HARRISON INFRASTRUCTURE GROUP

Traffic Impact Assessment

Kogan – Condamine Road, Crossroads QLD

Everleigh Solar Farm

Client: Gilvear Planning Pty Ltd

P10784

28/01/2022

Western Downs
Regional Council

APPROVED
3 March 2022

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Document Control Sheet

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1.0	28/01/2022	C. Wright	C. Smith	First Issue

Final Report	
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Contents

1. INTRODUCTION AND PREVIOUS ASSESSMENTS

HIG have been engaged by Gilvear Planning Pty Ltd in relation to proposed changes to the Edenvale and Everleigh Solar Farms, located on the Kogan Condamine Road in Crossroads.

In 2018, HIG completed two Traffic Impact Assessment and Pavement Impact Assessment Reports (HIG reference P10191) for the proposed Edenvale Solar Farm and Everleigh Solar Farm, assessing impacts during the operational and construction stages. A HIG addendum report was prepared for the Edenvale Solar Farm in 2021 (HIG reference P10680) to address the relocation of site access on Kogan Condamine Road (refer Figure 1).

Figure 1: Edenvale Solar Farm Accesses (extract 2021 HIG Report P10680)

It is understood that the original Everleigh site that was located north of Kogan Condamine Road will no longer be constructed, and that the approved Edenvale Solar Farm, which was to be constructed in two stages, will be separated into two solar farms. The first stage on Lot 4 of RG3414, is now to be known as Edenvale (previously Edenvale 1), and the second stage, the portion on Lot 8 on RP 190982, is now to be known as Everleigh (previously Edenvale 2). The new site extents are highlighted in Figure 2.

It is understood that the total solar generation over the two lots will remain unchanged from previous approvals.

Figure 2: Edenvale and Everleigh Solar Farms (Aerial: Queensland Globe)

Though the two sites previously formed a single solar farm with access only from Kogan Condamine Road, it is now proposed that these sites will operate separately, with each site having its own access to the road network. The Everleigh Solar Farm will now be accessed exclusively from Clynes Road during both operations and construction.

The purpose of this report is to investigate traffic impacts on the road network due to the proposed new access on Clynes Road to the Everleigh Solar Farm. Changes to the Edenvale Solar Farm are not considered as part of this report.

Construction of the Edenvale Solar Farm (Edenvale 1) site is understood to have commenced and is expected to be completed in 2023.

2. SITE LAYOUT

The Everleigh Solar Farm site layout is shown in Figure 3. Access to the Solar Farm will be obtained onto Clynes Road at the northern extent of Lot 8 on RP 190982. It is understood that construction traffic will use the northern site access, which will then become the staff/operational access.

