SUBMISSIONS REPORT

Dunedoo Solar Farm SSD 8847

March 2021

Project Number: 20-764

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DOCUMENT VERIFICATION

Project Title:	Dunedoo Solar Farm SSD 8847
Project Number:	20-764
Project File Name:	Dunedoo Solar Farm SSD 8847 Submissions Report

Revision	Date	Prepared by	Reviewed by	Approved by
Draft 1	11/01/2021	Zoe Walters and Jorge Van Den Brande	Natascha Arens	Natascha Arens
Draft 1.2	10/02/2021	Jorge Van Den Brande	Natascha Arens	Natascha Arens
Draft 1.3	12/02/2021	Jorge Van Den Brande	Natascha Arens	Natascha Arens
Draft 1.4	25/02/2021	Jorge Van Den Brande	Natascha Arens	Natascha Arens
Final	08/03/2021	Minor edits		

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ACRONYMS AND ABBREVIATIONS

ACHA	Aboriginal Cultural Heritage Assessment
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015* (NSW)
BSAL	Biophysical Strategic Agricultural Land
CEMP	Construction Environmental Management Plan
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment
DEE	Department of the Environment and Energy (now DAWE) (Cwth)
DPI	Department of Primary Industries (NSW)
DPIE	Department of Planning, Industry and Environment (NSW)
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	Environment Protection Authority (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
ERP	*Emergency Response Plan*
GWh	Gigawatt Hours
ha	Hectares
Heritage Act	*Heritage Act 1977* (NSW)
km	Kilometres
LEP	Local Environment Plan
LGA	Local Government Area
MW	Megawatt
NSW	New South Wales
OEH	Office of Environment and Heritage (formerly DECCW) (NSW)
OEMP	Operation Environmental Management Plan
PCT	Plant Community Type
PV	Photovoltaic
RAPs	Registered Aboriginal Parties

RFS	Rural Fire Service
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TEC	Threatened Environmental Communities
TL	Transmission Line
TfNSW	Transport for NSW (formerly Roads and Maritime Services)
VIA	Visual Impact Assessment

TABLE OF DEFINITIONS

Proposal	The construction, operation and decommissioning of a 55-MW AC solar farm generally comprising a solar array, access roads, underground and above ground cables, on-site substation and associated operational facilities including the construction of a 66-kV Transmission Line (TL) from the proposed on-site substation to the existing Essential Energy Dunedoo Substation, as set out in this EIS.
Proponent	ib vogt GmbH on behalf of Sun Spot 4 Pty Ltd
Development Footprint	Surface area of land that would be impacted by the operations of the Proposal upon subdivision of lots. The Development Footprint encompasses approximately 79 ha, comprising parts of the following lots: For the PV Field: Lot 137 DP 754309, Lot 140 DP 754309, Lot 1 DP 854326, Lot 1 DP 1260716, and the portion of Lot 80 DP 754309 north of All Weather Road. For the Castlereagh Highway / All Weather Road intersection upgrade: Lot 1 DP 535659 and All Weather Road's road reserve. For the 66-kV TL and associated infrastructure: Lot 80 DP 754309, Lot 7012 DP 93290, Lot 37 DP 754309, Talbragar River Reserve 56146 and All Weather Road's road reserve. For the extension of the existing Essential Energy Dunedoo substation: Lots 181-186 and 196-201 DP 754291.
Development Site	The Development Site is the immediate boundary and buffer around the Development Footprint, that includes immediate and adjacent land that are subject to direct activities from the proposal, of up to 10 metres from the Development Footprint. The Development Site encompasses approximately 112 ha.
Subject Land (Biodiversity Assessment)	The Subject Land is a terminology used in the Biodiversity Assessment, which includes land the Development Site and Development Footprint combined, and land where the Biodiversity Assessment Methodology (BAM) has been applied. A buffer of up to 5 metres has been applied for the Subject Land on the northern boundary of the Development Footprint The Subject Land is similarly defined within the Aboriginal Heritage Assessment and is referred therein as the 'proposal area'. The Subject Land encompasses a total approximately area of 158 ha.
Study Locality (Biodiversity Assessment)	10km search area around the Development Footprint. Only used by the Biodiversity Assessment.

Operator	Responsible for the operation and management of the solar farm and would implement the requirements of the development consent, EIS and OEMP and associated management plans.
Sub- contractor	Construction and operation subcontractors are contractually bound to implement the development consent, EIS, CEMP, OEMP, and associated management plans provided by the Contractor and/or Operator.
Intersection upgrade at Castlereagh Highway and All Weather Road	Based on swept path analysis for the 26.0m B-double truck, the intersection of Castlereagh Highway / All Weather Road would require widening of the north-eastern corner to facilitate turn movements from simultaneous inbound and outbound largest predicted vehicle movements. The work would occur in Lot 1 DP 535659 and All Weather Road's Road Reserve.
Essential Energy Substation	The existing Essential Energy substation would be expanded to accommodate the electricity generated by the Proposal. The expansion would be built on Lots 181-182 and Lots 200-201 of DP 754291 and the existing substation in Lots 183-186 and Lots196-199 of DP 754291 may also be augmented, located on 5-19 Evans Street Lane as identified on the map provided herein this EIS. It is proposed that the substation extension will be assessed under Part 4 of the EP&A Act. There are currently two (2) options for the 66- kV TL corridor. The land where the works will take place for the TL, will be registered in favour of Essential Energy via an easement where the works is undertaken outside land owned by Essential Energy. The TLs will be handed to Essential Energy upon completion of the construction. The assessment of these options is included in this EIS

