

Stantec Ref: 15321

19 August 2020

Jorge Van Den Brande
Technical Lead
NGH Environmental Pty Ltd
Unit 18, 21 Mary Street
Surry Hills
NSW 2010

Attention: jorge.b@nghconsulting.com.au

Dear Jorge,

Proposed Solar Farm, Dunedoo, NSW - Traffic Assessment

Stantec has reviewed the proposed access arrangements for the Dunedoo Solar Farm (the 'Proposal'), which is located approximately two kilometres north of Dunedoo, along the northern side of Allweather Road.

Two vehicle access points are proposed for the development site:

- Access Point 1 is located approximately 750 metres north-east of the intersection of Castlereagh Highway / Allweather Road; and
- Access Point 2 is approximately 480 metres west of the intersection of Digilah Road / Allweather Road.



Figure 1-1: Location of Access points

Four options were identified to determine a suitable and safe access arrangement and are shown in Table 1. Further consultation with the Council and analysis with the Proponent (Ibvogt) indicated that the best option would be option 3.

This assessment has been undertaken in consideration of Option 3. It is noted that the Proponent began consultation with Transport for New South Wales (TfNSW) on 05 March 2020. Should there be any further concerns, these would be addressed during the response to submission resulting from the exhibition period.

As part of option 3, it is also recommended that a Traffic Management Plan (TMP) be prepared for the construction phase, in consultation with TfNSW and Council, detailing measures that would be implemented facilitate the safe and efficient operations of heavy vehicles.

Table 1: Access Options

Options	Concern(s)	Proposed measures
<p>1</p> <p>Majority of staff to be bused/ride share to the site to minimise vehicle movements.</p> <p>All inbound and outbound movements via Castlereagh Highway.</p>	<p>Potential crash risk given the high-speed limit (100km/h). Relatively high number of construction worker movements will be generated if staff are not bused or do not ride share.</p>	<p>A traffic management(control) plan proposed to facilitate the turning movements of heavy vehicles at the intersection of Castlereagh Highway and Allweather Road.</p> <p>Potential upgrade required at the intersection of Castlereagh Highway / Allweather road to facilitate heavy vehicle turning movements.</p> <p>It is noted that swept paths undertaken at this intersection shows that the proposed upgrade can accommodate simultaneous inbound and outbound movements.</p>
<p>2</p> <p>All inbound and outbound movements via Digilah Road.</p>	<p>Relatively narrow, low-level bridge where Digilah Road crosses the Talbragar River; Council has raised concerns for potential bridge flooding.</p>	<p>A traffic management(control) plan proposed to facilitate vehicles movements across the bridge along Digilah Road. Potential bridge upgrade required along Digilah Road.</p> <p>Potential (widening) upgrade required at the Castlereagh Highway / Golden Highway/Digilah Road intersection to facilitate heavy vehicle turning movements.</p>
<p>3</p> <p>Majority of staff to be bused/ride share to the site to minimise vehicle movements.</p> <p>All construction staff access via Digilah Road and all truck access via Castlereagh Highway.</p>	<p>Potential crash risk given the high-speed limit (100km/h). Relatively high number of construction worker movements will be generated if staff are not bused or do not ride share.</p>	<p>A traffic management(control) plan proposed to facilitate the turning movements of heavy vehicles at the intersection of Castlereagh Highway and Allweather Road.</p> <p>Potential upgrade required at the intersection of Castlereagh Highway / Allweather road to facilitate heavy vehicle turning movements. (See Appendix A)</p> <p>It is noted that swept paths undertaken at this intersection shows that the proposed upgrade can accommodate simultaneous inbound and outbound movements.</p>
<p>4</p> <p>All inbound movements towards the site using Digilah Road and all outbound movements to Castlereagh Highway.</p>	<p>Relatively narrow, low-level bridge where Digilah Road crosses the Talbragar River; Council has raised concerns for potential bridge flooding.</p>	<p>A traffic management(control) plan proposed to facilitate vehicles movements across the bridge along Digilah Road. Potential bridge upgrade required along Digilah Road.</p> <p>Potential (widening) upgrade required at:</p> <ul style="list-style-type: none"> - Intersection of Castlereagh Highway / Allweather road to facilitate heavy vehicle turning movements. - Intersection of Castlereagh Highway / Golden Highway/ Digilah Road

1 Existing Conditions

1.1 Road Network

Castlereagh Highway is a regional state road under the care and management of Roads and Maritime Services (RMS), which generally runs in a northwest-southeast alignment. Within the vicinity of the Proposal site, it has a sealed road width of approximately eight metres, with one traffic lane of approximately 3.5 metres width and a 0.5m wide shoulder in each direction.

Allweather Road is a local road under the care and management of Warrumbungle Shire Council. It runs in a general east-west alignment, from its intersection with Castlereagh Highway in the west to its intersection with Digilah Road in the east. It has an unsealed road surface, with a width varying from five to eight metres.

Golden Highway is a regional state road under the care and management of RMS, and generally runs in an east-west alignment. Through Dunedoo township, it has a generous sealed road width of approximately 18 metres, accommodating one traffic lane in each direction and angled parking on both sides of the road. Outside of Dunedoo Village, Golden Highway has an approximate sealed carriageway width of eight metres, with one lane of traffic in each direction, approximately 3.5 metres wide with a 0.5 metres wide shoulder.

Digilah Road is a local road under the care and management of Warrumbungle Shire Council which generally runs in a north-south alignment. It has a sealed road width of approximately 5.5 metres and forms an intersection with Golden Highway approximately 750 metres to the northeast of Dunedoo township. There is a low-level bridge crossing approximately 140 metres north of Golden Highway, providing access across the Talbragar River.

1.2 Traffic Volumes

Traffic volumes were obtained from RMS traffic volume viewer for Castlereagh Highway, with the most recent volumes available being recorded in 2009. The volumes were recorded on Castlereagh Highway between Allweather Road and Golden Highway, and recorded an Average Daily Traffic (ADT) volume of 553 vehicles per day (vpd) travelling along this section of Castlereagh Highway.