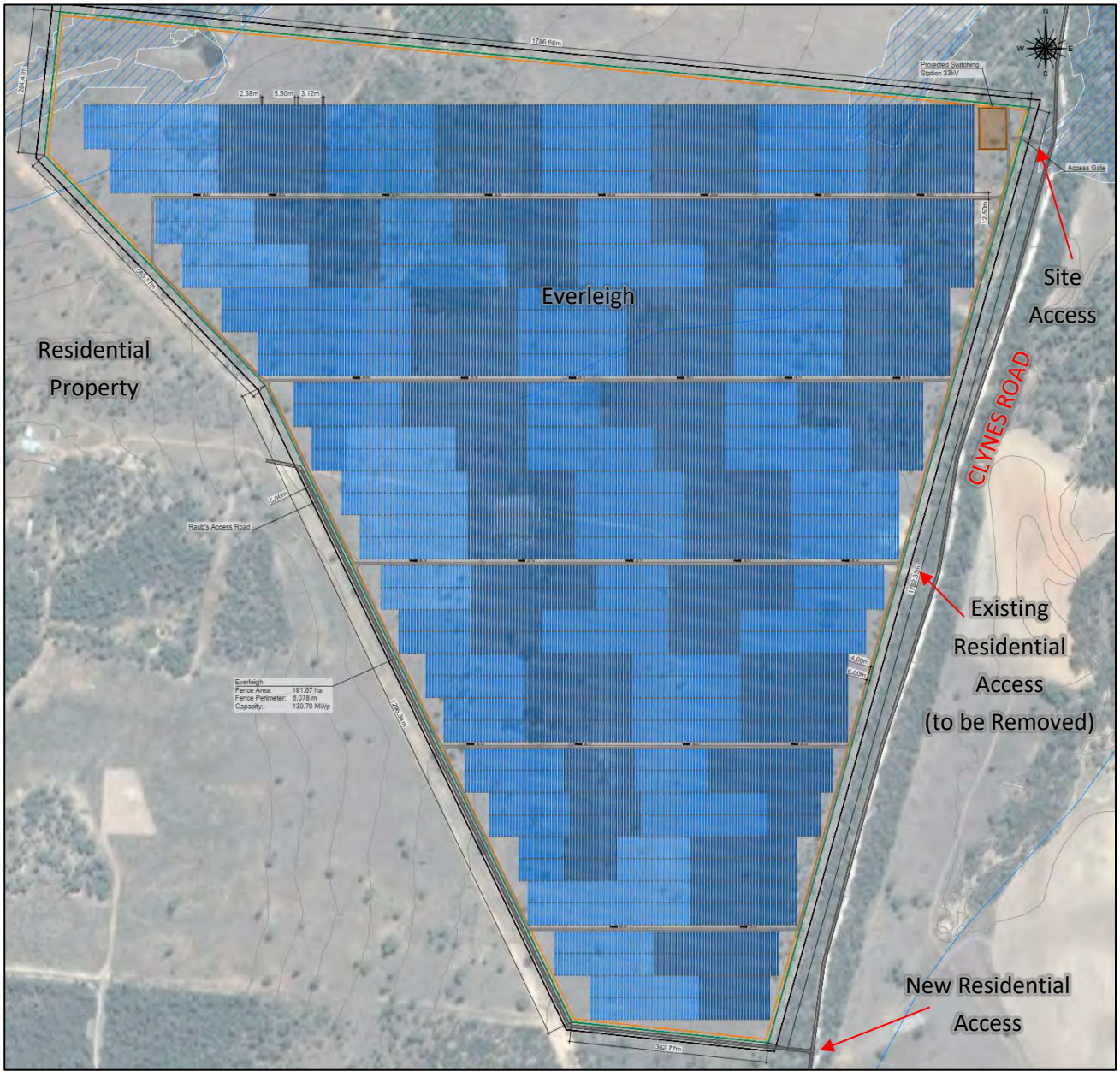

Figure 3: Everleigh Solar Farm Layout and Accesses (extract DPI General Layout 2021)

The existing residential use to the west of the solar farm will remain. A new access road to the residential property will be constructed at the southern end of Lot 8 on RP 190982 to replace the existing access road.

HIG have not investigated on-site parking or circulation as part of this report.

3. EXISTING CONDITIONS

3.1. Kogan Condamine Road

Kogan Condamine Road at the intersection location has the following properties:

- The road is a bitumen sealed, 2-lane, 2-way road with 8.6m wide seal (two 4.3m wide lanes) with centre linemarking.
- There is linemarking through the intersection with Clynes Road indicates no overtaking for vehicles travelling westbound.
- The road shoulders are generally gravel pavement 0.5m to 1m wide.
- The pavement condition is very good.
- There is a posted speed of 100km/h on the road.
- There are table drains either side of the Kogan Condamine Road in the vicinity of the intersection.

Figure 4: Kogan Condamine Road towards the west viewed from the intersection

The Average Annual Daily Traffic (AADT) volumes at TMR's permanent counter site 32096 (approximately 900m east of Chinchilla Kogan Road, and 13km west of Clynes Road, refer Figure 5) have largely remained consistent between 2010 and 2020 (refer Figure 6), remaining between 200 and 500 vehicles per day. A large increase in daily traffic volumes was observed during 2012-2014 which is assumed to correspond with a combination of flood repair and Coal Seam Gas (CSG) activities.