FOREWORD

ib vogt GmbH (the Proponent) on behalf of Sun Spot 4 Pty Ltd thanks the Warrumbungle Shire community members and the broader Central Western Region for their involvement in the proposed Dunedoo Solar Farm. Submissions and feedback received are greatly appreciated, and have assisted the project team in revising the Proposal to respond to community and agency comments, and to minimise potential impacts. The changes include:

- Amendments to All Weather Road and Castlereagh Highway proposed intersection upgrade.
- Clarification on the subdivision requirement for the Proposal.
- Amendments to the Proposal's water demand, quantity and nearby bores information update.

A Preliminary Hazards Assessment (PHA) was undertaken to inform these proposed changes and address agency comments.

All changes to the Proposal are detailed in full within this report.

The Proposal's environmental management commitments remain generally unchanged with some minor modifications in response to submissions.

If successful in achieving development consent, The Proponent is committed to being a good neighbour, a contributor to the local community and economy, and will continue to involve the community through all aspects of the Proposal. The Proposal will provide a great deal of ongoing benefit to the community, including economic benefit, employment, local procurement and use of local services.

1. INTRODUCTION

1.1. BACKGROUND

A photovoltaic (PV) solar farm is proposed approximately 2 kilometres (km) north of the township of Dunedoo in Central Western NSW by ib vogt GmbH (the Proponent) on behalf of Sun Spot 4 Pty Ltd. The solar farm would generate approximately 55 Megawatt (MW) of Alternating Current (AC) and would sit on 79-hectares (ha) of land (Development Footprint) comprised of a number of lots zoned RU1 Primary Production under the Warrumbungle Local Environment Plan 2013 (Warrumbungle (LEP). For the purpose of this report, the solar farm and its associated infrastructure is collectively known as the Proposal.

NGH Consulting (NGH) prepared an Environmental Impact Statement (EIS) on behalf of the Proponent addressing the key environmental issues as specified in the Secretary's Environmental Assessment Requirements (SEARs). Major impact item, such as but not limited to biodiversity (flora and fauna), soil impacts, Aboriginal heritage, visual impact, land use impacts, noise impact, and traffic impacts were assessed via specialist assessments and desktop studies to ensure that all environmental impacts identified could be managed appropriately.

The EIS was prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The EIS was submitted to the DPIE and placed on public exhibition from Tuesday 20 October 2020 until Tuesday 17 November 2020.

Following consideration of the issues raised and comments received during public exhibition, the Proposal has remained generally unchanged to that presented in Section 4 of the EIS (NGH, 2020). Some improvements have been made in response to submissions, including changes to road upgrades and intersection design at the Castlereagh Highway and All Weather Road have been made following consultation with Transport for NSW as detailed in section 3.3 of this report.

1.2. PURPOSE OF REPORT

NGH has prepared this Submissions Report on behalf of the Proponent, to provide responses to the community, organisation and government agency submissions received during the public exhibition period. The aim of this report is to fulfil the requirements of Section 85A of the EP&A Regulation, for which it:

- Considers and responds to the matters raised in the submissions for the proposal.
- Describes changes to the proposal, including a revised set of proposed mitigation measures.
- Details the additional studies undertaken to respond to matters raised.

Submissions received have assisted to clarify the key community concerns regarding the Proposal. Further investigations and consultation undertaken subsequent to the public exhibition period have assisted the Proponent in making positive changes to the project to address community comments and concerns.

The report is set out as follows:

- Section 1: Details an introduction to the proposal, and the purpose of the report.
- Section 2: Details the proposal as described in the EIS.
- Section 3: Details the high-level summary of submissions and briefly discusses additional studies undertaken and changes to the proposal.
- Section 4: Details responses to submissions, for all agencies, community groups and individuals. This section offers a consolidated summary of individual submissions, rather than individual responses.
- Section 5: Details a full list of updated mitigation measures.

2. OBJECTIVES, BENEFITS AND JUSTIFICATION FOR THE PROPOSAL

2.1. PROPOSAL OBJECTIVES

The Proposal's objectives remain as detailed within Section 2 of the EIS. The objectives have been developed in consideration of Australia's Commonwealth and State (NSW) policies and international agreements to which Australian is cosignatory.