Assuming a growth rate of 1% per annum since 2009, it is estimated that Castlereagh Highway and Golden Highway currently carry in the order of 605 and 680 vpd, which would result in an approximate two-way peak hourly volume of 97 and 113 vehicles per hour (vph)¹ respectively.

Transport for New South Wales (TfNSW) records an ADT of 2,231 vpd along Golden Highway.

Traffic volume data is not available for Allweather Road and Digilah Road, however given the rural nature of the roads, it is estimated that the current daily traffic volume along both roads is in the order of 10 to 20 vpd.

2 Traffic Generation

Construction activities would be undertaken during standard daytime construction hours (7:00am to 6:00pm Monday to Friday, and 7:00am to 1:00pm on Saturdays). Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities.

It is anticipated that the delivery of PV panels will occur over an approximate nine-month construction period, generating up to 40 trucks daily during the peak construction period. The largest design vehicle expected to access the development site is a 20.6m long trailer. The trailer will occasionally be used to transport larger plant such as the PV panels. The majority of construction vehicles are expected to be 19.5m long AVs (Articulated Vehicles as defined in AS2890.2:2002) or smaller.

Accordingly, during the peak construction period at the development site, it is assumed that the Proposal is expected to generate:

- Approximately 40 heavy vehicles per day, or 80 heavy vehicle movements (40 inbound and 40 outbound) per day. All of the heavy vehicle movements are proposed to arrive/depart to the south via the Castlereagh Highway / Allweather Road intersection.

- Approximately 12 light vehicles per day, or 24 light vehicle movements (12 inbound and 12 outbound) per day. All of the light vehicle movements are proposed to arrive/depart to the south via Allweather Road / Digilah Road intersection. It is expected that a proportion of construction workers (skilled and technical workers) will utilise ride sharing commuting to/from the site, and it can be reasonably expected that these light vehicles will have an average of three people per vehicle.

3 Appropriateness of Access Roads

The *Unsealed Roads Manual: Guidelines to Good Practice (2009)* states that the average traffic volumes for gravel roads usually varies between 20 and 200 vehicles per day. The document also notes that roads may warrant paving when maintenance costs increase to unacceptable levels, in wet climates, or when economic or social benefits are evident.

Allweather Road is estimated to accommodate well under 200 vehicle movements per day, and it is expected that the condition will remain during peak construction periods, as detailed in Section 4 of this letter.

It is therefore considered that traffic volumes along Allweather Road will remain within acceptable levels for gravel roads throughout the construction period.

It is recommended that the following form part of the Construction Traffic Management Plan (CTMP) to minimise the impact of construction traffic along the unsealed roads:

- Prior to construction, a pre-condition survey of the relevant sections of the existing road network be undertaken, in consultation with Council. During construction, the sections of the road network utilised by the Proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the Proposal would be rectified. At the end of construction, a post- condition survey would be undertaken to ensure the road network is left in the consistent condition as at the start of construction;
- It is reasonably expected that during construction, traffic volumes are expected to increase along Allweather Road. Water treatment of the road to minimise dust generation may be implemented;
- In order to assume safe and efficient movement along the intersection of Allweather Road / Castlereagh Highway, inbound and outbound truck movements be managed by appropriate traffic management to prevent two opposing trucks from entering and exiting the intersection at the same time. This can be done via phone or two-way radio, and should be done in consultation with RMS; and
- Light vehicle movements across the low-level bridge crossing on Digilah Road be managed by appropriate traffic management for safe and efficient vehicle movements.

The adoption of the above recommendations will assist to mitigate any impact to the road surface and adjacent properties.

Council has noted that Digilah Road was forced to close due to flooding on several occasions in previous years, thus a risk of flooding and road closure should be considered. It is also recommended that the following be carried out:

- A Flood Response Plan be prepared that will include an access contingency plan during such events; and
- The Flood Response Plan should include the catering of buses to transport workers to/from the site via Castlereagh Highway. It is noted that Warrumbungle Shire Council has nominated Milling Park in Dunedoo as the preferred location for light vehicles as workers are transported to the site by bus.

It is also noted that the access route for workers mentioned within the Flood response plan was discussed with Council as an alternative to minimise traffic at the intersection of Castlereagh Highway / Allweather Road.

4 Access Design

It is proposed to provide two vehicle access points at the development site:

- Access Point 1 is to be located approximately 750 metres north-east of the intersection of Castlereagh Highway / Allweather Road. The access will be designed to accommodate the largest vehicle expected to access the site, a 20.6m long trailer, and serve as the heavy vehicle access location. It is proposed to provide one heavy vehicle passing bay on the south-eastern side of Allweather Road in the vicinity of the intersection in order to accommodate these vehicles, to the satisfaction of the responsible Authorities.
- Access Point 2 is to be located approximately 480 metres west from the intersection of Digilah Road / Allweather Road, and will serve as the light vehicle access location.

All vehicles will be able to enter and exit the site in a forward direction, with appropriate turning facilities provided on-site. Accordingly, it is considered that both of the proposed site accesses have been appropriately designed to accommodate entry and exit movements of the largest design vehicles expected to access the site.

4.1 Castlereagh Highway/ Allweather Road

Austrroads' *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austrroads Part 6) specifies the turning treatments required on major roads at unsignalised intersections. Figure 2.26 of the Austrroads Guide, shown below in Figure 4-1, specifies the required turn treatments on the major road for a design speed of greater than or equal to 100km/hr.