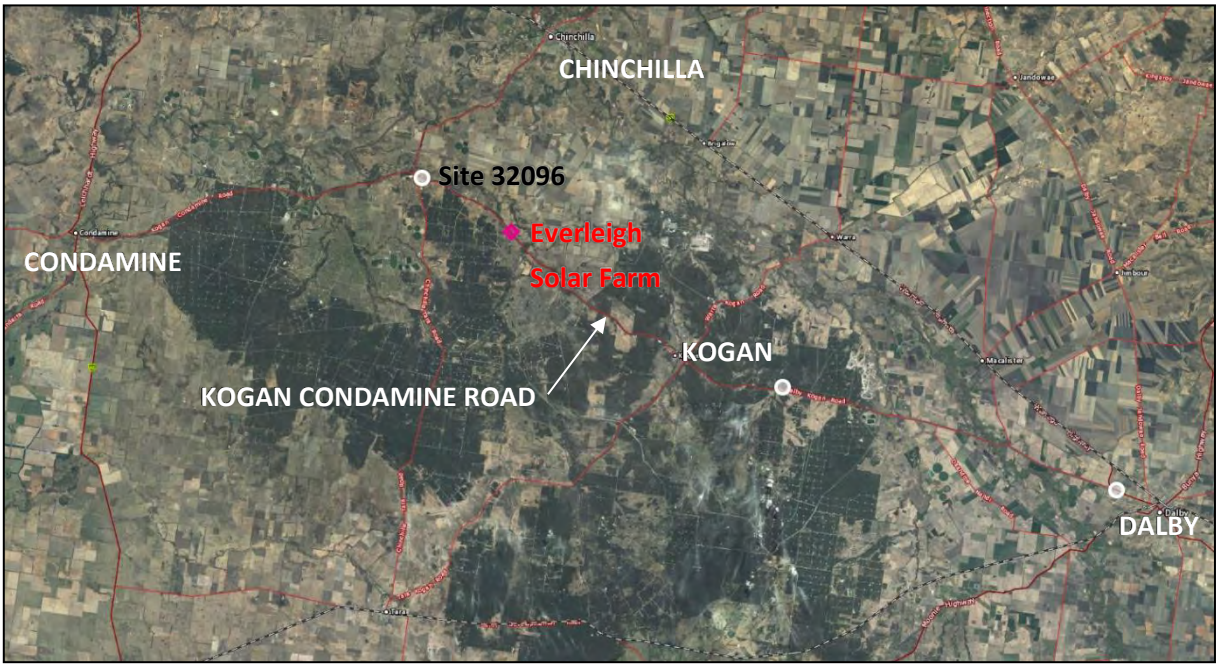

Figure 5: TMR Counter Site 32096 (Aerial: Queensland Globe)

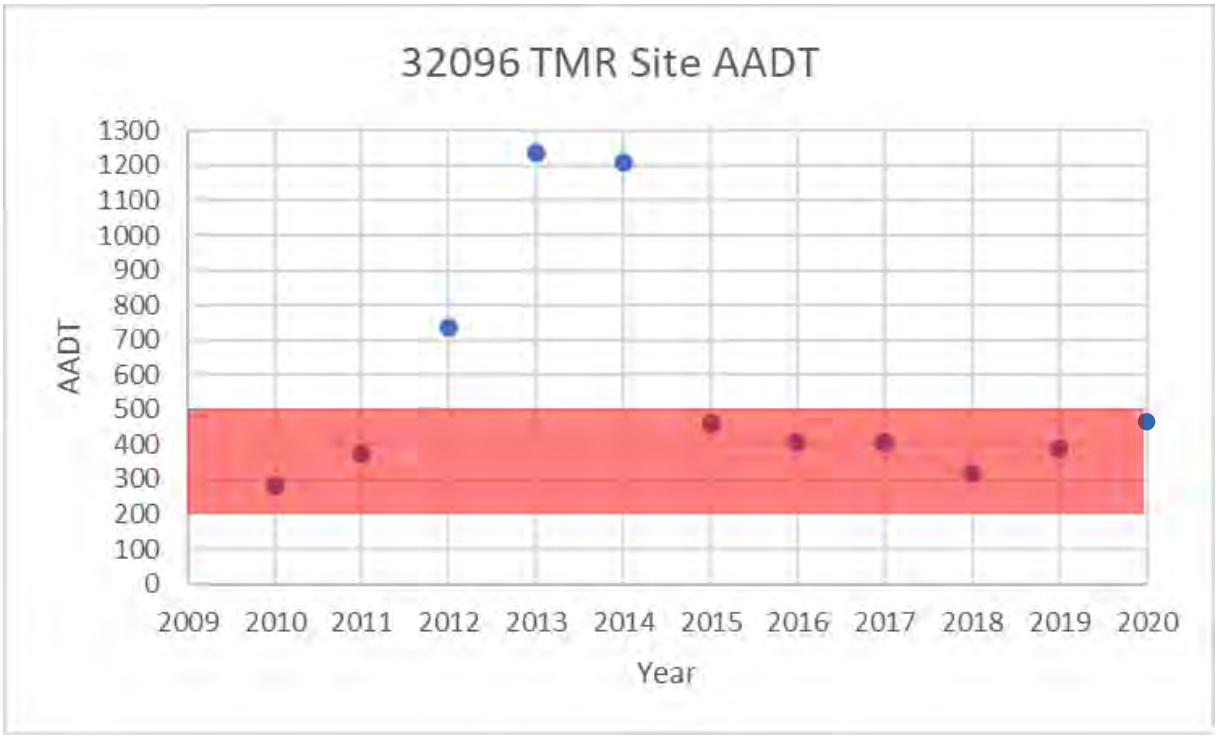

Figure 6: AADT on Kogan Condamine Road Remaining between 200vpd and 500vpd

Whilst background volumes on Kogan Condamine Road are not expected to have significantly increased since HIG's previous assessment, recent years have indicated some growth on the road. It is assumed that future background growth on the Kogan Condamine Road will be equivalent to a linear 7% per annum.