The Proposal's objectives are to:

- Generate electricity to power approximately 24,415 homes from a clean and renewable energy source with minimal negative cultural and environmental impacts, through an energy generation facility that has been developed in a manner acceptable to the local community.
- Assist in the reduction of Australia's GHG emissions intensity in relation to the gross domestic product (GDP) and contribute to State and Federal efforts to meet climate change mitigation targets.

2.2. PROPOSAL BENEFITS

2.2.1. Broad benefits

The broad project benefits remain as detailed within Section 2 of the EIS. Electricity generation is the largest individual contributor to greenhouse gas emissions in Australia (DEE 2016). Once constructed, the Proposal would provide around 144,540 MWh per year of GHG emission-free electricity. This represents the power consumption of about 24,415 homes (assuming an average household consumption of 4,215 kWh pa), which represents approximately 68% of the total annual residential requirements of the Study Area (36,130 homes). Generation figures may change subject to final site design and technology selection. The Proposal would prevent the generation of about 48,236 tonnes of GHG emissions per year, if these were to be generated by coal.

The Proposal would assist in reducing GHG emissions intensity from electricity generation and contribute to renewable energy targets committed to by the NSW and Federal Governments.

The Proposal would contribute to the NSW Renewable Energy Action Plan (NSW Government 2013), which supports the achievement of the national target of 20% renewable energy by 2020 (NSW Government 2013). The Proposal would also further the three goals of the Action Plan:

1. Attract renewable energy investment and projects.
2. Build community support for renewable energy.
3. Attract and grow expertise in renewable energy.

The Proposal would also contribute to the Australian Government's objective to achieve an additional 33,000 GWh of energy from renewable sources by 2020 under the Large-Scale Renewable Energy Target (LRET). While the LRET target was met in September 2019, the scheme will continue to require high-energy users to meet their obligations under the policy until 2030.

2.2.2. Local benefits

The local project benefits remain as detailed within Section 2.3.1 of the EIS, including:

- Direct and indirect employment opportunities during the peak construction phase and operation of the solar farm. This includes 100 direct jobs as well as indirect supply chain jobs of over 160 over the construction period. It would employ up to three (3) full time staff during operation and

up to nine (9) indirect service contractors. Maintenance contracts for panel cleaning, fence repair, road grading, security, etc. would also be required and would likely be met by local contractors.

- Previous projects have tended to spend approximately 15% of the capital cost in the local region, expected to be $11.4M based on construction cost of approximately $76M.
- Direct business volume benefits for local services, materials and contracting (e.g. accommodation, food and other retail).
- Significant wage spending would be directed at local and regional businesses and service providers during the construction period. Spending would include housing expenditure, retail, recreational spending, tools and equipment, and personal, medical and other services.
- Increased economic security to rural economies through diversification of employment opportunities and income streams.
- The Proposal would deliver solar energy into the national electricity system at Dunedoo to assist in powering and in assisting the resolution and reliability of the power supply issue in the Warrumbungle LGA.

To minimise the environmental costs of achieving the above benefits, the Proposal would respond appropriately to the environmental constraints of the site. It would be designed to:

- Preserve biodiversity features through minimising native vegetation removal and mitigating connectivity impacts.
- Manage impacts to items of Aboriginal significance.
- Minimise impacts to soil and water resources through pile driven panel mounts rather than extensive soil disturbance and excavation.
- Retain existing site topography.
- Retain some agricultural production value through managed stock grazing during operation.
- Preserve future agricultural production values, being highly reversible at the end of the project's life.

The Proponent takes its prospective role in the community very seriously and strives to be a good neighbour and supporter of the communities where it operates. The Proponent would seek opportunities to deliver economic and/or social benefits through its operations where possible.

The Proponent has listened to the concerns of the community through their consultation efforts, considered the submissions and have sought to address submission with changes to the proposal.

2.3. JUSTIFICATION

The assessments presented in the EIS indicate that the proposed Dunedoo solar farm should be approved, subject to the identified mitigation measures, principally because:

- The site is highly suited to utility scale solar electricity generation
- The Proposal reflects the technology best suited to the site and network requirements
- The Proposal provides an important contribution to the urgent need to abate carbon emissions in the electricity sector to meet government commitments and policy objectives and avoid dangerous climate change
- The Proposal incorporates Battery Storage, which would regulate inputs to the network and help overcome limitations associated with intermittent solar generation.
- The identified environmental impacts are generally minor, highly localised, capable of mitigation or offsetting and often confined to the construction phase
- The environmental risks associated with the Proposal are manageable and uncertainty can be addressed through mitigation measures and with the environmental management plants
- The Proposal offers a range of community benefits relating to electricity supply, economic activity, and local employment opportunities

- The Proposal is reversible and would not result in any permanent loss of land use potential or reduce future land and resource use options
- The Proposal is permissible and meets planning requirements, including those pertaining to the EP&A Act and Regulation, State and Regional Development SEPP, Infrastructure SEPP, and the Warrumbungle LEP.

