucks and daily traffic flows are considered to be much higher than those on Old Blue Vale Road but less than 500 vehicles per day two-way.

As part of the regional road network, it can be seen that the Kamilaroi Highway carries higher traffic flows, associated with both local and regional demands. There is no traffic data available from the RMS web page for this road, however the RMS web page does indicate that the daily traffic flows on the Oxley Highway to the east of Gunnedah are in the order of 3,500 vehicles per day with 16% heavy vehicle content. It is considered that the flows on the Kamilaroi Highway could be similar with similar heavy vehicle content.

Observations on site during a typical morning peak period shows that the current road network in the vicinity of the subject site and around Gunnedah operates very well with minimal delays and congestion. The route proposed to be used for the project all carries low traffic flows and operates with no delays except for those associated with drivers slowing down to observe traffic flows on the approaches to the various intersections and negotiating the intersections. The only delays noted were along the Kamilaroi Highway through the centre of Gunnedah and the project traffic will not operate through the centre of Gunnedah. All heavy vehicles will operate along the heavy vehicle route through Gunnedah which currently operates very well with minimal delays.

## 2.2 Road Safety

It is recognised that as part of the project work, there will be a significant number of heavy vehicle movements associated with the construction work which will impact along the local road network. As stated above, ALL heavy vehicle access to the project site will be via the Kamilaroi Highway – Blue Vale Road – Old Blue Vale Road to Orange Grove Road. The heavy delivery vehicles will not use the bridge crossing over the Namoi River via Chandos Street / O’Keefe Avenue.

The major road safety impact is associated with the delivery trucks accessing the site and their impact upon the operation of the intersections. The trucks will be accessing the site from either Newcastle or Port Botany in Sydney, where the solar panels will be shipped to. The trucks will then access Gunnedah via the regional road network which will include the New England Highway to Willow Tree and then the Kamilaroi Highway to Gunnedah. Both of these roads currently provide a high standard of road and allow for the movement of local, regional and national road freight and carry B-double trucks. It is considered that the additional truck movements associated with the construction activities for the project will have a minimal and acceptable impact upon road safety along these roads.

For the local traffic impacts, to ensure minimal impact upon road safety ALL heavy vehicles associated with the project will be directed to drive along the following route:

- Kamilaroi Highway to Gunnedah
- Utilise the heavy vehicle route to avoid the centre of Gunnedah
- Travel along Blue Vale Road via its intersect with the Kamilaroi Highway
- Old Blue Vale Road
- Kelvin Road
- Orange Grove Road.

This route is provided below (Figure 2-3) and will be included within the Driver’s Code of Conduct and will form part of the project inception meeting for the project for all staff and drivers.





Figure 2-1 – Designated Heavy Vehicle route to project site

The heavy vehicle route through Gunnedah currently caters for a large number of heavy vehicles including B-double combinations. This route provides a wide road pavement to cater for kerb side parking and the safe 2-way movement of trucks along the road. The intersections along this route are well laid out and provide good visibility in all directions to allow for the safe turning movements of vehicles. It is considered that this route can safely accommodate the additional traffic movements associated with the project.

#### 2.2.1 Intersection of Kamilaroi Highway and Blue Vale Road

The intersection of the Kamilaroi Highway and Blue Vale Road is very well laid out and has been upgraded as part of the Whitehaven mining operations to provide a sheltered right turn lane on the Kamilaroi Highway for traffic turning into Blue Vale Road as well as a left turn acceleration lane for vehicles turning left out of Blue Haven Road into Kamilaroi Highway. All heavy vehicle movements associated with the project will require right turns into Blue Vale Road (laden) with left turn out movements associated with unladen trucks. The existing intersection layout can safely accommodate these movements.

The posted speed limit on the Kamilaroi Highway in this location is 70 km/h and from Austroads Guidelines the sight visibility requirement is 151 metres. The sight distance has been measured and assessed on site and exceeds 250 metres in both directions.

Overall it is considered that this intersection provides a high level of control and operates to a high safe standard and as such no upgrade works are required at this intersection to accommodate the traffic movements associated with the proposed solar farm (construction and operation phase).

#### 2.2.2 Intersection of Blue Vale Road and Old Blue Vale Road

This intersection is well laid out and provides good visibility in both directions for drivers exiting the side road. It is noted that there is no dedicated sheltered right turn lane on Blue Vale Road (requiring a vehicle to stop in the through traffic lane on Blue Vale Road) for the traffic turning onto Old Blue Vale Road in this location, however the flat vertical road alignment and the horizontal alignment of the road ensures there is good visibility for a driver approaching this intersection from either direction on Blue Vale Road.

All traffic movements associated with the project will require right turns into Old Blue Vale Road for laden trucks and then left turn out of Old Blue Vale Road for unladen trucks. The critical issues for road safety in this location is forward visibility for drivers approaching the intersection on Blue Vale Road, to observe any vehicle waiting to turn right into Old Blue Vale Road) and the visibility to the right for a driver turning out of Old Blue Vale Road.

Visibility to the right for drivers exiting Old Blue Vale Road has been assessed on site and is considered to be appropriate. The posted speed limit in this location is 100 km/h and from the Austroads Road Design the distance required is 285 metres. The distance has been measured onsite and exceeds 350 metres in both directions for a driver exiting Old Blue Vale Road (refer Photo 9 and 10 below).





*Photo 9 – View to right for driver exiting Old Blue Vale Road onto Blue Vale Road*



*Photo 10 – View to left for driver turning out of Old Blue Vale Road onto Blue Vale Road*

Whilst it can be seen that this intersection does not provide a sheltered right turn lane, given the low traffic flows along both of these roads and the forecast additional traffic movements associated with the construction of the project, it is considered that the existing intersection provides a safe and acceptable layout. The critical issue for road safety is the right turn into the side road off Blue Vale Road and in particular the visibility for a driver northbound on Blue Vale Road. A driver wishing to turn into Old Blue Vale Road has good visibility to observe gaps in the on-coming traffic and can adjust their vehicle speed accordingly to ensure they do not need to stop to turn right into Old Blue Vale Road. The southbound traffic flow is less than 50 vehicles per hour ensuring large gaps between vehicles appropriate to turn right. Thus, there will be no requirement for vehicles to be stopped on Blue Vale Road waiting to turn right into Old Blue Vale Road. Drivers following a vehicle turning right into Old Blue Vale Road have good forward visibility and will be able to adjust their vehicle speed if required to avoid colliding with the rear of a turning vehicle. It is therefore considered that no upgrade to this intersection is required on road safety grounds to accommodate the traffic movements associated with the proposed solar farm (construction and operation phase).

#### 2.2.3 Intersection of Old Blue Vale Road and Kelvin Road

The intersection of Old Blue Vale Road and Kelvin Road is a simple give way controlled intersection with Old Blue Vale Road being the minor road. Trucks associated with the project will be turning left out of Old Blue Vale Road (laden) and the right turn off Kelvin Road (unladen) into Old Blue Vale Road. This intersection is well laid out and provides good vertical and horizontal visibility. Whilst there is no sheltered right turn lane provided on Kelvin Road the existing traffic flows are very low at this location and the additional traffic movements associated with the project will have a minimal and acceptable impact on the operation and safety of this intersection.

The posted speed limit in this location is 100 km/h and under Austroads Guidelines the visibility requirement is 285 metres. The distance available has been assessed on site and exceeds 320 metres (refer photo 11 and 12 below). The road in this location is flat and southbound drivers approaching the intersection have good visibility allowing them to adjust their vehicle speed to allow for right turn movements into Old Blue Vale Road.

It is considered that this intersection can continue to operate in a safe and appropriate manner with the additional traffic movements associated with the proposed solar farm project and does not require any road upgrades. However, it is considered that maintenance work is required at this intersection to remove the large amount of loose gravel material which has accumulated over the intersection. This could create a safety issue especially for 2-wheeled vehicles turning in and out of the side road.





Photo 11 – View to right for driver exiting Old Blue Vale Road onto Kelvin Road



Photo 12 – View for drivers turning right into Old Blue Vale Road off Kelvin Road



#### 2.2.4 Intersection of Kelvin Road and Orange Grove Road

The intersection of Kelvin Road and Orange Grove Road provides for a simple T intersection control with Kelvin Road being the priority road. This intersection is well laid out and provides good visibility for drivers on all approaches (refer photo 13 and 14 below). The posted speed limit in this location is 100 km/h and under Austroads Guidelines the visibility requirement is 285 metres. The visibility available has been assessed on site and exceeds 400 metres ensuring that drivers can use this intersection in a safe and appropriate manner. It is considered that this intersection can continue to operate in a safe and appropriate manner with the additional traffic movements associated with the proposed solar farm project and does not require any road upgrades.