3.2. Clynes Road

Clynes Road is a local government controlled road with the following properties:

- The road has a gravel road surface with an unsealed pavement approximately 5.7m wide on a 7.3m wide formation at the intersection. The road has grassed shoulders.
- The pavement width varies significantly along the length of the road, between 3.8m and 5.7m.
- The formation width also varies between 6m and 7m.
- The pavement condition is good, except for a major pothole at 1.1km south of the intersection.
- There are multiple substandard horizontal curves along Clynes Road which both limit the visibility achieved, as well as significantly reducing speed along the road (refer Figure 7 and Figure 8).
- There is no posted speed on the road, therefore as the road is a rural road, the default 100km/h speed limit applies.

Figure 7: Clynes Road approach to the Kogan Condamine Road / Clynes Road intersection

Figure 8: Substandard Horizontal Curves Between Access and Kogan Condamine Road (Aerial: QldGlobe)

The Institute of Public Works Engineering Australasia Queensland's (IPWEAQ) Lower Order Road Design Guidelines (LORDG) specifies that an unsealed Minor Road with between 50-150vpd should have a minimum formation width of 7.0m, and a pavement width of 6.0m. The existing road geometry of Clynes Road does not comply the minimum standard for a Minor Road under the IPWEAQ LORDG.

3.3. Kogan – Condamine Road / Clynes Road Intersection

The Kogan Condamine Road / Clynes Road intersection has the following properties:

- The intersection is a give-way sign-controlled T-intersection with Clynes Road as the minor road and Kogan Condamine Road as the major road.
- The intersection is unsealed on Clynes Road approach and sealed on Kogan Condamine Road. There is no sealed edge protection strip on the southern leg of the intersection.
- The intersection has a hazard board and finger boards.
- On Clynes Road, on the approach to the intersection, there are advanced T-intersection, advanced give way, and give way signs.
- There is linemarking through the intersection which indicates no overtaking for vehicles travelling westbound. There is no edge linemarking at the intersection.
- There is a posted speed 100k/h on Kogan Condamine Road, and no posted speed on Clynes Road.
- The pavement is generally in good condition at the intersection.
- There is a sealed basic right turn treatment (BAR) for Clynes Road. The BAR meets Austroads requirements except for the taper on the eastern end, which finishes just east of the sealed access.
- TMR's Road Planning and Design Manual refers to Austroad's Guide to Road Design Part 4A for the determination of Safe Intersection Sight Distances (SISD). For a flat road with a 110km/h design speed, Austroads specifies that a minimum 285m SISD is required. The intersection is on a straight section of Kogan Condamine Road, with over 400m visibility to both the east and west.
- The intersection is not lit.
- There is a sealed access on Kogan Condamine Road located on the northern side of the road, 45m east of the intersection. Refer to Figure 9.
- There is a single cell 450mm RCP located at the western end of the BAR.
- Wambo Creek Bridge is located 100m east of the intersection.
- There is a large reinforced concrete box culvert (RCBC) centred chainage 20.27, approximately 300m east of the intersection centreline. The culvert is immediately east of the end of the intersection BAR.
- There are multiple substandard horizontal curves on the Clynes Road approach to the intersection, which both limit the visibility achieved, as well as significantly reducing speed on the approach. There is approximately 80m visibility to the intersection on the Clynes Road approach.
- QldGlobe has no crashes recorded at the intersection within the last five years of available data (to 2018).
- There is Telstra infrastructure in the vicinity of the intersection.
- There are no overhead power lines in the vicinity of the intersection.

Figure 9: Intersection viewed from property access on northern side of Kogan Condamine Road to the east

Based on on-site observations, it is estimated that existing traffic volumes on Clynes Road are in the order of 10 vehicles per day, with 20% heavy vehicles. It is assumed that there will be minimal traffic growth on Clynes Road. It is expected that only 1 to 2 vehicles would use Clynes Road during the peak hour. HIG have conservatively assumed a minimum of 1vph for each turning movement at the intersection during peak hour.

2025 peak hour background traffic volumes at the intersection are estimated in Figure 10.