2.4. PROPOSAL SUMMARY

The Proposal remains generally as detailed in Section 4 of the EIS (NGH, 2020). The Proposal is to construct and operate solar photovoltaic panels solar farm that would have a capacity of up to 55 MW AC to generate power from a renewable source. The solar farm component of the Proposal includes:

- Approximately 173,000 PV solar panels, mounted on single axis tracking systems, powered by approximately 2,850 tracker motors.
- Electrical cables and conduits.
- Inverter/transformer stations, containerised or skid mounted, distributed across the site.
- Battery storage units, containerised, distributed across the site.
- On site substation containing transformer, synchronous condenser, associated HV switchgear, switch room, control room and lightning protection masts.
- Communications tower (up to 25 metres high), within the facility connection substation fenced area.
- Site office, compounds, storage shed, parking, access tracks and perimeter fencing.
- Two (2) access points via All Weather Road.
- Internal access tracks.
- Lighting, CCTV system, security fencing.
- Vegetative screening.
- A new hybrid Transmission Line (TL) to connect the solar farm into the Essential Energy transmission network, which will be handed to Essential Energy upon completion. Two (2) TL options are being considered.
- Construction of a passing bay along All Weather Road and upgrade to the Castlereagh Highway and All Weather Road junction.
- Subdivision and consolidation of lots.
- A new bay in the Dunedoo Substation and any required augmentation within the existing Dunedoo Substation. A new communications tower up to 15m tall.

The panels would be arranged in rows and would comprise of a metal or similar frame mounting system with a maximum height of approximately 3 metres above the natural ground level. Spaces between rows (edges of panel) may vary between approximately 3 metres and 9 metres.

The mounting systems would require approximately 30,000 piles that would be driven or screwed into the ground on a depth of approximately 2.5 metres. Depth will be defined following detail geotechnical investigations. Pile heights would vary according to topography and expected flood level.

The Proposal would require a connection to the Essential Energy Dunedoo Substation and the Proponent is currently considering two (2) connection options using existing and new Essential Energy TL easements. Option 1 would join the existing 852 66-kilovolt (kV) feeder easement (utilising existing infrastructure if possible) that runs south of the Development Site into the Dunedoo Substation. Option 2 would join the existing 85A 66-kV feeder easement (utilising existing infrastructure where possible) that runs southeast-northwest across the southern section of Lot 80 DP754309. The Proposal also requires upgrading/expanding the existing Dunedoo Substation for both connection options.

The Proposal would potentially require the subdivision of three (3) lots within the Development Site with four (4) lots within the Development Site to be consolidated into two (2) lots for the purpose of the solar farm array area while facilitating existing landowner operations. One (1) lot would be subdivided for the purpose of

Essential Energy's eventual ownership of the proposed facility connection substation, if required. The arrangements would be made under lease and purchase agreement with the involved landowners.

The Proponent would undertake the necessary works for upgrading and constructing the connection infrastructure, and once constructed, the infrastructure will be handed to Essential Energy to own and operate throughout the lifecycle of the Proposal.

The Development Site would be accessed through two (2) access points via All Weather Road, which runs adjacent to the solar array area and provides access to Castlereagh Highway and Digilah Road. The intersection of Castlereagh Highway and All Weather Road would be upgraded and a passing bay installed on All Weather Road as part of the Proposal to facilitate safe construction heavy vehicle access to and from the site.

The Proposal is expected to operate for 30 years and construction is expected to take 10-12 months, commencing indicatively in late 2021. After the operating phase, the Proposal would either be decommissioned, returning the site to its existing land use; or upgraded with new photovoltaic equipment, pending any required approvals.

3. CONSIDERATION OF SUBMISSIONS

3.1. EXHIBITION AND LOCATION

Community feedback was sought through two (2) community open days and direct engagement through letters, emails, phone calls and face to face meetings. 23 people provided feedback forms and feedback has been overwhelmingly positive.

Community feedback has been sought through a number of established consultation activities during the course of the Proposal development and exhibition, as detailed in Section 6.3.3 of the EIS.

Shortly after submission of the EIS to the DPIE and during the exhibition period, a 4th newsletter was mailed out to residences in the Dunedoo postcode. This newsletter included an update on the Proposal, information about the SSD process, timing for the public exhibition of the EIS and places where the EIS was available for viewing during the public exhibition period. The newsletter provided information about making a submission about the Proposal. The newsletter was made available on the Proposal website https://dunedoosolarfarm.com.au/news.

3.2. SUBMISSIONS RECEIVED

During the exhibition period, submissions were received from members of the public, community groups and government agencies. DPIE received a total of 20 submissions (see Table 3-1 for more detail) during the exhibition period via the major projects planning portal.

- Three submissions were received from members of the public. Two supported the Proposal and one objected.
- Three submissions were received from community groups and organisations. Two supported the Proposal and one objected.
- Fourteen submissions were received from public authorities commenting on the Proposal. No agency objections to the Proposal were received.

The issues raised in each submission received are summarised in this document; Section 4 (public and organisation submissions) and Section 5 (public authority submissions).