*Photo 13 – View to right for driver exiting Orange Grove Road onto Kelvin Road*



Photo 14 – View north along Kelvin Road for driver wishing to turn right into Orange Grove Road

### 2.3 Mitigation Measures

Temporary signage should be installed on the approaches to these intersections to advise drivers of increased heavy vehicle turning movements to increase road safety awareness. It can be seen that the vast majority of the drivers on these roads are local drivers and as such will be aware of the increased movements and will be alert to these increased demands. Residents along the heavy vehicle route will also be notified of the works program via a regular letter drop.

For the length of Old Blue Vale Road, the increased truck movements (refer Section 2.5 below) could impact upon the operation of this road, due to the single sealed travel lane along the centre of the road only. The layout of the road requires opposing drivers to place the kerb side wheels of their vehicle on the dirt to the side of the seal to allow passing. However, the increased demands will only occur during the construction period (being less than 12 months) and once the facility is constructed and operational, there will be little if any demand for additional traffic to travel along this road. It is considered that this road can continue to operate as a single sealed lane however the following mitigation measures are put forward for the project:

- A similar upgrade should be applied at the eastern end of Old Blue Vale Road to allow for two opposing heavy vehicles to pass close to Kelvin Road;
- Provide regular community updates for residents along Old Blue Vale Road to advise of construction activities and increase heavy vehicle movements along Old Blue Vale Road;
- Agree a maintenance schedule with Gunnedah Shire Council for the construction period to allow for increased wear along the edges of the sealed pavement due to the increased passage of heavy vehicles and the demand for placing two wheels in the dirt to the side of the sealed central pavement lane.



As part of the construction work, a length of 30 metres of seal is to be provided for the site access road from its connection to Orange Grove Road be provided to minimise the transport of dust from the site onto the public road. It is noted that the site access is adjacent to the existing length of seal on Orange Grove Road and as such no upgrade works are required on Orange Grove Road.

#### 2.3.1 Light Vehicle Route

For light vehicles associated with workers, the proposed access route will be via Chandos Street and O'Keefe Avenue to allow for direct access between the subject site and the centre of Gunnedah. This route provides a safe and acceptable route for light vehicles which can safely and conveniently cross the Namoi River on the existing bridge.

### 3 Construction Activities

The construction and commissioning phase is expected to last approximately 9-12 months. The main construction activities include:

- Site establishment and preparation for construction:
  - Installation of security measures including fencing.
  - Establishment of site compound, material layout and wash down areas.
  - Ground preparation.
- Installation of environmental controls
  - A detailed Construction Environmental Management Plan (CEMP) would outline the environmental controls required.
- Minor vegetation clearing (grasses, shrubs and isolated trees).
  - Targeted clearance of low lying vegetation around trenching areas to steel post installation to minimise disturbance to existing ground cover.
  - Establishment of tree and vegetation protection measures as required.
  - Clearance of larger vegetation such as bushes and isolated trees.
  - Establishment of additional sedimentation and erosion controls as required.
- Preliminary civil works including:
  - Drainage works
  - Setting up foundations for the substation
  - Earthing works (see below)
- Installation of steel post and rail foundation system for the solar panels.
- Installation of PV panels and DC wiring beneath the panels.
- Installation of underground cabling (trenching) and installation of inverter stations.
- Construction of internal access tracks.
- Construction of 132kV substation.
  - Site Establishment and clearing (if required)
  - Bulk earthworks via a range of plant that may include scrapers, bulldozers, excavators, rollers, trucks and loaders for carrying plant in and out of the site
  - Detailed civil works including drainage, earthing, foundations etc. generally using excavators, piling rigs, trucks and cranes
  - Erection of steelwork, equipment, demountable buildings and transformer generally using trucks, EWP's and cranes
  - Electrical connections generally EWP's and other minor plant
  - Testing and commissioning generally EWP's and other minor plant
- Construction of new transmission line from substation to existing 132 kV transmission line.
  - Transmission line stringing for new conductor and OPGW will be completed generally by trucks, cranes, EWPs, winches and other minor plant and vehicles. Civil works may be required for construction benches.
  - For the new transmission line structure excavators, piling rigs, cranes, trucks, winches and EWPs are generally required.
- Offsite electrical works by Transgrid including
  - Approx. 1.6km of high capacity fibre (OPGW retrofit) to connect the 132kV Solar Farm Substation to TransGrid's Gunnedah Substation
  - Installation of switchgear at Gunnedah Substation
- Testing of electrical infrastructure
- Removal of temporary construction facilities and rehabilitation of disturbed areas.



The project does not require any concrete footings to be provided for the solar panels construction. The substation will require a hardstand base with material imported for this.

A site office and compound will be established on site for the duration of the works with temporary access tracks provided to allow for access across the site as required.

All staff vehicles will be able to park within the site adjacent to the site office with no external parking demands. The car park area will allow for up to 50 vehicles to park within this compound area. As part of the project construction it is proposed to maximise the local workers content (from Gunnedah and Tamworth) and car pooling will be encouraged as part of these trips. With 3 or 4 people arriving in a single vehicle it can be seen that the parking demands will be contained within the site.

The current access road to the site is via an unnamed, unsealed road off Orange Grove Road near the western boundary of the Site in the south-west corner of Lot 151 DP754954. This access road would be utilised as the Main Access Road following upgrade of the intersection with Orange Grove Road.

TransGrid will require a permanent sealed access road off Orange Grove Road and the new Gunnedah Solar Farm substation.

### 3.1 Timing

The construction of the solar farm is expected to commence in Quarter 4 2018 or Quarter 1 2019 and be completed within a 12 month timeframe.

The first stage of the associated works requires the road upgrade work on Orange Grove Road to be completed prior to commencement of construction activities on site.

### 3.2 Working Hours

**Construction hours** are in accordance with the *Interim Construction Noise Guidelines* (DECC 2009) (ICNG) with standard construction hours being

- 7:00am and 6:00pm Monday to Friday
- 7.00 AM to 4 .00 PM on a Saturday
- No construction work is to be carried out on a Sunday or public holiday.

No construction work, upgrading or decommissioning activities will be undertaken outside of these hours with the exception of:

- The delivery of material as requested by the NSW Police Force to other authorities for safety reasons; or
- Emergency work to avoid the loss of life, property and / or material harm to the environment.

### 3.3 Construction staff numbers

Peak demand levels for the construction work will vary with a peak of 100 people and a lower level outside of the peak period. The staff will be sourced locally where appropriate with some specialist and project management staff being temporarily located in Gunnedah. Staff will be encouraged to car pool as appropriate with other staff transferred to and from the site via mini coaches to reduce vehicle demands. Due to the size of the site footprint, these same vehicles will also be used on site to move staff across the site.

With a peak of 150 staff, a vehicle occupancy rate of 4 people per vehicle has been assumed based upon carpooling and the use of a mini bus e.g. Toyota Coaster. This would give 40 vehicle movements inbound and outbound for staff movements.

All construction light vehicles will be able to park on site within the office compound area as required.

### 3.4 Heavy vehicle requirements

The level of heavy vehicles accessing the site will vary throughout the project timeframe. At the beginning of the project there will be a requirement for some earthwork moving equipment to construct the access tracks and some minor earthworks across the site as required. This may require a scrapper or bull dozer which will be transported to site on a low loader. This machinery will remain on site for the duration of the earthworks portion of the project construction work.

While extensive earthworks are not proposed, some land forming (including localised cut and fill areas) may be undertaken to achieve more consistent gradients beneath the PV modules. Additionally, earthworks are required for trenching works.

In total, approximately

- 900 m<sup>3</sup> of gravel would be required to cap the access road
- 7850m<sup>3</sup> of sand (subject to detailed design) would be required for the bedding of cables that are to be buried throughout the site
- 2400m<sup>3</sup> of imported fill to construct the raised platform (0.5m) for the substation

Should any excavated material not be suitable for reuse or additional fill material is required the maximum amount of fill is estimated to be 12,000 m<sup>3</sup>.