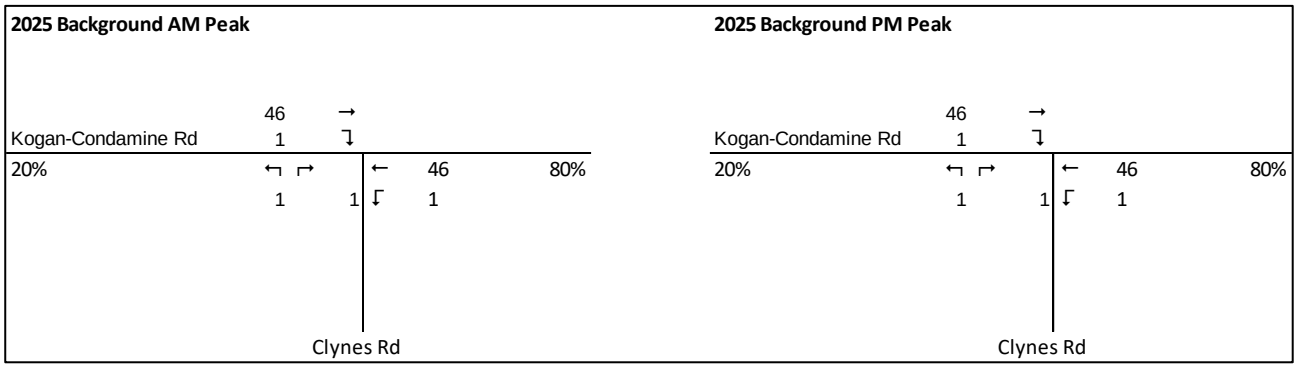

Figure 10: 2025 Peak Hour Background Traffic Volumes at Kogan Condamine Road / Clynes Road

4. SITE ACCESSES

4.1. Everleigh Site Access

The proposed site access will be located approximately 650m south along Clynes Road from the Kogan Condamine Road. The applicant has indicated that the site access will be designed to accommodate B-double vehicles, though no formal design has been provided.

The pavement width at the access location was 5.7m on a 7.3m wide formation.

The view from the site access looking north is shown in Figure 11, and looking south is shown in Figure 12.

Figure 11: Site Access Looking South Along Clynes Road

Figure 12: Site Access Looking North Along Clynes Road

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections provides specifies that the Safe Intersection Sight Distance (SISD) for a level road with a 110km/h design speed is 285m. Australian Standard AS2890.1 specifies that for a 100km/h road, a 160m is the minimum safe sight distance (SSD) for an access.

The sight distance south of the access exceeds 300m, though it is not expected that significant traffic will approach from this direction. The sight distance to the north was measured to 200m, falling short of a 110km/h design speed SISD under Austroads, though exceeding the minimum 100km/h SSD under Australian Standards. The 200m SISD currently available is sufficient for an 80km/h design speed.

The existing grassed shoulder interferes with the available site distance, though it is noted that even if maintained, without realigning Clyne Road to straighten and remove sub-standard horizontal curves and/or removal of trees within the reserve, it is unlikely that the SISD would be able to be achieved.

4.2. Residential Access

A new residential access will be constructed approximately 2.4km south along Clynes Road from the Kogan Condamine Road, approximately 900m south of the existing residential access. The access will be located close to an existing access to Lot 9 on RP190989. No formal design of the access has been provided.

The pavement width at the residential access location was 5.5m on a 6.3m wide formation.

The view from the residential access looking north is shown in Figure 13, and looking south is shown in Figure 14.

Figure 13: Residential Access Looking North Along Clynes Road

Figure 14: Residential Access Looking South Along Clynes Road

The sight distance south of the access exceeds was measured to 250m, and the sight distance to the north was measured to 240m, both falling short of a 110km/h design speed SISD under Austroads. Both sight distances exceeded the minimum 100km/h SSD under Australian Standards. The 250m SISD to the south is sufficient for a 100km/h design speed, while the 240m SISD to the north is sufficient for a 90km/h design speed.

Sight distance could be increased either through the removal of trees located adjacent the road pavement and/or realigning the road to remove sub-standard horizontal curves. Given the low volumes expected at this location, it is unlikely that these options would be practical or desirable.

5. TRAFFIC IMPACT

Due to changes to the access arrangements for the Everleigh Solar Farm, it is expected that there will be an increased traffic impact to the Kogan – Condamine Road / Clynes Road intersection.

The Kogan Condamine Road / Clynes Road intersection is located at chainage 20.7 along the Kogan Condamine Road, and is shown in Figure 15.