The full submissions can be found on the DPIE's website:

https://www.planningportal.nsw.gov.au/major-projects/project/10021

Table 3-1 Submissions Received

Category	Number of responses received
Community groups/ Organisations - Altomonte - Wellington Valley Wiradjuri Aboriginal Corporation - APA Group	3
Individual members of the public - Joumana Issak - Nafees Khan - Ian Nott	3
Agency submissions - NSW Environmental Protection Authority (EPA) - Department of Primary Industries - Agriculture - Water NSW (WNSW) - Department of Primary Industries - Fisheries (DPI-Fisheries) - Biodiversity, Conservation and Science (BCS) - Regional NSW and Mining - Crown Lands - Warrumbungle Shire Council (WSC) - Fire Rescue NSW (FRNSW) - NSW Rural Fire Services - Transport for NSW (TfNSW) - Department of Planning, Industry and Environment (DPIE) - Water Division - Heritage NSW – Aboriginal Cultural Heritage (ACH) - Essential Energy	14
Total	20

3.3. ADDITIONAL CONSULTATION

3.3.1. Transport for NSW

Additional consultation was undertaken with TfNSW and WSC to discuss the available options for the All Weather Road and Castlereagh Highway proposed intersection upgrade. A meeting was held with TfNSW and WSC on 3/12/2020, where the TfNSW submission was discussed. From this discussion, it was agreed that the use of Digilah Road was potentially problematic for heavy vehicles during construction for numerous reasons and the use of the Castlereagh Highway and All Weather Road junction would be further explored.

The Proponent and Stantec spent considerable time analysing the Castlereagh Highway and All Weather Road junction further and sent a memo to TfNSW and WSC on 21/1/2021 making recommendations for the safest reasonable use of the junction. A meeting to discuss the memo dated 21/1/2021 was held on 28/1/2021 with TfNSW and WSC and a solution was generally agreed within the meeting for use of the Castlereagh Highway and All Weather Road junction. The outcome of the meeting on the 28/1/2021 has been captured in the agreed meeting minutes (refer to Appendix E) and updated Stantec memo dated 11/2/2021 (refer to Appendix F).

4. PROPONENT'S RESPONSE

4.1. RESPONSES TO PUBLIC, COMMUNITY GROUPS AND ORGANISATION SUBMISSIONS

Three (3) submissions from the public were received and three (3) submissions from organisations were received. Two (2) of the three (3) public submissions were in support of the Proposal and two (2) of the three (3) organisation submissions were letters of support for the Proposal.

Concerns expressed in submission varied between impact to the visual amenity, impacts to Biophysical Strategic Agricultural Land (BSAL), glare and reflection impacts, and impacts to biodiversity. These matters are addressed in this report and detailed below in Table 4-1.

Table 4-1 Proponent's response to issues raised by the community.

Position	Submission ID.	Detail of issue	Proponent Response
PUBLIC			
Support	Nafees Khan Joumana Issak	The two (2) letters of support generally outlined the following reasons for supporting the Proposal: • The Proposal would provide a source of better power and electrical infrastructure within the Warrumbungle LGA. • The Proposal would assist Australia in maintaining its climate change commitments through the reduction of GHG emissions intensity. • The development would provide positive socio-economic benefits through diversification and increase in training and job opportunities within the community.	**Noted**

Position	Submission ID.	Detail of issue	Proponent Response
PUBLIC			
Objection	Ian Nott	The letter of objection outlined the following reasons: • The Proposal is being proposed to be located on prime agricultural land (1st Class Land) and should not be allowed to be developed as such.	The Proponent has taken in consideration the *Large-Scale Solar Energy Guidelines for State Significant Developments 2018* (the Guidelines) in the preparation of this Proposal and its EIS, including the avoidance, where possible. The Proponent has undertaken a number of steps to reduce impact on BSAL as far as possible. **BSAL soil test** BSAL and Critical Industry Cluster Maps have replaced agricultural land classification maps so reference to prime agricultural land has been replaced with BSAL in this response. As described in the EIS, approximately 90% of the Proposal is proposed on BSAL according to NSW government BSAL maps, as shown in Appendix A. As part of efforts to minimise impact on BSAL, detailed soil investigations were undertaken at site to verify BSAL mapping. This site specific testing found that only 30% of the Development Site reached the requirements of BSAL as shown in Appendix B, significantly reducing the impact of the development on BSAL. **Site design and iteration to avoid and minimise BSAL impacts** In addition, significant site optimisation and design was performed to further reduce BSAL impacts while still resulting in an economically viable project. Some design steps that were used to avoid and minimise BSAL impacts are outlined below: 1. Attempts were made to involve land owners to the north of the current Proposal (as noted by Altomonte (Nominees) Pty Ltd in their submission) which would have shifted the Development

Position	Submission ID.	Detail of issue	Proponent Response
PUBLIC			
			Footprint outside of the BSAL mapped area shown in Appendix A. 2. The original Proposal, as shown in Appendix B, included land south of All Weather Road. This land is generally considered higher quality in soil testing than north of All Weather Road and was avoided in the final Development Footprint as far as possible so as to avoid BSAL impacts as far as reasonable. **Potential agricultural use during operations and reinstatement after decommissioning** It is important to note that the development of a solar farm does not exclude the potential use of the land for agricultural activities, due largely to the minimal earthwork required to construct and operate a solar farm. More specifically, disturbance usually occurs in the top 2 metres of soil. This excavation is very localised and restricted to the area of the mounting frames that supports the solar panels and other ancillary infrastructure. The land below the solar panel's may be usable for some agricultural activities during operations. Once the facility is decommissioned, the land can be restored to its original use and land classification.