Once the earthworks have been completed, the balance of the construction work will commence requiring machinery shown below in Table 3-1:

Table 3-1 – Construction machinery requirements

Equipment	Quantity	Model Type
Pile Driver	10	Gayk HRE 1000 or similar
All terrain fork-lift (tele handler)	10	Manitou MHT-X or similar
All terrain utility vehicle	10	John Deere XUV560 or similar
Backhoe	5	New Holland LB90B or similar
Excavator	4	Cat C13 ACERT or similar
Bulldozer	4	Cat C9.3 ACERT or similar
Scraper	2	Open Bowl Scrapers or similar
Roller	4	Vibratory Soil Compactors
Winches	4	Attached to medium sized dozers or similar
Flatbed truck	5	Isuzu FVZ 1400 or similar
Mobile crane	1 – 2	KATO NK550VR or similar
Elevated work platforms	1	Bravi Lui 460 Elevated Work Platform 280kg Capacity or similar

Other equipment if required may include an elevated work platform, scraper, roller and winches. All of the plant will be located on site and will therefore be only required to access the site once for the construction works.

The solar panels are expected to be all delivered from the Port at Newcastle or Port Botany in Sydney. Other specialist equipment is generally sourced from Newcastle or Greater Sydney as required whilst consumables such as concrete and general material supplies will be local from the Gunnedah area.

### 3.5 Vehicle movements

A summary of the vehicle movements is provided below in Table 3-2.

Table 3-2 – Summary of vehicle movements for full project

Phase	Purpose	Vehicle Type / Trailer Type	No. of one-way vehicle movements
Site Set-Up and Demobilisation	Portacabin delivery and removal	Low loader	10
	Skip delivery and removal	Low loader	20
	Generator delivery and removal	Semi-trailer	2
	General deliveries	Semi-trailer	20
	Crane mobilization and demobilization	Crane	4
	Water tank delivery and removal		2
Roads and hardstands	Delivery of imported capping for road laydowns and crane hardstands	Truck and dog	375
	Plant delivery and removal: excavators, compactors drill rig	Low loader	20
	Concrete deliveries for maintenance container hardstands	Concrete agitator	60
Generating Equipment	Tool container delivery and removal	Low loader	2
	Module deliveries	Semi-trailer or B-double	1,300
	Mounting structure and pile deliveries	Semi-trailer or B -double	1,000
	Inverter Station deliveries	Low loader	26
	DC cabling trays and combiner boxes	Semi-trailer or B-double	200
AC Cable Installation	AC Cable delivery	Semi-trailer or B -double	180
	Backfill material delivery	Dump Truck	1,500
Plant delivery and removal	Telescopic handler and excavator	Low loader	28
Overhead Line	Conductor delivery	Semi-trailer	20
	Pole deliveries	RAV	5
	Pole dressing delivery	Semi-trailer	1
Other	Employee vehicle movements per day per direction	Light vehicle / mini coaches	40

Phase	Purpose	Vehicle Type / Trailer Type	No. of one-way vehicle movements
	Monitoring equipment fibre SCADA servers etc	Truck	2
	Waste Collection	Truck	200
	Consumables (Oil and Fuel)	Truck	20
	Miscellaneous deliveries	Light vehicle	20
		<b>TOTAL</b>	<b>5,057</b>

In summary, peak vehicle movements are 50 light and 16 heavy vehicles two-way (50/16 inbound, 50/16 outbound) per day. For the light vehicles, the vast majority of these will be inbound movements in the morning bringing workers to the site with these vehicles then remaining on site for the full working day before leaving at the end of the working day. It is expected that there will be limited light vehicle movement outside of these periods, other than support staff e.g. office staff or the occasional visitor to the site.

For the heavy vehicles, these will typically be spread out across the working day. For the solar panel deliveries, these trucks are arriving from either the Port of Sydney or the Port of Newcastle and the journey length will be over 5 hours, ensuring that these vehicles will not all arrive at the same time. Allowing for each truck to be emptied on site one at a time, the outbound movements will also be spread out and not all leave at the same time. All other heavy vehicles will also be spread out over the normal working day with no concentration of heavy movements expected.

## 4 Traffic Management Assessment

The proposed traffic management measures allow for all access off Orange Grove Road only. The access to be used will be for the construction traffic movements as well as the future on-site operational demands. This access is to be provided in accordance with the requirements for the site operations and take into account the specific design requirements of Gunnedah Shire Council.

All heavy vehicle movements in and out of the site are as shown below in Figure 4-1.



Figure 4-1 – Heavy Vehicle access route to subject site

All light vehicle movements in and out of the site are shown below in Figure 4-2.

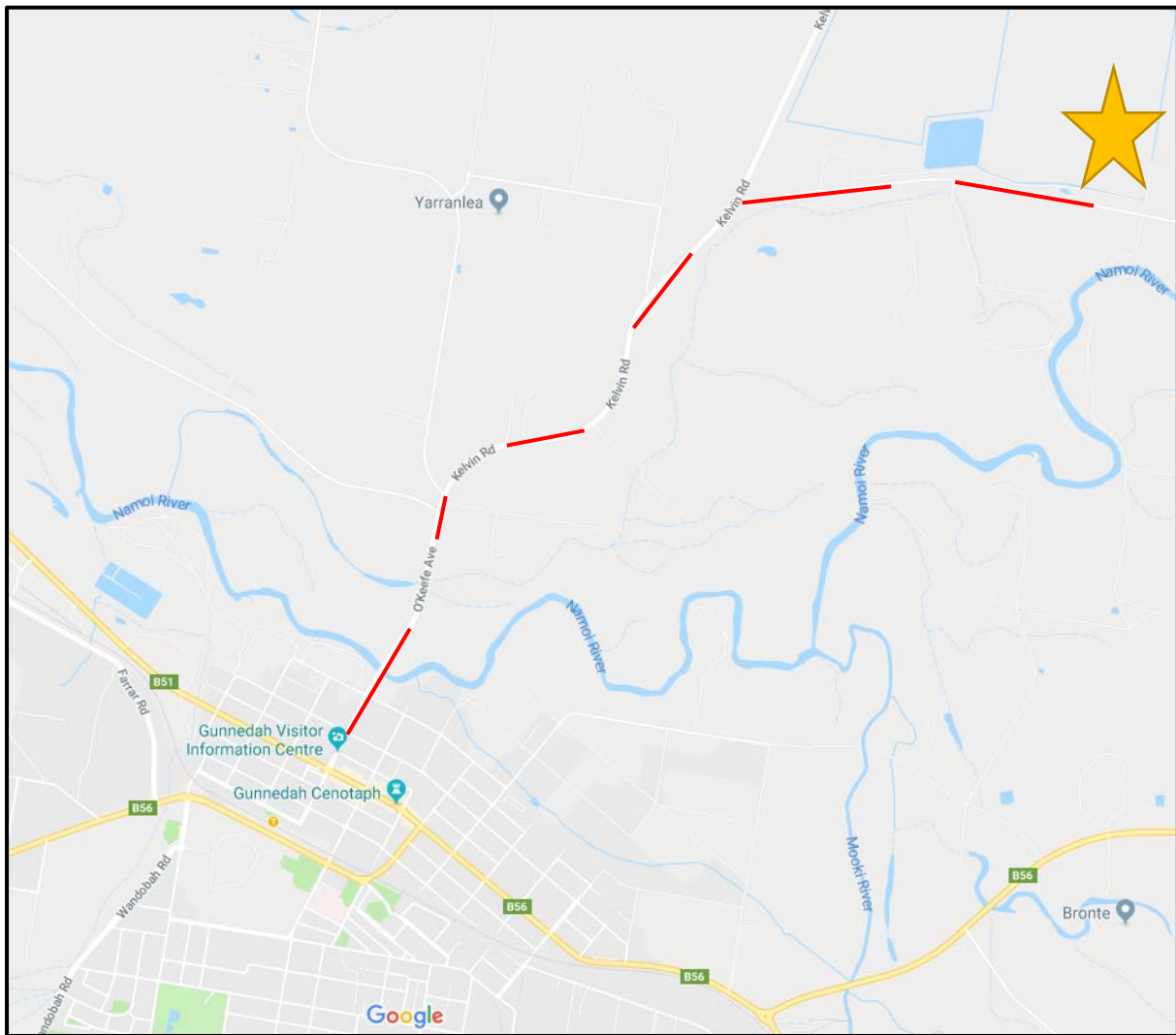


Figure 4-2 – Light vehicle access in and out of the subject site

#### 4.1.1 Impact Assessment

The project will require the delivery of the solar panels and other specialist equipment from Newcastle or Sydney with the access route via:

- Newcastle or Sydney metropolitan regional road network;
- M1 Motorway to Hunter Expressway (Sydney source);
- New England Highway to just north of Willow Tree;
- Kamilaroi Highway from New England Highway to Gunnedah.