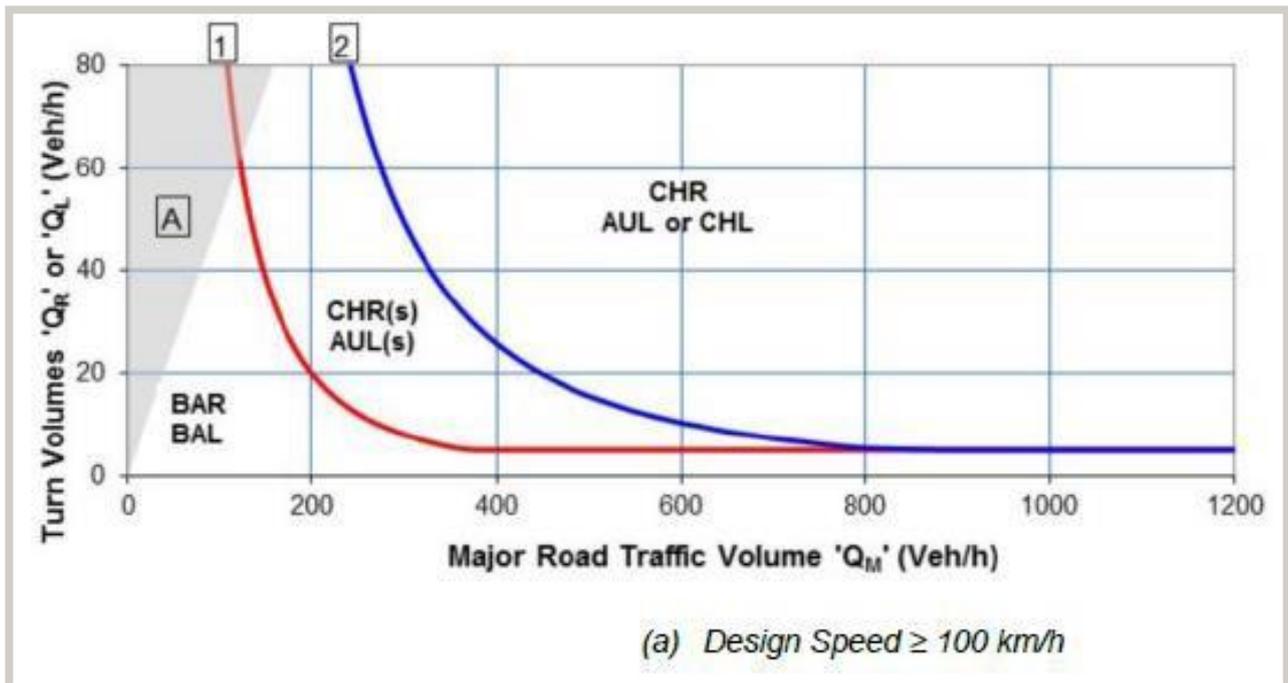


Figure 4-1: Warrants for Turn Treatments on Major Roads at Unsignalised Intersections

During the peak construction phase of the Proposal, Castlereagh Highway is expected to accommodate approximately 685 vehicle movements per day. Allweather Road is expected to accommodate approximately 100 vehicle movements a day along its Western End, including 80 heavy vehicle movements associated with the construction of the Proposal.

Heavy vehicles are expected to arrive and depart the site at regulated intervals throughout the day, which will be managed on-site. Over a typical eight-hour construction vehicle delivery schedule, this equates to approximately 10 vehicle movements an hour through the Castlereagh Highway / Allweather Road intersection, at a 50:50 ratio. Therefore, the Q_R value is 5 vph for the right turning movements onto Allweather Road.

Assuming 16% of daily trips occur during each peak hour, Castlereagh Highway is expected to have a two-way peak hour volume of 97 vph (Q_M).

Accordingly, the intersection of Castlereagh Highway / Allweather Road would require a Basic Right Turn (BAR) turning treatment to be provided during construction of the solar farm. Due to the existing bridge crossing located approximately 40 metres south of the intersection, there is insufficient land available to provide a BAR turning treatment without requiring significant bridge reconstruction and widening. As such, it is proposed that the north-eastern corner of the intersection be upgraded to facilitate heavy vehicle movements.

Figure 1 and 2 in **Appendix A** shows a proposed intersection upgrade by LG Civil, based on a 20.6m long A-double as the design vehicle. The intersection upgrade allows for inbound heavy vehicles to safely perform a right turn movement onto Allweather Road. Similarly, the design caters for heavy vehicle turning left onto Castlereagh Highway. The swept path undertaken by LG Civil shows that both inbound and outbound movement of the design vehicle can occur simultaneously at the intersection. Details of the design vehicle are shown in Figure 3 of **Appendix A**.

However, in the rare event this should occur, it is recommended that outbound vehicles be required to stop on Allweather road in a position so to allow inbound heavy vehicles a safe and comfortable access through the intersection. These events could be facilitated through appropriate traffic management and communication between drivers and the development site.

4.1.1 Option(s) considered for intersection upgrade

It is noted that a widening at the south-eastern corner of the intersection was considered previously. Details of the widening, including swept paths, are shown within **Appendix B**. However, due to design constraints (i.e. boundary limitations and bridge reconstruction), the widening option was eventually considered unsuitable.

4.2 Allweather Road / Digilah Road

It is estimated that approximately 12 light vehicle movements will access the site via the Allweather Road / Digilah Road intersection during the peak hour (one vehicle movement every five minutes). The section of Allweather Road between Access Point 2 and Digilah Road has sufficient width to accommodate two-way simultaneous traffic movements.

5 Road Upgrades

5.1 Allweather Road

Suggested location and details of a typical heavy vehicle passing bay are shown in **Appendix C**. Access Point 1 will be designed to accommodate inbound and outbound movements for a 20.6m A-Double vehicle.

The road width of Allweather Road from its intersection with Castlereagh Highway to the first bend in the road prior to the Access Point 1 location (approximately 280 metres east of Castlereagh Highway) is considered to be of insufficient width to allow for simultaneous two-way heavy vehicle movements. A passing bay is proposed to be provided along this section of Allweather Road to accommodate two heavy vehicles passing each other.