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
Objection	Altomonte Group	The letter of objection outlined the following reasons: • Proposal fails to meet the Warrumbungle DCP objectives. • Concern regarding the threatened species and habitats that the Proposal could affect. • Reflection and glare caused by the panels could impact surrounding community members, particularly those driving along Mendooran Road. • Viewpoints in the VIA were not undertaken from private residences. • Concern with the reduction of visual amenity in Dunedoo Township • Location • Disapproval regarding the loss of prime agricultural land.	**Warrumbungle DCP objectives** The Proposal has been designed to comply with Warrumbungle DCP objectives throughout its design iterations. This is detailed in the EIS through sections: • 2.2.2 Alternative Locations and Layouts • 8.1 Biodiversity • 8.3 Visual Amenity and Landscape Character • 9.2 Land Use **Impacts to threatened species** The Development Site has been selected to avoid or minimise impacts to biodiversity where possible, including potential Serious and Irreversible Impacts (SAII). Most areas of Threatened Ecological Communities (TECs) in the Development Site have been avoided through the iterative design process. Where biodiversity impacts could not be avoided, an offset credit requirement has been generated. The biodiversity assessment undertaken by the Proponent, detailed in Section 8.1 of the EIS, found that three (3) Plant Community Types (PCTs) occur within the Development Site which correspond to two (2) TECs: ○ *White Box, Yellow Box, Blakely's Red Gum Grassy Woodland* (BC Act-Endangered and EPBC Act-Critically Endangered) ○ *Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions* (BC Act-Endangered).

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			Impacts to these TECs were identified as being potentially SAII, however, the Proposal has been designed to minimise impact to these communities; and the determining authority will assess whether these impacts are serious and irreversible. The assessment also found that 25 threatened species required targeted survey, however, none of these species were detected within the Development Site upon completion of targeted surveys. The assessment also found that ten (10) threatened species and five (5) migratory species listed under the EPBC Act were considered likely to occur in the Development Site. However, only one (1) EPBC Act-listed Marine species, Dollarbird *Eurystomus orientalis*, was identified in proximity to the Development Site. Based on the bird surveys undertaken and evaluation of habitat, this species is not considered likely to occur in the Development Site regularly or rely on the habitats present. No other EPBC Act-listed species were recorded during the field surveys. Assessments of significance were completed for the above species. These concluded that a significant impact was unlikely, and therefore, no referral was considered necessary to the Federal Department of Agriculture, Water and the Environment (DAWE). Furthermore, the Proponent will need to retire ecosystem credits through the appropriate regulated offset mechanism. • Ecosystem credits: ○ 20 ecosystem credits were generated from the removal of approximately 0.9 ha of native vegetation for Option 1

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			○ 19 ecosystem credits for the removal of approximately 0.85 ha of native vegetation for Option 2. • Species credits – no species credits were generated from impacts due to no observations of such species requiring credits within the Development Site. In addition to the above, the submission from Biodiversity, Conservation and Science (BCS), former OEH, dated 4 November 2020, stated that: *"BCS is satisfied that the BDAR adequately assesses the impacts to biodiversity of the development in accordance with the Biodiversity Assessment Method (BAM), noting that a total of 19 or 20 ecosystem credits (depending on the final transmission route) will be generated by the development.* *The planning proposal is fully consistent with the NSW Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 as well as the Guideline on Development Controls on Low Flood Risk Areas."* **Visual Impacts and Glare** Moir Landscape Architecture Pty Ltd was engaged to undertake a Visual Impact Assessment (VIA) and model the viewshed of proposed infrastructure. The VIA also included an on-ground assessment of the Proposal's operational visual impact. Section 8.3 of the EIS details the findings, recommendations and conclusions of

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			the visual impacts a result of the Proposal. These are summarised below: The predicted potential visual impact was assessed for 15 viewpoints. The Proposal would be visible from all 15 viewpoints, however the Visual Impact Rating concluded that out of the 15 viewpoints seven (7) will have 'low' visual impacts and eight (8) will have 'moderate' visual impacts. In terms of visual sensitivity, seven (7) viewpoints will have high sensitivity rating due to the number of viewers associated with the population of the town. From these viewpoints it is likely that the solar farm will be visible, however at a distance of over 2.5 km from most viewpoints the solar farm will not be a dominant element in the view. Although determined to be 'moderate' in impact, it is more likely that the impact of the Proposal from these viewpoints will be negligible. No viewpoints were assessed to have a high impact, therefore; no further assessment from a residence was necessary. Potential for glare and reflectance to affect road safety are considered to be very low given the distance between the solar farm and the road/dwelling, sun angles throughout the year and corresponding tilt (typically not more than 60 degrees) of the solar panels compared to road/dwelling, low reflectivity of the proposed solar panels which are designed to absorb 82% to 93% of the sun's energy and directly convert it to electricity thus effectively reducing reflectivity and glare and reflectance within the general landscape generally being considered low.