These roads all form part of the road freight routes within the State road network and all currently carry heavy vehicle movements including B-double access for the full length of the routes. These routes will be documented as the Haulage Route for all delivery vehicles to enter and exit the site for the vehicles associated with haulage of the solar panels for the project site.

These roads carry a high number of heavy vehicles, including B-doubles associated with local and regional agricultural demands. These agricultural demands are seasonal in nature and occur 24 hours a day often involving night travel and operations. There are a number of farms in the general locality of the project site as well as in the wider Gunnedah area that use these local and regional roads during these seasonally high demand periods. Due to the seasonal nature of this work and the requirement for quick turnaround of crop deliveries it is considered that it is not appropriate to limit truck movements for these existing farms. Similarly, it is considered that it is not appropriate to limit truck movements to and from the project site at these times as the traffic movements on the local roads will continue to remain low.

For the regional road network e.g. Kamilaroi and Oxley highways the total traffic flows will remain well within acceptable limits and as such will continue to operate to a good level of service for all road users. Current daily traffic flows on these highways are considered to be in the order of 3,500 vehicles per day. Assuming 10% of the traffic movements occur in the peak hour, this would give 2-way flows on these roads of 350 vehicles. The RMS Guide to Traffic Generating Developments indicates that for rural roads, allowing for 15% heavy vehicles the 2-way flow for a level of service of B is 530 vehicles. With the additional traffic associated with the critical construction period on the site the level of service on these roads will remain at B.

The traffic flows along the local roads giving access for the heavy and light vehicle movements associated with the project are currently very low based on-site observations. Therefore, the additional 50 light vehicle movements associated with the staff movements and 10 daily truck movements (per direction) will have a minimal and acceptable impact upon the operation of these local roads during construction. Once operational, the traffic movements are much lower with 10 staff based on site and as such the impact will be negligible.

There is minimal background traffic growth in this location. The RMS count data from the station east of Gunnedah on the Oxley Highway (Station I.D. 6167) shows traffic flows of 3,588 in 2017 and 3,356 in 2015, representing an increase of around 3% per annum. Other counts along the regional road network show similar or lower increase values. For the assessment of the future impacts in 10 years-time, it can be seen that the site at that time will be operational with 10 staff located on the site. The impact of these ten staff will be very low on the local road network.

The site is expected to be operational for more than 10 years so that the impact of the decommissioning of the site cannot be assessed in detail at this stage. The site could remain operational beyond 10 years and the impact will remain low beyond the 10 year design horizon.

There will be no public vehicle access within the work site during the construction works, with a fence provided at the commencement of the project along the entire site boundary. This fence will remain once the project is constructed for security purposes with a locked gate to be provided at the site access off Orange Grove Road.

There will be no pedestrian access to the site for the general public. There are no pedestrian paths in the locality of the site or expected demands in this remote rural area so there will be no impacts for pedestrians created by the project works.



There is no school within the general locality of the subject site that will be impacted upon by the project. The majority of the heavy vehicle route proposed for the project does not form part of the local school bus run, with the section of Kelvin Road between Orange Grove Road and Old Blue Vale Road (approximately 2.5 kms) only being located on a school bus run. As part of the employee and site induction for all heavy vehicle drivers this school bus route will be highlighted so that drivers are aware of a potential school bus over this section. It is noted that the light vehicles associated with the staff movements will typically occur in the morning prior to this school bus inbound movement and staff leaving the site at the end of the day will be after the return of this school bus run and as such will not have any interaction. Once on the regional and state road network all school zones will be delineated in accordance with RMS Guidelines with reduced speed limits in accordance with normal NSW road rules. All drivers associated with the project construction work will adhere to the road rules as applicable.

There will be no impact upon public transport services with no diversions required. There are no bus stops impacted upon by the proposal. Gunnedah is not serviced by a train and is reliant upon a coach link with infrequent operation.

There will be minimal impact for emergency vehicles and heavy vehicles with no diversions required.

There will be minimal impact upon any other development within the locality of the site.

There will be minimal impact upon adjoining Council areas. Traffic routes in and out of the locality will be along the arterial road network which will experience minimal impacts due to the works.

There are no residential dwellings in the immediate locality of the site access that will be impacted upon by the project and construction work. There are a number of residences along the heavy and light vehicle access routes and these residents will be notified in writing of the construction works and the activities as required.

Construction vehicle movement on internal roads may lead to dust generation. A water truck will be used for dust suppression to minimise the production of dust, with the amount of water spreading adjusted accordingly to reflect the conditions. Additionally, any significant deposits of dirt and other construction materials will be promptly removed from public roadways.

Post construction, the traffic numbers generated by the project are very low, with a maximum on-site workforce of 10 people. There will not be any need for regular heavy vehicle access to the site once the solar farm is operational except for the occasional heavy vehicle for emergency repairs or irregular maintenance.

#### 4.1.2 Delivery vehicles

All deliveries for the project will be via 19 metres semi-trailers or B-double combinations (26 metres in length maximum).

The access routes along the regional / state road network to the site are all along approved B double routes whilst the local roads between the Kamilaroi Highway and the project site carries B-doubles associated with local agricultural demands and as such the use of B double trucks for deliveries to the site are considered appropriate. These trucks will only use the designated heavy vehicle route to access the site and will not use O'Keefe Avenue to cross the Namoi River.

Delivery vehicles would be required throughout the project period. The travel time between the ports (Newcastle or Sydney) and the site for the solar panels is approximately 4 to 6 hours and these deliveries will be spaced out over the construction period, to minimise the impact upon the road network and to reduce the need to store the panels on site. Other deliveries will include the metal structures for the solar panels, sand and gravel for the foundations and internal tracks and cabling. There will also be some deliveries of specialist equipment such as photovoltaic boxes or skids and delivery stations.

The trucks associated with the delivery of the supplies will all travel along the State and regional road network. There are a number of schools located along these routes, however all have marked school zones and speed limit restrictions as per State guidelines. As these routes are all on the State and regional road network it can be seen that heavy vehicles currently operate on these roads safely. It is considered that there will be no noticeable impact upon road safety adjacent to these schools associated with the additional truck movements associated with the construction work.

There is no requirement to divert traffic as part of this construction work. The existing heavy vehicle detour for Gunnedah shall be utilised as appropriate.

#### 4.1.3 Construction staff movements

For the construction work, the staffing levels will peak at 150 on site and as part of the project, staff will be encouraged and supported to carpool and use mini buses provided to allow for shared trips from shared accommodation in Gunnedah to the site, approximately 6 kilometres. There will be 40 vehicles inbound in the morning associated with on-site staff and a similar number departing at the end of the working day.

The site is located approximately 6 kms from the centre of Gunnedah and with no footpaths provided on any of the local roads construction staff are unlikely to walk to the site. Some construction staff however could cycle to the site, as the 6 km ride would take 20 minutes or less to complete. The route via the light vehicle access route could be used by cyclists with the wide sealed pavement allowing for a safe cycling environment. Cyclists will be able to park their bikes on site close to the site office and showers should be provided together with work lockers to cater for cyclists.

The vehicle numbers associated with the construction work are relatively low and it is considered that the movement of vehicles in and out of the site for construction works can safely occur with minimal delays to pedestrians and in a safe manner. No limitation on truck access times is considered appropriate for the project. Given the journey length between the port and the subject site, the vehicles as they are approaching the site will be spread out ensuring the impact is not occurring all together. With unloading of vehicles taking 30 minutes or more, trucks exiting the site will also be spread out.

#### 4.1.4 Impacts on Old Blue Vale Road

A protocol will be provided for both undertaking dilapidation surveys and making any necessary repairs following construction to Old Blue Vale Road (refer Figure 4-3 below). The dilapidation surveys will assess the existing condition of Old Blue Vale Road prior to construction and the repair of Old Blue Vale Road should it be identified in the dilapidation surveys to have been damaged during construction.

With regards to any emergency repairs required, the contractor on site would contact the relevant authorities and will ensure the road is safe. Repairs will be made in accordance with the relevant authority standard.