6 Conclusion

Stantec has assessed the proposed vehicle access arrangements of the Dunedoo solar farm, located along Allweather Road. In consultation with Council and the Proponent, the assessment determined the following:

- Daily traffic volumes along Allweather Road during the peak construction period are expected to remain within the acceptable levels of traffic volumes for unsealed roads;
- Swept path assessment (undertaken by LG Civil) has determined that the proposed upgrade at the north-eastern corner of the Castlereagh Highway / Allweather Road intersection is able to accommodate simultaneous inbound and outbound turning movements of the design vehicle. However, it is recommended that outbound vehicles be required to stop on Allweather road in a position so to allow inbound heavy vehicles a safe and comfortable access through the intersection.
- It is recommended that a heavy vehicle passing bay be provided along the south-eastern side of Allweather road between Castlereagh Highway and Access Point 1 to allow for heavy vehicle passing;
- It is recommended that a Traffic Management Plan (TMP) be prepared for the construction phase to facilitate the safe and efficient operations of heavy vehicles at the intersection of Castlereagh Highway / Allweather Road;
- A TMP is also recommended to address the temporary increase in traffic across the low-level bridge crossing on Digilah Road to the north of Golden Highway;
- It is recommended that the TMP include a Flood Response Plan for access contingency during flood events at the low-level bridge on East Digilah Road; and
- The Flood Response Plan should include alternate modes of transportation to transport workers to/from the site, where light vehicles are parked at Milling Park, off the Golden Highway in the centre of Dunedoo and staff are bused to site via the Castlereagh Highway / Allweather Road intersection in accordance with the TMP.

Accordingly, based on the assessment and the recommendations above, it is considered that the proposed access arrangements for the Dunedoo solar farm are suitable to accommodate the expected construction vehicle types and traffic volumes during the construction phase.

If you have any queries, please feel free to contact us.