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			Therefore, glare and reflection impacts to drivers on the road between Mendooran and Dunedoo and to the Corumbene farming aggregation are highly unlikely. **Location** The initial siting of a Solar Farm is based on a number of factors including solar resource, proximity to existing transmission infrastructure, connection requirement into the Dunedoo Zone Substation, relatively flat terrain, potential for securing landowner arrangements, relatively low impacts and other approved solar farms/renewable projects in the area. Following initial siting options, the Proponent has considered Federal and State policies and frameworks, international agreements, undertaken environmental assessments, run workshops and modified the design iteratively in response to all of these activities. The result is a feasible solar farm that has considered all relevant aspects and the environmental constraints of the area. It is important to note that the initial design included land south of All Weather Road, within the basin immediately adjacent to the Talbragar River. Design iterations were undertaken that resulted in a reduction of approximately 60% of the original footprint which now sits wholly north of All Weather Road. The Proponent finds that such iterations improved the outcome of the Proposal as it avoids and reduces environmental impacts to biodiversity, soil, BSAL, water, visual and noise, while providing the Proposal's benefits. **Loss of Agricultural Land**

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			Response has been provided above to the submission from Ian Nott, which is replicated below. The Proponent has taken in consideration the *Large-Scale Solar Energy Guidelines for State Significant Developments 2018* (the Guidelines) in the preparation of this Proposal and its EIS, including the avoidance, where possible. The Proponent has undertaken a number of steps to reduce impact on BSAL as far as possible. **BSAL soil test** BSAL and Critical Industry Cluster Maps have replaced agricultural land classification maps so reference to prime agricultural land has been replaced with BSAL in this response. As described in the EIS, approximately 90% of the Proposal is proposed on BSAL according to NSW government BSAL maps, as shown in Appendix A. As part of efforts to minimise impact on BSAL, detailed soil investigations were undertaken at site to verify BSAL mapping. This site specific testing found that only 30% of the Development Site reached the requirements of BSAL as shown in Appendix B, significantly reducing the impact of the development on BSAL. **Site design and iteration to avoid and minimise BSAL impacts** In addition, significant site optimisation and design was performed to further reduce BSAL impacts while still resulting in an economically viable project. Some design steps that were used to avoid and minimise BSAL impacts are outlined below:

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
			1. Attempts were made to involve land owners to the north of the current Proposal (as noted by Altomonte (Nominees) Pty Ltd in their submission) which would have shifted the Development Footprint outside of the BSAL mapped area shown in Appendix A. 2. The original Proposal, as shown in Appendix B, included land south of All Weather Road. This land is generally considered higher quality in soil testing than north of All Weather Road and was avoided in the final Development Footprint as far as possible so as to avoid BSAL impacts as far as reasonable. **Potential agricultural use during operations and reinstatement after decommissioning** It is important to note that the development of a solar farm does not exclude the potential use of the land for agricultural activities, due largely to the minimal earthwork required to construct and operate a solar farm. More specifically, disturbance usually occurs in the top 2 metres of soil. This excavation is very localised and restricted to the area of the mounting frames that supports the solar panels and other ancillary infrastructure. The land below the solar panel's may be usable for some agricultural activities during operations. Once the facility is decommissioned, the land can be restored to its original use and land classification.

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
Comments	Australian Pipeline Trust (APA)	APA provided recommendations to be included in the conditions of consent. These include: 1. No Improvements within Easement 2. Risk Assessment Required 3. Electrical Interference Studies 4. Design to Comply with Australian Standards 5. High Voltage Powerlines 6. Construction Management Plan 7. Easement Delineation on Plans 8. Pipeline Operator Access	The Proponent supports the recommendations provided by the APA and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the Proposal is approved.

Position	Submission ID.	Detail of issue	Proponent Response
ORGANISATIONS			
	Wellington Valley Wiradjuri Aboriginal Corporation	Although supportive of the Proposal, the Wellington Valley Wiradjuri Aboriginal Corporation brought up some concerns that there was no mention of the wetland and that Black Swans previously nested there. The submission indicated that these swans previously were a cultural resource for Wiradjuri people.	The Proponent notes that the cultural heritage of the wetlands were not mentioned in the Aboriginal Cultural Heritage Assessment (ACHA) report, nor did the WVWAC mention this matter in their response to the draft ACHA report during consultation. The location of the wetlands and associated significance of the wetlands as a Black Swan nesting site would be included in the Aboriginal Cultural Heritage Management Plan prepared for the construction of the project. The significance of this site and the potential for any mitigation measures to be included in the management plan would be discussed with the WVWAC during the development of the plan. The Proponent consulted with the local Dunedoo Coolah Landcare Group, and they have offered to be part of a community-working group to develop a management plan with WVWAC.