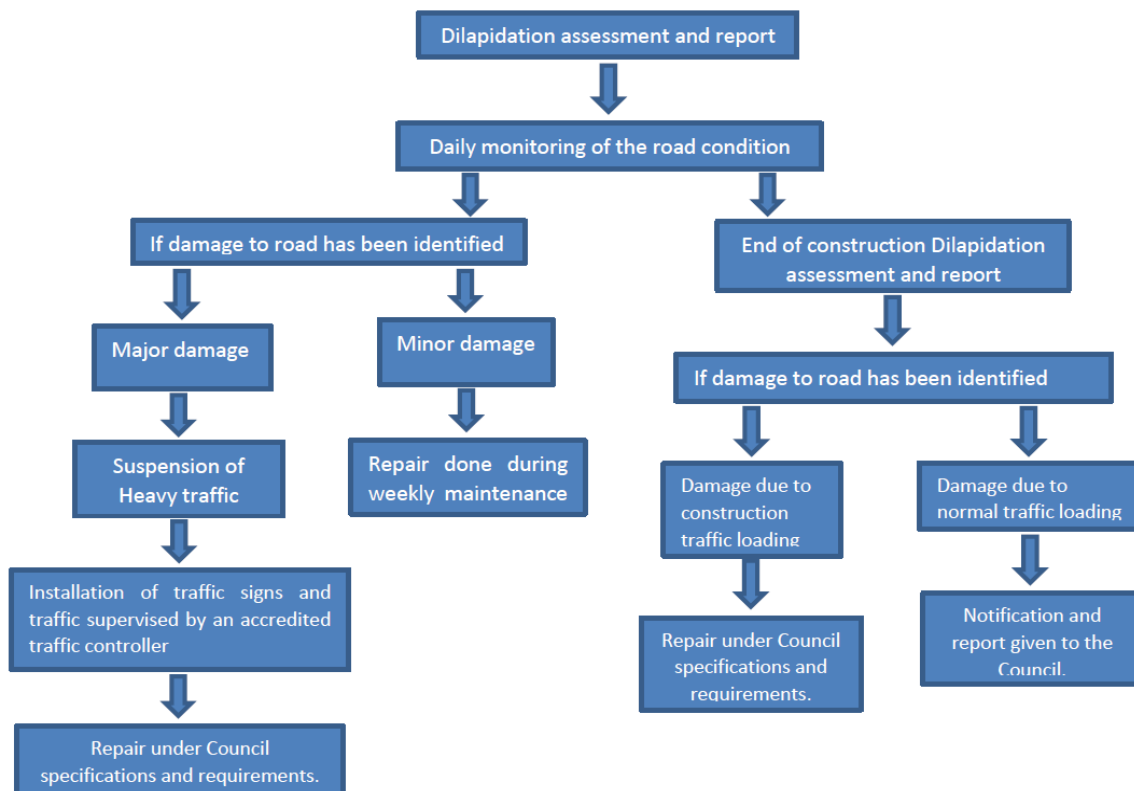


Figure 4-3 Dilapidation Assessment Protocol

#### 4.1.5 Cumulative Impacts from other developments

Other know developments in the locality have been determined to be:

- Orange Grove Solar Farm
- Vickery Mine Extension project
- Rocglen Mine
  - Modification
  - Coal extension project
- Sunnyside Mine – Five-year extension to mining operations
- Whitehaven coal handling and preparation plant
- Watermark Coal mine
- Queensland Hunter Gas Pipeline
- Keepit dam upgrade – This project was approved in April 2009 and completed in 2011 and thus will not affect the Gunnedah Solar Farm.



Table 4-1 – Cumulative Impacts of other know developments

Project	Cumulative Construction Impacts	Cumulative operational Impacts
<b>Orange Grove Solar</b> The proposal intends to build a PV solar facility generating over 30MW of power and occupying 417 ha of land off Orange Grove Road located approximately 12km east of the township of Gunnedah and approximately 4km from the Gunnedah Solar Farm.	<b>Note:</b> TransGrid have already confirmed that they do not have the infrastructure for both projects to proceed and they will not be undertaking any major upgrade works.	<b>Note:</b> TransGrid have already confirmed that they do not have the infrastructure for both projects to proceed and they will not be undertaking any major upgrade works.  As such only one project can proceed to construction and operation and there will not be any cumulative operational impacts.
<b>Vickery Mine Extension project</b> The Vickery Coal Project, owned by Whitehaven Coal Limited (Whitehaven) is an approved, but yet to be developed, open cut coal mining operation situated in the Gunnedah Coalfield approximately 25km north of Gunnedah. Whitehaven is seeking a new Development Consent for extension of open cut mining operations at the Vickery Coal Project.	Cumulative construction impacts of the proposal may include: <ul style="list-style-type: none"> <li>Additional construction traffic causing increased traffic flows along haulage route and specifically Blue Vale Road at the southern end between Old Blue Vale Road and the Kamilaroi Highway.</li> </ul> These impacts would be temporary for the duration of the construction work only and will not have a significant impact upon the overall operation of this section of the road. The project works at Vickery Coal Project will not generate any additional traffic movements but will allow for an extension in time for the on-going operations. The traffic flows on Blue Vale Road will remain at the current levels and well within acceptable limits.  The intersection of Blue Vale Road and the Kamilaroi Highway is well laid out and provides a full length sheltered right turn lane as well as a left turn acceleration lane. It is therefore considered that the intersection has adequate capacity to accommodate the flows associated with the construction traffic operations.	Operational traffic impacts associated with the mine will need to be assessed and managed by the proponent of that development as part of their development application processes. It is considered that the project will not generate any additional traffic movements but will allow for an extension in time for the on-going operations.  Existing traffic flows on Blue Vale Road are less than 500 vehicles per day on this road and the project site, during the operational phase will typically generate less than 30 vehicle movements per day and thus have a minimal and acceptable impact upon the operation of this road.  The operational traffic will typically be light traffic only and will therefore not use Blue Vale Road but rather the light vehicle route via Chandos Street / Kelvin Road.

<p><b>Rocglen Mine</b>  <i>Modification</i> Rocglen mine is located 28km north of the Gunnedah township. The Road Haulage modification was only approved for the 2016 and 2017 calendar years and will not affect this development.</p>	<p>Due to the timeframe of this modification there are no impacts.</p>	<p>Due to the timeframe of this modification there are no impacts.</p>
<p><b>Rocglen Mine</b>  <i>Coal rejects management</i>  Relates to coal rejects management and disposal methods. The proposal will change the rejects management strategy so that the rejects disposed of at Rocglen will not be restricted to just Rocglen-sourced coal. This modification would involve a combination of back-haulage using returning coal trucks as well as trucks specifically to carry reject material.</p>	<p>The environmental assessment submitted to DP&amp;E showed the average daily heavy vehicle movements associated with the transport of coal rejects to and from the mine would remain unchanged.</p> <p>These impacts would be temporary for the duration of the construction work only and will not have a significant impact upon the overall operation of this section of the road. The project works at Rocglen Mine will not generate any additional traffic movements but will allow for an extension in time for the on-going operations. The traffic flows on Blue Vale Road will remain at the current levels and well within acceptable limits.</p> <p>The intersection of Blue Vale Road and the Kamilaroi Highway is well laid out and provides a full length sheltered right turn lane as well as a left turn acceleration lane. It is therefore considered that the intersection has adequate capacity to accommodate the flows associated with the construction traffic operations.</p>	<p>As the daily heavy vehicle movements would remain unchanged there are no expected operational impacts.</p> <p>Existing traffic flows on Blue Vale Road are less than 500 vehicles per day on this road and the project site, during the operational phase will typically generate less than 30 vehicle movements per day and thus have a minimal and acceptable impact upon the operation of this road.</p> <p>The operational traffic will typically be all light traffic only and will therefore not use Blue Vale Road but rather the light vehicle route via Chandos Street / Kelvin Road.</p>
<p><b>Rocglen Mine</b>  <i>Coal extension project</i>  The Project, will permit up to 5 million tonnes (Mt) of coal, not previously considered in the life of mine plan, to be extracted. This represents an increase in coal recovery from Rocglen by close</p>	<p>Operational traffic impacts associated with the mine will need to be assessed and managed by the proponent of that development as part of their development application processes. It is considered that the project will not generate any additional traffic movements but will allow for an extension in time for the on-going operations.</p>	<p>Additional traffic associated with haulage of coal. However, as the environmental assessment states that the Project does not involve any change to the coal production rate, transport fleet, hours of coal haulage or coal haulage route used between Rocglen and the Whitehaven CHPP.</p>