Figure 15: Kogan Condamine Road / Clynes Road Intersection (Aerial: Qld Globe)

5.1. Construction Impact

Construction estimates from 2018 for the Edenvale 1 and 2 Solar Farm estimates that the construction of the solar farm would result in average volumes of approximately 15 vehicles per day, but would result in peak construction volumes of 40 trips per day (loaded and unloaded), and peak hour volumes of 13 vehicles per hour. It is expected that 80% of construction trips will travel to and from Dalby.

Construction vehicle traffic will primarily be 19m Articulated Vehicles (AV), but may include up to 26m long B-doubles. There will also be a mix of 12.5m long truck, buses and 19m long truck and dog configurations.

It is estimated that during the peak of construction of the Everleigh Solar Farm, approximately 40 additional daily trips will turn through the Kogan-Condamine Road / Clynes Road intersection as shown in Figure 16. It is expected that construction will be completed by 2025, which has been chosen as the design year.

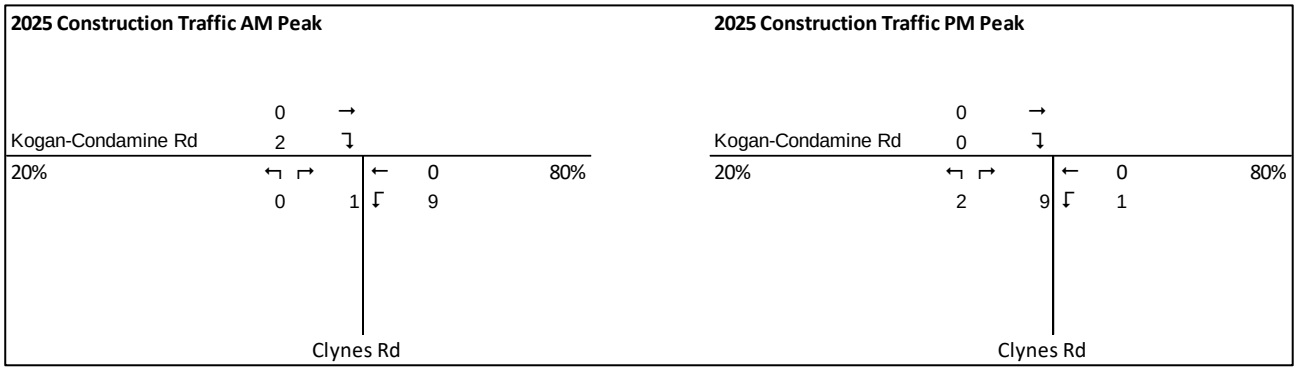

Figure 16: 2025 Peak Construction Traffic at Kogan Condamine Road / Clynes Road

2025 peak hour background traffic volumes with expected construction volumes at the intersection are estimated in Figure 17.

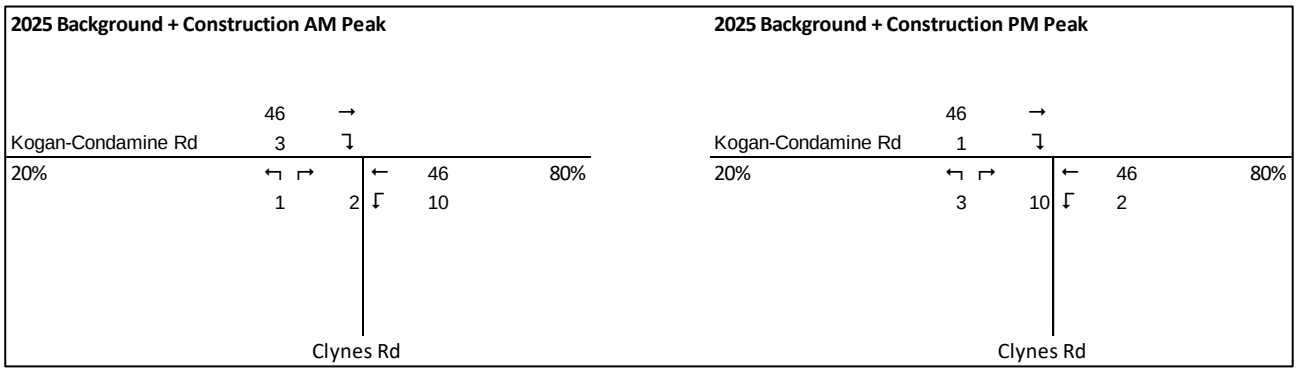

Figure 17: 2025 Peak Hour Background + Construction Traffic Volumes at Kogan Condamine Road / Clynes Road

Impact analysis using SIDRA Intersection 9.0 indicates the intersection with the expected construction traffic volumes will operate with a Level of Service A for all movements, with negligible queueing and delays in 2025. SIDRA movement summary tables are shown in Appendix A.