Yours sincerely
Stantec Australia Pty Ltd



Desmond Ang
Traffic Engineer

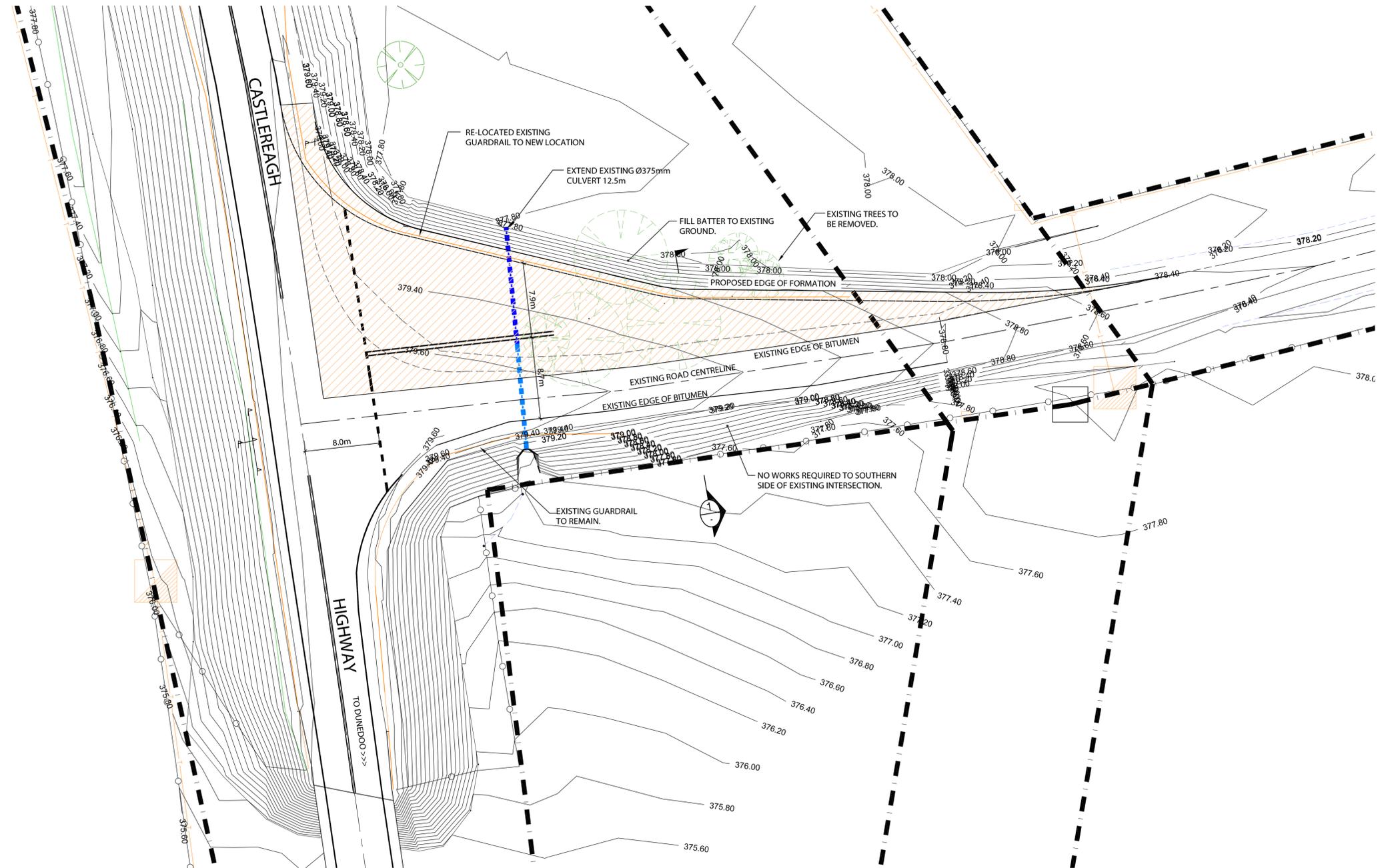
desmond.ang@stantec.com



Tom Guernier
Senior Traffic Engineer

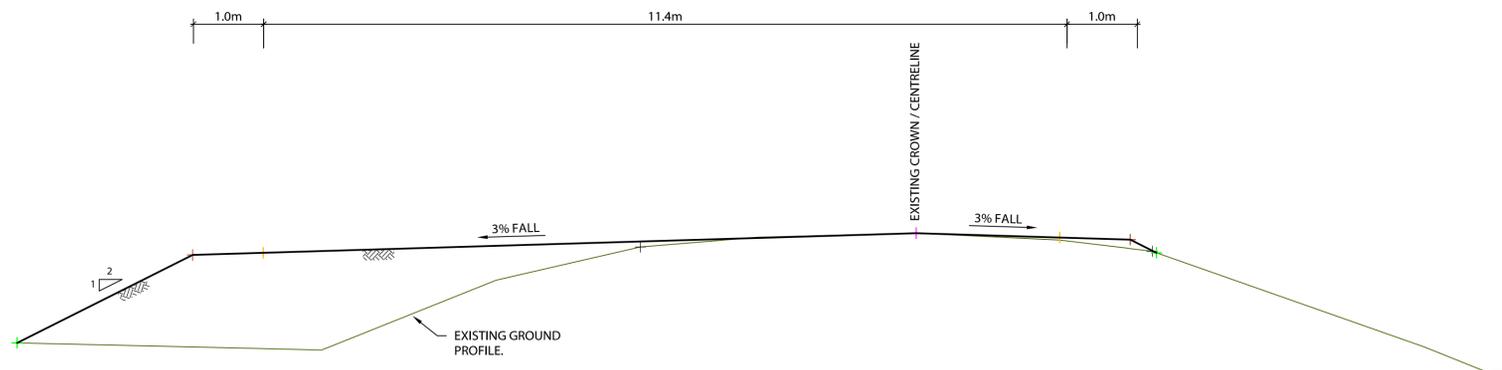
tom.guernier@stantec.com

Appendix A – Castlereagh Highway / Allweather Road Intersection Design



LEGEND

- PROPOSED EXTENTS OF PAVEMENT WIDENING
- EXISTING PROPERTY FENCE
- EXISTING PROPERTY BOUNDARY
- EXISTING TABLE DRAIN
- EXISTING TELSTRA
- EXISTING ROAD PAVEMENT
- EXISTING ROAD CENTRELINE
- DENOTES EXISTING VEGETATION
- DENOTES EXISTING VEGETATION TO BE REMOVED



SECTION 1
SCALE 1:50



REV	DESCRIPTION	DATE	BY	REV	DESCRIPTION	DATE	BY
B	ISSUED FOR APPROVAL.	04/03/20	MG				
A	PRELIMINARY ISSUE.	24/02/20	MG				

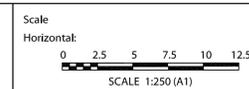


**PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW**

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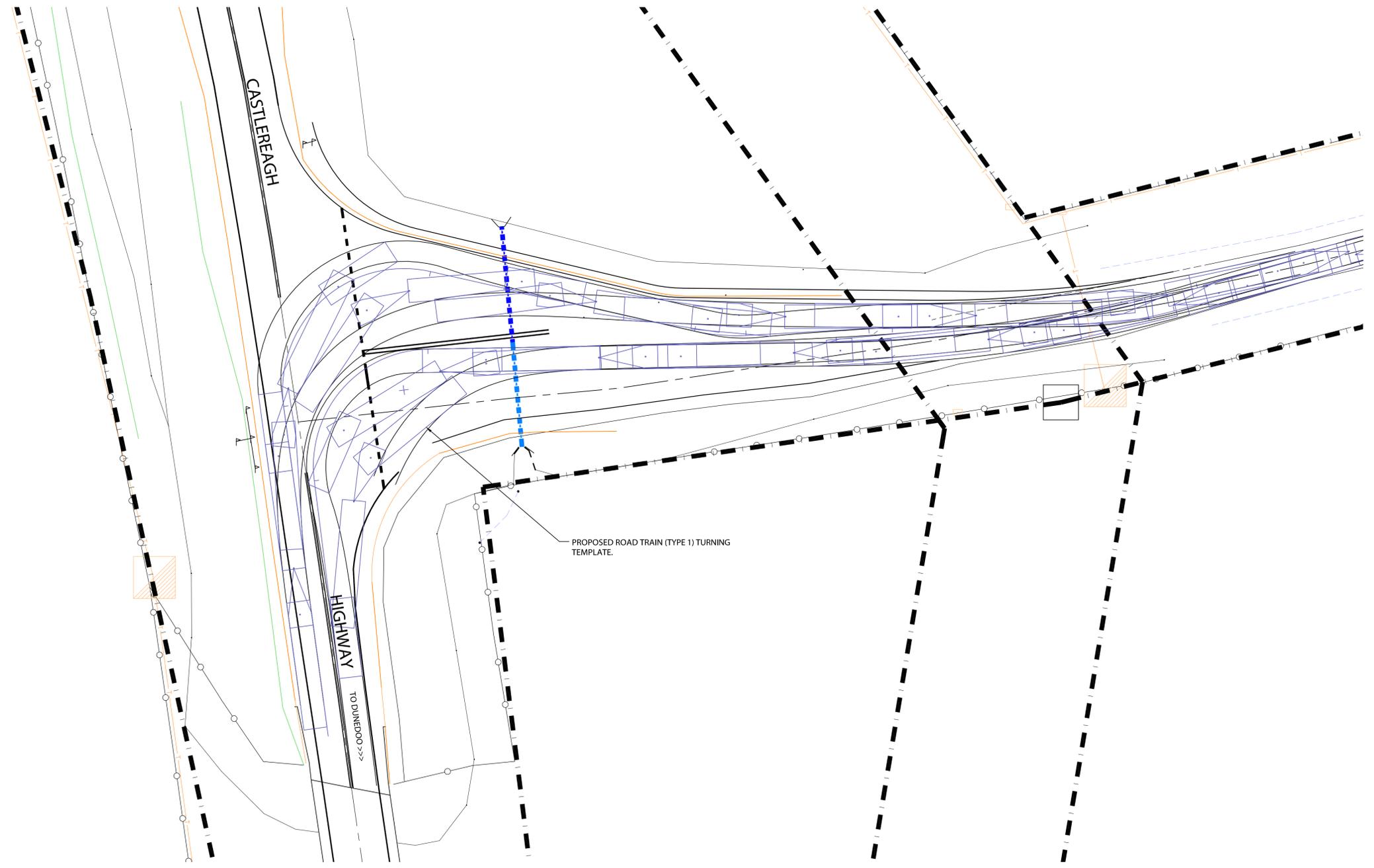