<p>to 30 %. At a maximum recovery rate of 1.5 Mt run-of-mine (ROM) coal annually, this will increase the projected life of the operation for coal extraction by up to four years.</p> <p>The footprint of the open cut pit will increase by approximately 50 hectares to a total open cut mined area of approximately 164 hectares.</p>		<p>On this basis, the Project does not pose any additional annual impacts upon the local road network or traffic volumes, nor does it pose any additional conflict with other road users.</p>
<p><b>Sunnyside Mine</b></p> <p>The Sunnyside Coal Mine is located approximately 15km west of Gunnedah township.</p> <p><i>Modification</i></p> <p>The modification requires approval to continuation of mining of the approved coal reserves beyond November 2015 for a further period of 5 years (i.e. until the end of 2020). This modification was approved in November 2015.</p>	<p>As this is merely a continuation of a mine already in operation at the time that this EIS is being prepared there will be no construction impacts from the mine that will create any cumulative impacts as they have already been considered in the above assessment.</p> <p>This mine is located to the west of Gunnedah and gains access to the wider road network via the Oxley Highway.</p> <p>The construction traffic associated with the project will not travel along the Oxley Highway and therefore will not impact upon the Sunnyside Mine traffic.</p>	<p>During operation, traffic from Sunnyside Mine would utilise the Oxley Highway and the Kamilaroi Highway causing additional heavy vehicle traffic on the road network.</p> <p>Both the Oxley Highway and the Kamilaroi Highway have suitable capacity to cater for operation traffic from the mine and construction traffic from the solar farm as both are key freight routes in NSW and designated as '<i>oversize, over mass load carrying vehicles network approved roads</i>' by Roads and Maritime Services.</p>
<p><b>Whitehaven Coal Handling and Preparation Plant (CHPP)</b></p> <p>The Whitehaven CHPP is located approximately 5km north-west of Gunnedah township.</p> <p>Rejects from Whitehaven CHPP need to be disposed of at an alternative site.</p> <p>The proposal is to install belt press filters (BPF) at the Whitehaven CHPP and use them to produce a dewatered fine rejects 'filter cake' which would be transported to Whitehaven open cut mines (Melville or Rocglen) via truck</p>	<p>As this project was approved in August 2015 it is assumed that the BPF has been constructed and therefore there would not be any cumulative construction impacts.</p>	<p>The trucks used to transport the rejects back to the mine site would be a combination of returning coal trucks and reject-specific trucks. However, the environmental impact statement for the projects states that the total number of heavy vehicle movements transporting coal and/or rejects would remain unchanged and operating hours would also remain the same. As a result, no material impacts on the local road network, other road users or adjoining residences would occur.</p> <p>This is therefore consistent with the existing situation that were observed as part of the site work. The existing traffic flows on Blue Vale Road are considered to be less than 500 vehicles per day.</p>



(either combined with coarse rejects or separately)		Operational traffic for the project site will not use Blue Vale Road as they can use the light vehicle route.
<b>Watermark Coal Mine</b> The project is located approximately 25km south south-east of the Township of Gunnedah and to the immediate west of the village of Breeza within the Gunnedah LGA. The proposal is the construction and operation of an open cut mine extracting up to 10 million tonnes of coal per annum over 30 years. This project was approved in January 2015 but construction had not started at the time this EIS was written.	Construction requirements for open cut mine are reasonably low as the machinery requirements for the establishment are used for the future operations. The construction work will require plant to be moved to site and will remain on site for the duration of the project. Limited material and supplies demand for a quarry.  Impact will be along the Kamilaroi Highway where the connection to the local road network is for the new mine. As part of the approval process, Watermark Coal Mine will have reviewed impacts of their vehicles turning in and out of the site road and will have assessed the required intersection control (and upgrade as required). This will have allowed for background growth on the Kamilaroi Highway and will cater for the development traffic associated with the project, which has a low hourly increase on the Kamilaroi Highway flow.	The operation of the mine will create increased traffic in the Breeza area and on the Kamilaroi Highway from staff moving to and from work and also operational traffic from the haulage of coal.  Operational traffic impacts associated with the mine would have been assessed and managed by the proponent of that development as part of their development application processes at that time.  The operational traffic of the Proposal will be minimal and is expected to be local to Gunnedah and as such will not travel on the Kamilaroi Highway.
<b>Queensland Hunter Gas Pipeline</b> Hunter Gas Pipeline Pty. Ltd. (HGP) proposes to build and operate a high pressure, underground (minimum depth of cover 750mm) 420km steel gas pipeline to transport gas from the proposed Narrabri Gas Project to Newcastle via, Gunnedah, Quirindi, Scone, Muswellbrook, Singleton and Maitland. The project was approved in 2009 but construction had not started at the time the EIS was written.	The proposed underground pipeline route will cross Kelvin Road and Orange Grove Road causing potential short-term traffic disruptions. Short-term partial road closures may occur however all public roads would remain open with controlled single direction traffic flow (as required) through the works areas.  These impacts would be temporary, and the project construction activities shall not impact upon the construction work for the gas pipeline when this construction commences.	There are no expected cumulative operational impacts

<p><b>Kamilaroi Highway overpass</b></p> <p>A second rail overpass (road-over-rail bridge) is due for construction in Gunnedah.</p> <p>The rail overpass will be located within the town of Gunnedah and will run from the Oxley Highway on the western side of the township of Gunnedah over the railway and exit onto Warrabungle Street.</p> <p>The project is expected to commence in July 2018 and take 2 years to construct.</p>	<p>The overpass is on the western side of the town however there will be traffic impacts from required traffic management measures along the Oxley Highway and construction traffic.</p> <p>Cumulative construction impacts of the proposal may include:</p> <ul style="list-style-type: none"> <li>• Increased heavy vehicle movements for hauling of construction materials and equipment, staff and service vehicles causing congestion, increased collision risk and damage to road infrastructure.</li> <li>• Additional traffic management during construction causing congestion and delays. However, no works are proposed on the Kamilaroi Highway so there will be no impacts for heavy vehicle movements to the project site that will operate along the heavy vehicle route around the town.</li> <li>• Increased traffic movements in the surrounding road network resulting from diversion of vehicles during temporary road closures (View Street, New Street, Barber Street, Warrabungle Street). However, this will not impact upon the designated heavy vehicle route to the north of the township along Bloomfield Street.</li> </ul> <p>These impacts would be temporary and will be managed by the Construction Traffic Management Plan that will be prepared for the rail overpass construction.</p> <p>There could be impacts due to the cross use of the Kamilaroi Highway and Oxley Highway for supplies and staff for this overpass construction and the project site. However, both the Kamilaroi Highway and the Oxley Highway are key freight routes in NSW and designated as '<i>oversize, over mass load carrying vehicles network approved roads</i>' by Roads and Maritime Services and have adequate capacity to cater for these additional traffic flows.</p>	<p>There are no cumulative operational impacts expected from the operation of the railway overpass and the project site.</p>
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The major road networks affected by the additional projects include the Kamilaroi Highway, the Oxley Highway and Blue Vale Road. The Queensland Hunter Gas Pipeline may also affect Old Blue Vale Road and Kelvin Road.

Both the Oxley Highway and the Kamilaroi Highway have suitable capacity to cater for construction and operational traffic as both are key freight routes in NSW and designated as '*oversize, over mass load carrying vehicles network approved roads*' by Roads and Maritime Services. Both highways are State roads, which carry high traffic volumes and any additional construction or operational vehicle traffic on these major roads would be within the range of daily variation in traffic on these routes.

Blue Vale Road already has a number of heavy vehicle movements associated with Whitehaven Mining activities. The increase in heavy vehicle movements could cause some minor delays. However, the movements associated with the Proposal would only impact 1.4km of Blue Vale Road before turning into Old Blue Vale Road so impacts would be limited to this section of road and its intersections with the Kamilaroi Highway and Old Blue Vale Road.

In addition to causing some minor delays along haulage routes, additional construction traffic may also increase collision risk, have the potential to cause damage to road infrastructure and increase noise levels along haulage routes. Traffic impacts would largely be temporary and are considered acceptable.



## Appendix A. Safe Construction Activities

The contractor on site is responsible for the management of all traffic in connection with its activities and the construction works conducted on the site. The Contractor will provide all traffic management, safety warnings and signage including such persons as necessary to direct traffic, as required by AS 1742:2009 – Manual of uniform traffic control devices.