An assessment was made of the total volumes at the intersection in 2025 against TMR's warrants for turn treatments at intersections. The intersection volumes fall into the warrant for a BAL and BAR, as shown in Figure 18. The intersection does not currently feature a BAL treatment.

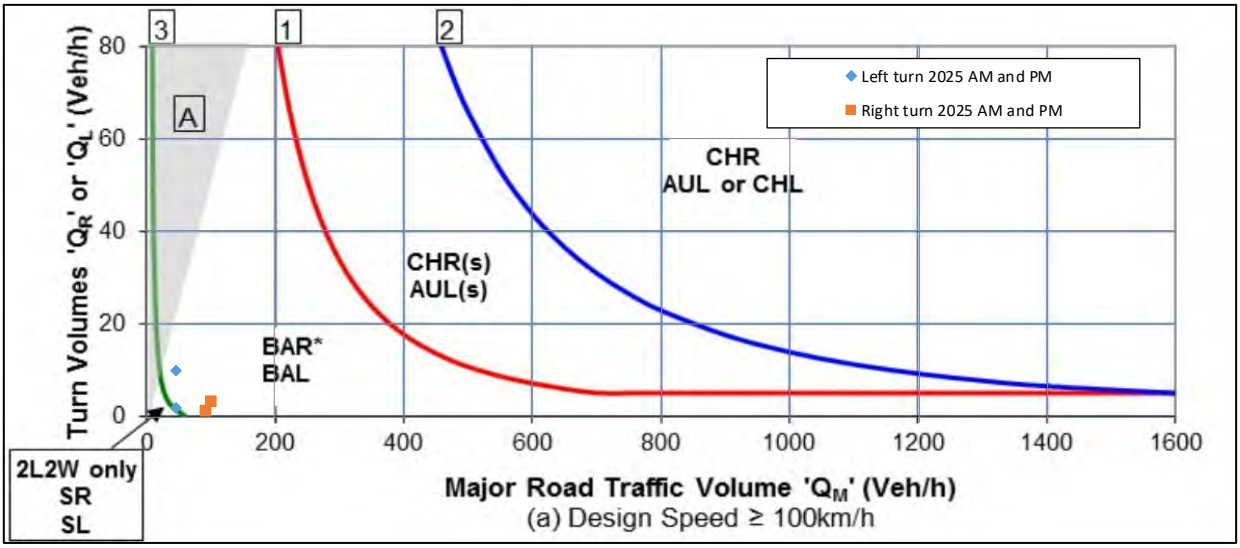

Figure 18: Kogan Condamine Road / Clynes Road Turn Treatment Warrants

5.2. Operations Impact

It is understood that during the operational phase 3 to 5 permanent staff will be required, accessing the site generally with 4WD vehicles. Additional contractors will be required on an intermittent basis. It is expected that average daily traffic during operations will amount to approximately 10 vehicles per day. It is not expected that the traffic impacts of Everleigh Solar Farm when operational will exceed the construction impact to the intersection, and hence this has not been analysed.

5.3. Pavement Impact

The Pavement Impact Assessment in HIG's 2018 Report for Edenvale identified that the operational period of the solar farm would have a negligible impact on the state controlled road network. Pavement impacts during construction were determined to require a one off contribution of $125,601.84. This value has not been recalculated as part of this report, but is not expected to have changed substantially from the HIG 2018 Report, as while the solar farms are now separated the traffic generating characteristics of the solar farms during construction and operation remain unchanged.

As construction volumes associated with the now separated Edenvale (previously Edenvale 1) and Everleigh (previously Edenvale 2) Solar Farms are not expected to differ from those assumed in the 2018 Report, HIG consider that no updates to the Pavement Impact Assessment are warranted due to the access changes, and therefore the conclusions of the 2018 report remain applicable to the split form of the two solar farms. The previously determined contribution should be paid proportionally by the two solar farms based on the electricity generation expected from each site.