**PROPOSED INTERSECTION
LAYOUT PLAN**



CIVIL DRAWING

Designed	GD	Approved on behalf of RHM Consulting Engineers	
Drawn	MG	Project Engineer/Director	Date
Datum	AHD	Drawing No:	Rev
Date	SEP 19	- C01	B



REV	DESCRIPTION	DATE	BY	REV	DESCRIPTION	DATE	BY
B	ISSUED FOR APPROVAL.	04/03/20	MG				
A	PRELIMINARY ISSUE.	24/02/20	MG				

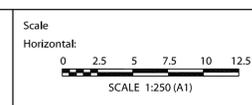


**PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW**

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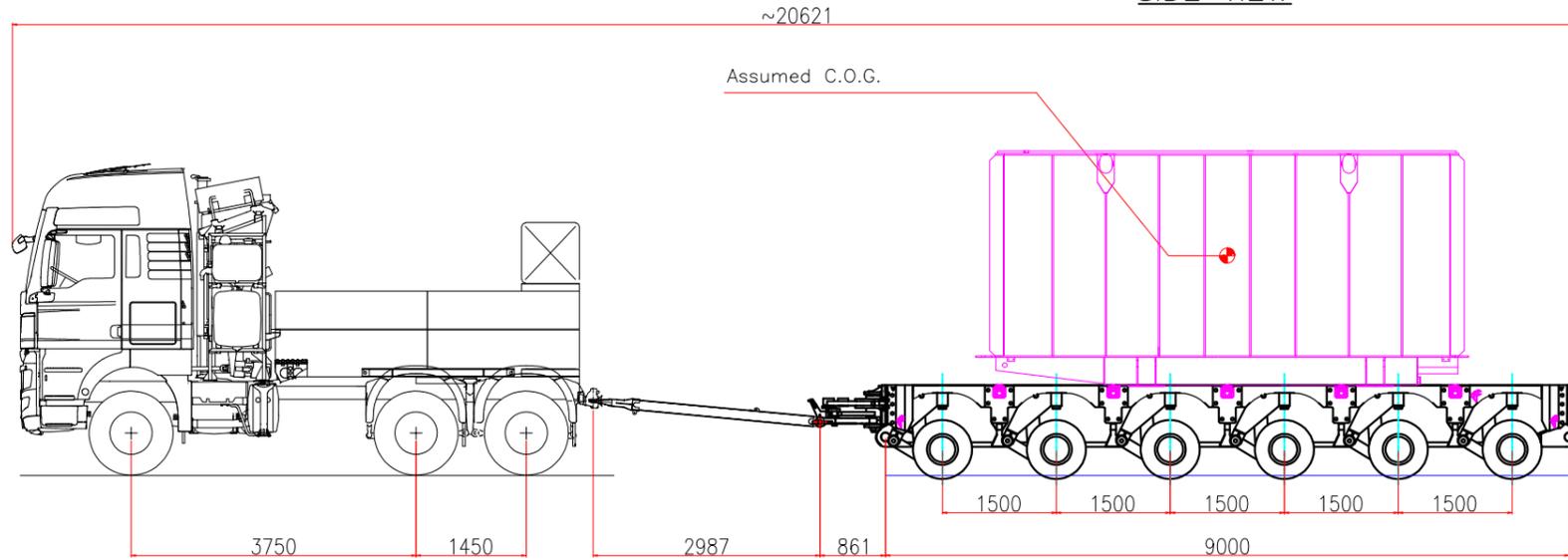


**TURNING TEMPLATE
DIAGRAM
LEFT OUT / RIGHT IN**

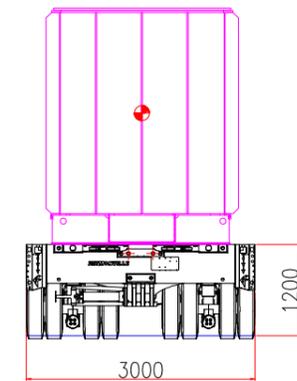


CIVIL DRAWING			
Designed	GD	Approved on behalf of RHM Consulting Engineers	
Drawn	MG	Project Engineer/Director	Date
Datum	AHD	Drawing No:	Rev
Date	SEP 19	- C02	B