### *External traffic movements*

The Contractor will:

Ensure traffic management controls are established, maintained and monitored to underpin the safety of workers, other personnel and the general public

Establish traffic management controls in consultation with relevant stakeholders

Ensure traffic management controls comply with regulatory and legislative requirements

Ensure traffic management controls comply with the contract

Ensure traffic management controls maintain the flow of traffic within the site and on surrounding public roads

Reinstate any areas affected by the temporary construction access requirements to their original condition

The primary drivers for determining the traffic management controls during the construction period are:

- Safety of personnel, the general public and construction workers
- Minimising impact (if any) on operations
- Contractual requirements (including site access)
- Road traffic authority and local government requirements
- OHS requirements in relation to the movement of all vehicular traffic and pedestrians either within or adjacent to sites
- Environmental management requirements
- The impact construction traffic has on the local community in the surrounding area, and
- The need to meet construction requirements (including any schedule and cost constraints)

The traffic management controls will be communicated to appropriate stakeholders which will include the local community in the site vicinity via a letter box drop.

The Contractor will ensure:

Any significant deposit of dirt and other materials caused by construction traffic and other operations (in relation to the works) will be promptly removed from existing public roadways

Suitable precautions are taken to ensure no rock is dislodged onto any roadway from construction vehicles

Construction plant and equipment do not park on or within the pavement or shoulders of any existing trafficked roadway

Construction vehicles (when loaded) comply with the mass, loading and access requirements of the road traffic authority

Construction traffic will cause the least possible obstruction to public and other traffic

Directional signage will be installed to direct construction traffic and warn other motorists of construction traffic.

This signage is positioned in accordance with the approved Traffic Control Plans.

All drivers will be provided with a copy of the access routes to and from the site as part of their induction for the project;

A Vehicle Movement Strategy has been developed to eliminate the impact on local roads arising from additional construction traffic (e.g. solar panel delivery vehicles). The Vehicle Movement Strategy directs all drivers to access the site from the south via the Kamilaroi Highway to eliminate the impact on the local roads. There is no requirement to restrict the direction of flow and/or time of day for movements.

The Contractor will comply with any client or Road Traffic Authority signage requirements for traffic control. Where construction work is to be undertaken either on or adjacent to a public roadway that is open to traffic, the work must be undertaken in accordance with all regulatory and legislative requirements that govern the movement of vehicles and pedestrians on any public roadway.

### ***Within the Worksite***

All employees, subcontractors, suppliers and any other persons connected with the project must adhere to all such Statutory Requirements and comply with all lawful directions. Any breach of such requirements may result in disciplinary action of the persons concerned.

The maximum speed limits within the Worksite are:

- 40 kph on formed roads
- 20 kph during foggy/dusty conditions with headlights on
- 10 kph when passing pedestrians

The Contractor will manage access to and from the site by all employees, subcontractors, suppliers and any other persons connected with its activities and the works; and all occupants within the worksite and through each area of the site.

The Contractor shall provide for safe and continuous operation of normal pedestrian and vehicular traffic along all roads, pedestrian paths and vehicular access to the worksite and must provide and maintain all necessary watchmen, lights, barriers, notices and signs.

The Contractor will not unnecessarily obstruct any side road, branch track, drain or watercourse and will not break down or remove any fences or gates without prior notification to the client. If unavoidable, the Contractor will remove such obstruction or repair such breakage as soon as possible, or as directed by the Client.

A Vehicle and Traffic Management Procedures briefing will be included in the Project Site Induction.

### ***Pedestrian Traffic***

The Contractor may encounter pedestrian traffic at and near to the site. The Contractor will ensure that sites are appropriately isolated and secured from unauthorised entry; and that the Site is appropriately sign-posted and controlled. Given the location of the site it is considered that any pedestrian activity will be negligible.

### ***Site Construction Traffic***

Traffic within the Site will be managed in accordance with the Site Management Plan. The Sites Layout Plans will indicate site access and egress points and detail any required separation of construction plant and personnel. These plans will be communicated during Tool Box Meetings and/or Daily Pre-start Meetings.

The Site Layout Plan will incorporate details of parking arrangements for the site construction workers, speed limits within the construction works or through access roads established for vehicular and plant construction traffic.

The Sites Layout Plan will detail traffic management controls that are appropriate within each site.

Traffic controls shall be regularly reviewed for effectiveness and will be amended to maintain or improve a safe work environment. Traffic management controls established for sites will be inspected at ***weekly intervals*** to verify that a safe work environment is being maintained. Records of inspections shall be maintained.

### ***Access Roads and Site Movement***

Unless sign-posted otherwise, load limits on public roads adjoining the sites apply within them.

If required the Contractor shall request approval from the client prior to any over-dimensional load, or load in excess of load limits entering the site, or using the roads within the site.

All workers must travel to and from the site via the nominated access roads.

### ***Parking***

All workers must park in the Designated Parking Areas as specified in the Site Management Plan. The Contractor shall ensure no persons (in connection with its activities) parks in any other area of the site or in any other area without prior written consent.

### ***Monitoring, Measurement and Review***

The purpose of Monitoring and Measurement is to ensure that all construction works, including subcontracted activities, are being performed in accordance with the contract requirements, statutory requirement and in a controlled and safe environment. Ongoing monitoring and audit of Traffic Management procedures and the worksite implementation of traffic control shall be conducted.

Audits of the Traffic Control measures under differing operating conditions are to be carried out including during overcast and rainy weather, at night or at any other restrictive times where conditions may change in accordance with the requirements of AS1742.3.

Results of audits, inspections and improvements are to be reported in the reporting cycle of the contract to enable assessment of the adequacy of the implementation of the Traffic Control within contract performance and system review meetings.



### ***Inspection and Auditing of Traffic Control Plan (TCP)***

Regular Site Inspections by designated supervisory and field staff of worksite protection are to be arranged on a ***daily frequency*** depending on the complexity of traffic control on the site.

Site Inspections will be carried out and the following Traffic Management Forms completed:

- Traffic Control Daily Checklist
- Traffic Control Weekly Checklist

A daily record of the inspections should be kept. This should include:

- When traffic controls were erected
- When changes to controls occurred and why the changes were undertaken
- Any significant incidents or observations associated with the traffic controls and their impacts on road users or adjacent properties
- Where significant changes to the work or traffic environment or adverse impacts are observed, the controls should be reviewed as a matter of urgency.

The monitoring program should generally incorporate inspections:

- Before the start of work activities on site
- During the hours of work
- Closing down at the end of the shift period

The inspection program shall be adjusted to suit changing circumstances and/or risk environment such as during times of increased traffic flows or speeds, contra-flow arrangements or when changed controls are introduced.

The Audits of the implemented Traffic Management features will be undertaken following setup in accordance with the TCP and prior to the TCP being put into service.

## Appendix B. Drivers Code of Conduct

### 1.1 General Requirements

All vehicles / drivers accessing the site must:

- i) Be registered and hold a valid driver's licence for the class of vehicle being operated;
- ii) Operate the vehicle in a safe and appropriate manner whilst travelling to / from the site or when operating within the site. This includes obeying all New South Wales state road rules.
- iii) ALL heavy vehicles must adhere to the designated heavy vehicle routes as far as practical;
- iv) Comply with the directions of authorised personnel when operating within the site and obey any relevant signage installed along the internal roads.
- v) Not use a mobile phone while operating any vehicle.
- vi) Must always wear a seatbelt when operating any vehicle.

### 1.2 Vehicle Speeds

Drivers shall observe the posted speed limit along the designated transport route and adjust their vehicle speed as required to suit the road environment and prevailing weather conditions. Vehicle speeds must be appropriate to ensure the safe movements of the vehicle with consideration to the vehicle configuration.

Maximum speeds limits within the project site shall be as follows:

- i) 40 km/hr along formed roads.
- ii) 20 km/hr during foggy / dusty conditions. Headlights must be on.
- iii) 10 km/hr when passing pedestrians or any plant equipment.

### 1.3 Driver Fatigue

Drivers shall not be permitted to operate a vehicle or plant equipment when impaired by fatigue. If you suspect that you or someone else is experiencing fatigue, please inform your supervisor.

Operators of heavy vehicles shall be aware of the requirements relating to fatigue as outlined in the Heavy Vehicle National Law. Drivers shall also be aware of their adopted fatigue management scheme (shown below) and ensure that they are operating within its requirements.