6. RECOMMENDATIONS

6.1. Kogan Condamine Road / Clynes Road

In relation to the Kogan Condamine Road / Clynes Road intersection:

- The project will add up to 40vpd to the intersection during the peak construction period, though this will reduce to approximately 10vpd during the operational period.
- The visibility at the intersection is sufficient to meet Austroads requirements for a 110km/h designs speed.
- It is recommended that truck turning signs be temporarily installed at the access during the construction period.
- It is recommended that a 10m long seal edge protection strip be provided at a minimum, to minimize edge wear and tracking of gravel material from onto Kogan Condamine Road.
- It is recommended that give-way and centre linemarking be provided on Clynes Road within the 10m long seal edge protection strip.
- It is recommended that the intersection is upgraded to include a sealed BAL on the Kogan Condamine Road.
- It is recommended that swept path analysis be undertaken to confirm that the intersection layout adequately caters for the swept paths of the design vehicle (26m B-double).

6.2. Clynes Road

In relation to Clynes Road:

- The project will add up to 40vpd to the road during the peak construction period, though this will reduce to approximately 10vpd during the operational period. During peak construction the road will exceed 50vpd.
- The visibility along the road and at accesses does not meet Austroads requirements for a 110km/h design speed.
- It is recommended that the road be widened to achieve IPWEAQ LORDG minimum pavement (6m) and formation width (7m) along the length of the road from Kogan Condamine Road to the northern site access (approximately 650m).
- The widening of the road should attempt to address the existing sub-standard horizontal curves along the road and improve sight distance.
- It is recommended that vegetation along the length of the road, in particular grass on the shoulder at the northern site access, be regularly cut back during construction to maximise available site distance along the road.
- It is recommended that swept path analysis be undertaken to design the northern site access to ensure that it adequately caters for the swept paths of the design vehicle (26m B-double).
- It is recommended that the residential access be designed in accordance with Western Downs Regional Council's Rural and Residential Turnouts Standard Drawing (R-004).
- It is recommended that the major pothole 1.1km south of the intersection be repaired.

Appendix A SIDRA INTERSECTION RESULTS

MOVEMENT SUMMARY

Site: 101 [2025DEVAM (Site Folder: Development)]

Kogan Condamine / Clynes Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clynes Road														
1	L2	1	50.0	1	50.0	0.003	6.3	LOS A	0.0	0.1	0.16	0.55	0.16	51.1
3	R2	2	50.0	2	50.0	0.003	6.6	LOS A	0.0	0.1	0.16	0.55	0.16	50.4
Approach		3	50.0	3	50.0	0.003	6.5	LOS A	0.0	0.1	0.16	0.55	0.16	50.7
East: Kogan Condamine														
4	L2	10	50.0	11	50.0	0.034	6.1	LOS A	0.0	0.0	0.00	0.10	0.00	55.4
5	T1	46	10.0	48	10.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	59.4
Approach		56	17.1	59	17.1	0.034	1.1	NA	0.0	0.0	0.00	0.10	0.00	58.6
West: Kogan Condamine														
11	T1	46	10.0	48	10.0	0.029	0.0	LOS A	0.0	0.2	0.03	0.04	0.03	59.7
12	R2	3	50.0	3	50.0	0.029	6.3	LOS A	0.0	0.2	0.03	0.04	0.03	54.8
Approach		49	12.4	52	12.4	0.029	0.4	NA	0.0	0.2	0.03	0.04	0.03	59.4
All Vehicles		108	15.9	114	15.9	0.034	0.9	NA	0.0	0.2	0.02	0.09	0.02	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2025DEVAM (Site Folder: Development)]

Kogan Condamine / Clynes Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clynes Road														
1	L2	1	50.0	1	50.0	0.003	6.3	LOS A	0.0	0.1	0.16	0.55	0.16	51.1
3	R2	2	50.0	2	50.0	0.003	6.6	LOS A	0.0	0.1	0.16	0.55	0.16	50.4
Approach		3	50.0	3	50.0	0.003	6.5	LOS A	0.0	0.1	0.16	0.55	0.16	50.7
East: Kogan Condamine														
4	L2	10	50.0	11	50.0	0.034	6.1	LOS A	0.0	0.0	0.00	0.10	0.00	55.4
5	T1	46	10.0	48	10.0	0.034	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	59.4
Approach		56	17.1	59	17.1	0.034	1.1	NA	0.0	0.0	0.00	0.10	0.00	58.6
West: Kogan Condamine														
11	T1	46	10.0	48	10.0	0.029	0.0	LOS A	0.0	0.2	0.03	0.04	0.03	59.7
12	R2	3	50.0	3	50.0	0.029	6.3	LOS A	0.0	0.2	0.03	0.04	0.03	54.8
Approach		49	12.4	52	12.4	0.029	0.4	NA	0.0	0.2	0.03	0.04	0.03	59.4
All Vehicles		108	15.9	114	15.9	0.034	0.9	NA	0.0	0.2	0.02	0.09	0.02	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.