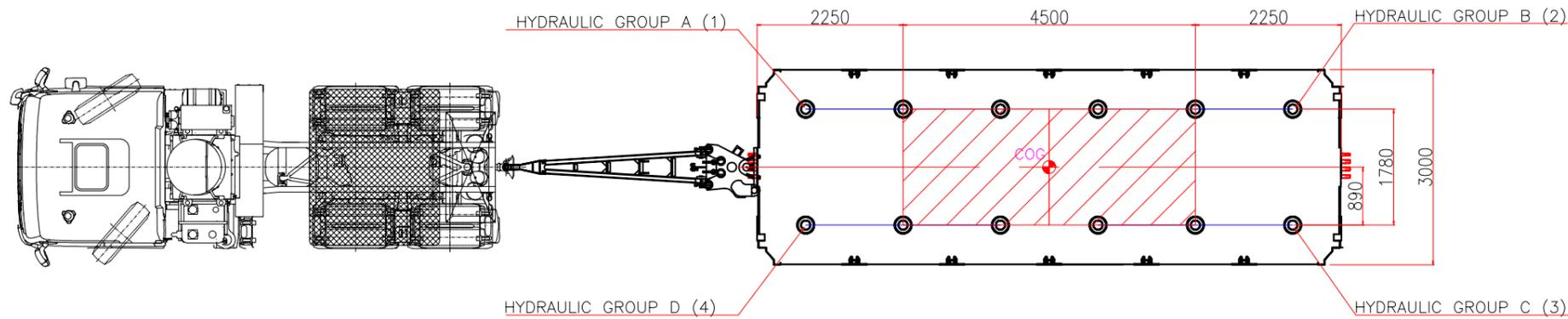
SIDE VIEW



END VIEW



AREAL VIEW

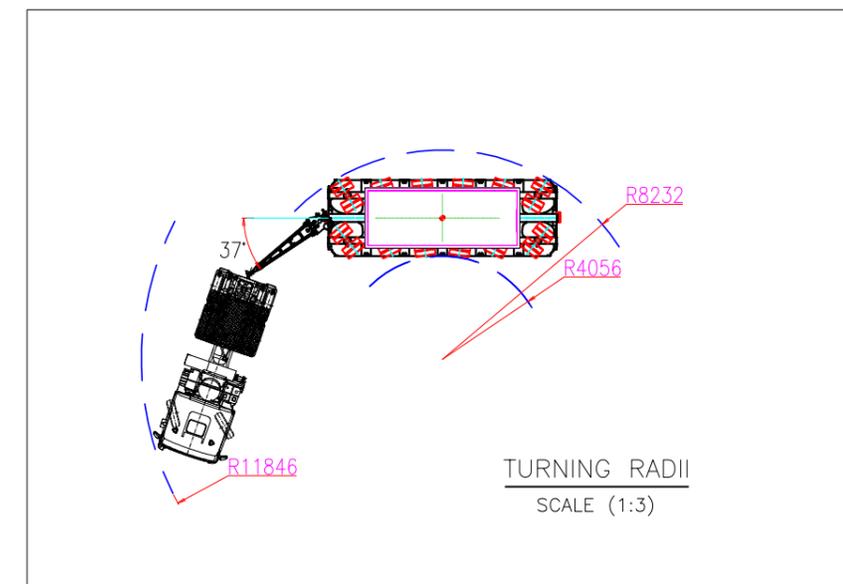


Cargo details:
Assumed outline
Based on expected dims of
Transformer 66/33 – 66 MVA

General Notes:

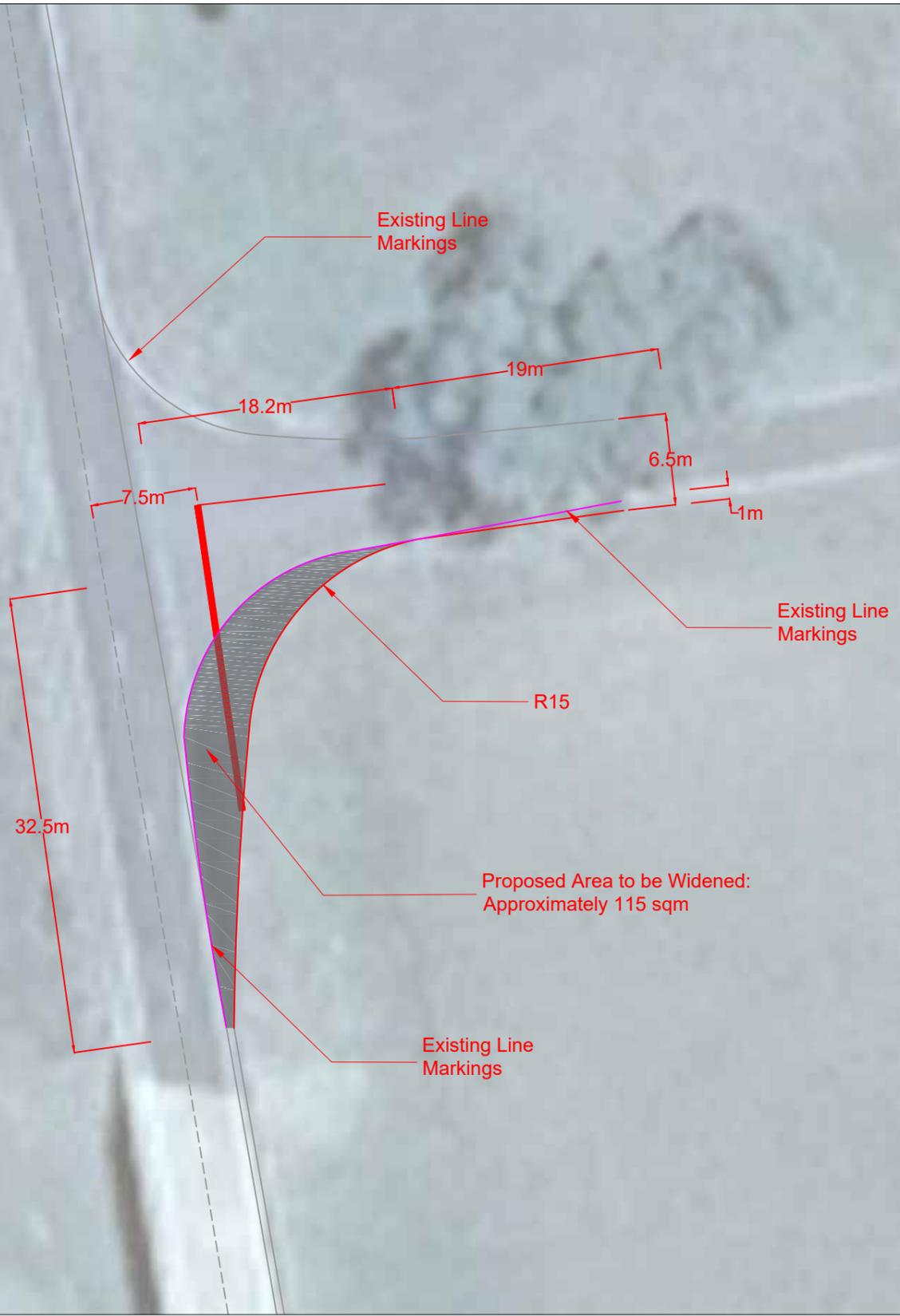
1. Agility Project Logistics (APL) accepts no responsibility if the unit is not manufactured or supplied in accordance with the dimensions referenced.
2. Dimensions to be verified on site prior to shipment.
3. Drawing not to scale.
4. Final transport planing is the subject of final cargo drawings and center of gravity location.
5. Dimensions shown are in millimeters.
6. APL takes no responsibility for transport saddles, boxes, crates and assumes that they can withstand all loads which can arise during transport.
7. Present drawing is intended for information purposes only.
8. Trailer models and types are the subject of availability at the moment of transport.
9. 4 axle-group hydraulic arrangement is advised for additional stability,