- i) Standard Hours of Operation
- ii) Basic Fatigue Management (BFM)
- iii) Advanced Fatigue Management (AFM)

### Basic Fatigue Management (single driver)

Time	Work	Rest
In any period of...	A driver must not work for more than a maximum of...	And must have the rest of that period off work with at least a minimum rest break of...
6 ¼ hours	6 hours work time	15 continuous minutes rest time
9 hours	8 1/2 hours work time	30 minutes rest time in blocks of 15 continuous minutes
12 hours	11 hours work time	60 minutes rest time in blocks of 15 continuous minutes
24 hours	14 hours work time	7 continuous hours stationary rest time*
7 days	36 hours long/night work time**	No limit has been set
14 days	144 hours work time	24 continuous hours stationary rest time taken after no more than 84 hours work time and 24 continuous hours stationary rest time and 2 x night rest breaks# and 2 x night rest breaks taken on consecutive days.

### Advanced Fatigue management:

The seven principles are grouped into three categories:

#### Work-related rest breaks (such as short rest breaks):

1. Reduce the time spent continuously working in the work opportunity
2. The more frequent breaks from driving, the better

#### Recovery breaks (such as major rest breaks):

1. Ensure an adequate sleep opportunity in order to obtain sufficient sleep
2. Maximise adequate night sleep
3. Minimise shifts ending between 00:00-06:00
4. Minimise extended shifts

#### Reset breaks (such as long periods of rest or extended leave):

1. Prevent accumulation of fatigue with reset breaks of at least 30hrs (and include two night periods, 00:00 – 06:00) between work sequences

ALL details relating to fatigue management for delivery vehicles are covered by the National Heavy Vehicle Regulator

## 1.4 Operating Hours

### *Construction*

Construction is to be completed in accordance with the *Interim Construction Noise Guideline* (DECC 2009) which defined standard construction work hours as:

- Monday to Friday: 7am to 6pm
- Saturday: 7am to 4pm
- Sunday and Public holidays: No work

The following construction, upgrading and decommissioning activities may be undertaken outside these hours without the approval of the secretary:

- The delivery of materials as requested by the NSW Police Force or other authorities for safety reasons; or
- Emergency work to avoid loss of life, property and / or material harm to the environment.

Vehicle movements shall be undertaken during standard construction hours (or just before to allow workers to get to site). Oversize vehicles up to 26 metres long may require access to the site after hours however this would be subject to the requirements of Roads and Maritime, Gunnedah Shire Council or NSW Police.

### *Normal Operations*

Daily operations and maintenance by site staff would be undertaken during standard working hours:

- Monday to Friday: 7am to 6pm
- Saturday: 7am to 4pm
- Sunday and Public holidays: No work

During normal operations, all vehicle movements shall be undertaken during the standard operating hours (or just before to allow workers to get to site). There may be a requirement for vehicles to access the site after hours during an emergency however these would be infrequent.

Vehicles which arrive at the site prior to commencement of working hours shall have the engine turned off to minimise noise impacts on surrounding residences.

## 1.5 Transport Routes

All vehicles must travel to and from the project site via the approved route as shown below (Figure 1 Heavy vehicles and Figure 2 Light vehicles).





Figure 1 - Transport route to/from the site for HEAVY vehicles.

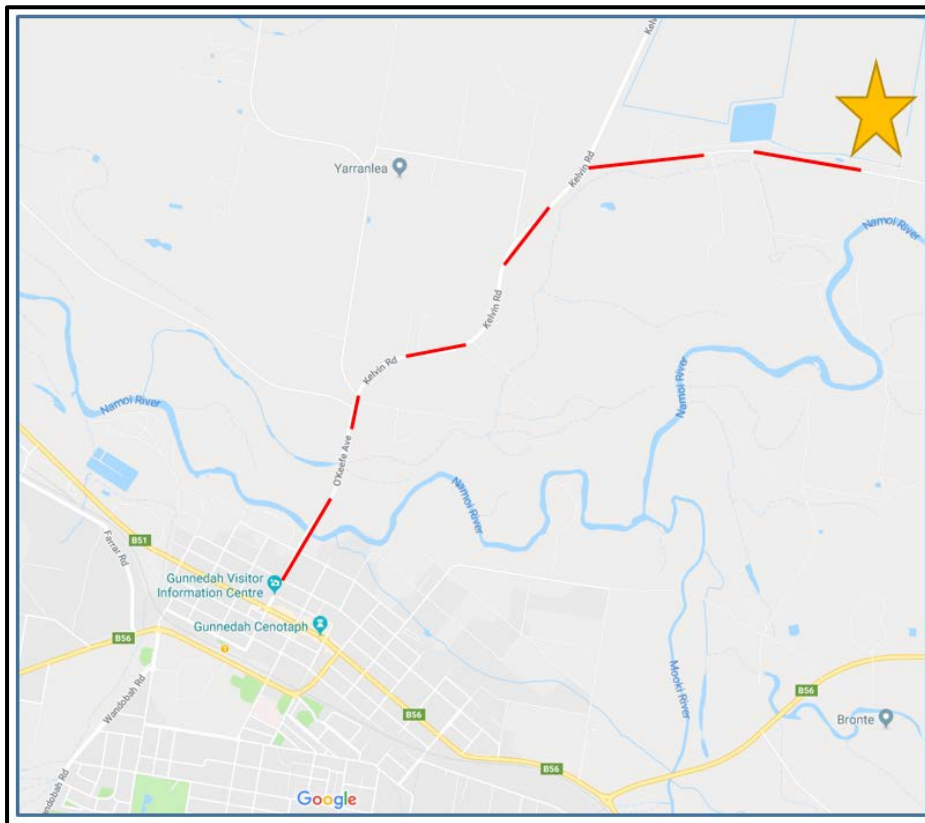


Figure 2 - Transport route to/from the site for LIGHT vehicles

### 1.6 Vehicle Departure and Arrival

Heavy vehicles departing the site shall have a minimum 5 minute separation to reduce the impacts upon the local road network.

Always maintain a minimum separation of at least 50 metres between vehicles when travelling within the site.

Drivers must contact the site supervisor upon arrival and await further instructions or direction before proceeding.

Drivers must also report to the site supervisor prior to departure.

All vehicles must enter and exit the site in a forward direction. Vehicles are to be washed down and in a clean condition upon exiting the site to prevent dirt being tracked onto the public road network.

### 1.7 Overtaking

Overtaking shall not be permitted within the site unless the intention to overtake has been communicated to the driver of the leading vehicle and consent to overtake granted.

### 1.8 Breakdowns and Incidents

#### *Heavy Vehicles*

In the case of a breakdown, the vehicle must be towed to the nearest breakdown point as soon as possible. All breakdowns must be reported to the RMS Transport Management Centre on 131 700 and the vehicle protected in accordance with the Heavy Vehicle Drivers Handbook. The relevant shift manager on site shall also be notified.

If a breakdown occurs on-site please remain inside your vehicle, notify the shift manager of your location and await further instruction.

If you are involved in an accident, please notify the shift manager immediately and contact emergency services if required.

#### *Light Vehicles*

In the case of a breakdown, ensure that the vehicle is secure, notify the shift manager of your location and await further instruction.

If you are involved in an accident, please notify the shift manager immediately and contact emergency services if required.

### 1.9 Penalties and Disciplinary Action

Any driver who fails to comply with the above requirements will have their details recorded and may be subject to disciplinary action.

#### 1.10 Emergency Contact Numbers

i)	RMS Transport Management Centre	131 700
ii)	Gunnedah Shire Council	(02) 6740 2119
iii)	NSW Polic Service (Griffith)	(02) 6742 9099
iv)	Site Office	_____
v)	Shift Manager on Duty	_____

### 1.11 Driver Declaration

I, the undersigned, hereby agree to abide by this Driver Code of Conduct for the transport of equipment or personnel to / from the Gunnedah Solar Farm, located off Orange Grove Road, Gunnedah, NSW. I have read and understand the requirements outlined in the attached document and will, to the best of my ability, comply and assist with their implementation, requirements or ongoing administration.

*The subject document to which this declaration relates is included as part of this overall document and signing of this declaration confirms that the signee has read and understood their requirements as outlined throughout.*

#### Driver Details

Full Name	
Organisation	
Signature	
Date	

#### Representative of:

Full Name	
Signature	
Date	