CONCEPT
review purposes only



Info. Type	Ref. No.	Description	Revision	Date	Rev.	Description	Drawn	Date	Ch'd.	CLIENT: SIEMENS Gamesa	TITLE:			
This plan is based on the information as detailed above										66/33 - 66 MVA Transport Arrangement				
P Preliminary, issued for comment											IM 06.12.18			
Agility Project Logistics B.V. Waalhaven Oostzijde 83 3087 BM Rotterdam The Netherlands phone: +31 10 7519900 fax: +31 10 7519996 www.agilitylogistics.com										LOCATION:				
This drawing and the information contained therein is the property of Agility Project Logistics, LLC and is offered on the condition that it will not be reproduced, copied or disclosed, directly or indirectly nor used for any purpose other than for which it is specifically furnished.										PROJECT:				
										Original Size: A3	SHEET: 1 of 1	SCALE: Not to Scale	DRAWING: AU-PLN-001-03	REVISION: P

Appendix B – Other upgrade option(s)



Note:
Traffic Management Plan to be implemented for the turning movements of heavy vehicles

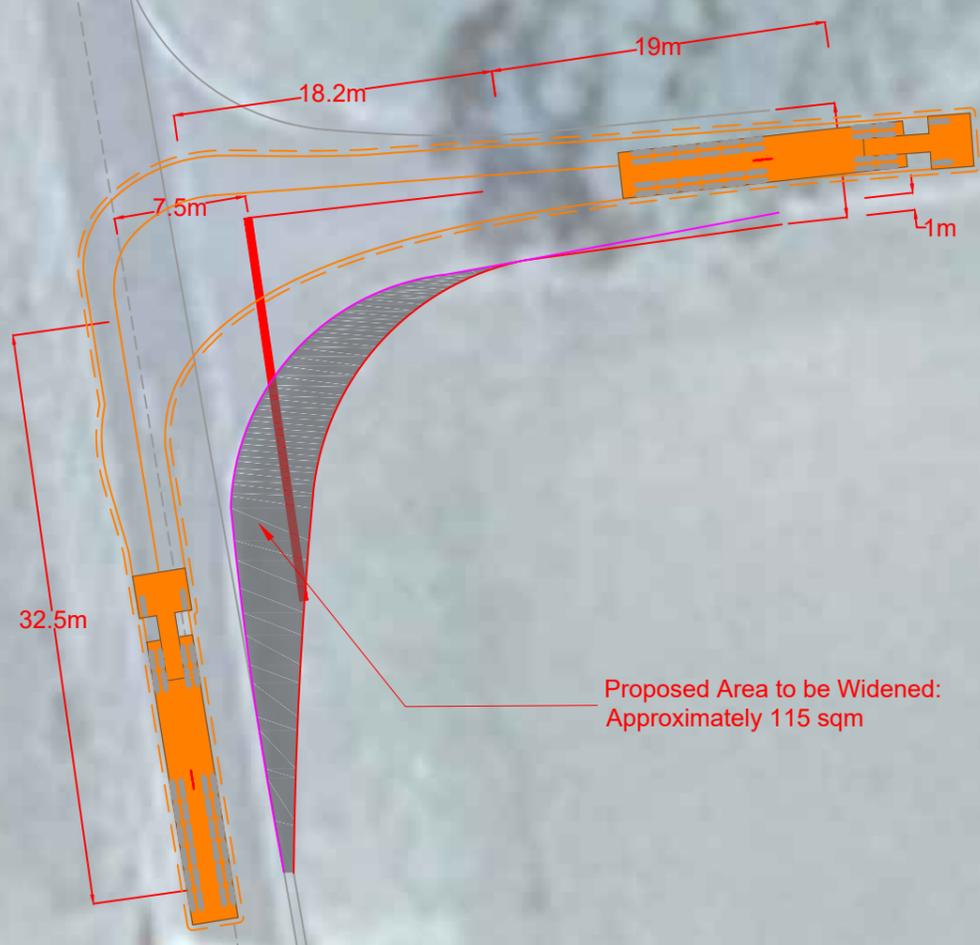
Tuesday, January 14, 2020 9:47:19 PM

REV	DATE	DRN	CHK	DESCRIPTION
00	21/01/20	DA		

Dunedoo Solar Farm - Access Design
Castlereagh Highway / Allweather Road
Proposed Intersection Layout - Option 1

DRAWN: DA --- ---
DATE: 12-01-20 STATUS: ---
SCALE: 1:400 @ A3
DWG NO:15321 - 0S1G





Proposed Area to be Widened:
Approximately 115 sqm

Note:
Traffic Management Plan to be implemented for the turning movements of heavy vehicles.

Tuesday, January 14, 2020 9:47:19 PM

REV	DATE	DRN	CHK	DESCRIPTION
00	21/01/20	DA		

Dunedoo Solar Farm - Access Design
Castlereagh Highway / Allweather Road
Swept Path Assessment - 20.6 m Truck - Entry

DRAWN: DA	---	---
DATE: 12-01-20	STATUS: ---	
SCALE: 1:400 @ A3		
DWG NO:15321 - 0S1G		





Note:
Traffic Management Plan to be implemented for the turning movements of heavy vehicles.

Tuesday, January 14, 2020 9:47:19 PM

REV	DATE	DRN	CHK	DESCRIPTION
00	21/01/20	DA		

Dunedoo Solar Farm - Access Design
Castlereagh Highway / Allweather Road
Swept Path Assessment - 20.6 m Truck - Exit

DRAWN: DA	---	---
DATE: 12-01-20	STATUS: ---	
SCALE: 1:400 @ A3		
DWG NO:15321 - 0S1G		



Appendix C – Typical Passing Bay Details



Tuesday, January 14, 2020 9:47:19 PM

Note:
Traffic Management Plan to be implemented for the turning movements of heavy vehicles.

REV	DATE	DRN	CHK	DESCRIPTION
00	21/01/20	DA		

Dunedoo Solar Farm - Access Design
 Passing Bay
 Swept Path Assessment - 20.6 m Truck

DRAWN: DA --- ---
 DATE: 12-01-20 STATUS: ---
 SCALE: 1:500 @ A3
 DWG NO:15321 - 0S1G