4.2. PROPONENTS RESPONSE TO AGENCY SUBMISSIONS

This section considers all issues raised in the public authority submissions. For each submission, the issues are summarised in the left-hand columns and the Proponent's response is provided in the right-hand column of Table 4-2.

Table 4-2 Public authority submissions and Proponent's response

Issue	Detail of issue	Proponent Response
WARRUMBUNGLE SHIRE COUNCIL		
Suggests conditions for a consent and Proposed Subdivision	• WSC believes the Proposal fails to meet the Rural Subdivision Principles and will lead to an increase in the fragmentation of agricultural land and land use conflicts. • WSC believes the creation of a 23.472 ha allotment containing a dwelling and 4 additional lots all significantly under the minimum lot size of 600ha are contrary to the objectives of the minimum subdivision lot size requirements (EP&A Act, s4.15(1)(a)(0) Warrumbungle LEP, clause 4.1 Minimum subdivision lot size and clause 4.2(4) Rural subdivision). • WSC is concerned that the Proposal will cause conflict between land uses within the zone as the proposal is contrary to the objective of the RU1 Primary Production zone • WSC is concerned that the Proposal will likely result in social and economic impacts due to the fragmentation of rural	**Subdivision** The Proponent has maintained ongoing engagement with WSC in order to clarify the subdivision requirements, its outcome and benefits. The Proponent does not believe that the proposed subdivision poses a risk of social and economic impacts nor that the Proposal will result in the fragmentation of rural lands. It is important to note that the existing lots, as currently allotted are below the minimum lot size, and with the proposed subdivision, the average lot sizes would increase, however still under the minimum lot size. In other words, the proposed subdivision would result in bigger lots on average than currently exists and therefore provides an improvement to the existing situation. Notwithstanding, the Proponent is still looking into this matter and will retain the current subdivision proposal as detailed in the EIS and summarised below. <u>Lot A and Lot B</u> The Proponent will subdivide Lot 140 DP754309 and Lot 1 DP854326 into eastern and western portions. The western portions, (Lot A) will be retained by the landowner to maintain their existing use. Eastern portions Lot 140 DP754309 and Lot 1 DP854326 will be amalgamated with Lot 137 DP754309 and Lot 1 DP1260716 (Lot B) and are to be purchased by the Proponent for the purpose of the Proposal. As mentioned in Section 4.2 of the EIS, Lot A would allow continuation of existing practices as it remains owned by the existing landowner, including the existing dwelling. The amalgamation

Issue	Detail of issue	Proponent Response
	lands which could become an unserviced area with no agricultural or community facility values (EP&A Act, 54.15(1)(b).	to create Lot B also retains agricultural capability with the potential for grazing sheep between the rows of the panels during operations and commitment to return existing land use to the land after the facility is decommissioned. Therefore, it is considered that the subdivision allows a maintenance of agricultural practices. Any reduction in agricultural output from the region would be expected to be negligible in light of the overall regional capability. <u>Lot 80 (Lot C in the EIS)</u> The recently updated *Conveyancing Act 1919* guidelines now allows for leases of a partial lot for the purpose of electricity generation facilities. The Proponent has adopted this approach as the preferred way forward. The Proponent will, however, retain flexibility to carry out the subdivision of Lot C if the guidelines change since the lease required for the Proposal of Lot 80 DP754389 is longer than 5 years. <u>Lot 80 (Lot D in the EIS)</u> Current communication from Essential Energy indicates that subdivision of Lot D will not be required for the substation and the substation area would for part of the solar farm leased area. However, the Proponent will retain flexibility to perform the subdivision of Lot D to allow for freehold ownership of the substation by Essential Energy if required. and as required under section 7A of the *Conveyancing Act 1919* since the lease required for the Proposal of Lot 80 DP754389 is longer than 5 years. The Proponent has signed a lease or purchase Option Deed with the owners for the lots proposed to be subdivided and consolidated for the Proposal. A copy of the written consent for the Proposal from the landowners has been provided to DPIE. In accordance with section 89E(3) of the EP&A Act, development consent may be granted to the subdivision as part of this SSD application despite the proposed lot size being under the Warrumbungle LEP minimum lot size. This is addressed in further detail in Section 5.2.1 of this EIS.

		Lot Size Consolidation as described above would result in larger average size lots that the current lot configuration. Specifically, the existing four (4) lots have approximate areas of 40, 29, 16 and 2.4 ha and the proposed subdivision/consolidation would result in two (2) lots with approximate areas of 64.4 and 23 ha. **Fragmentation** The consolidation reduces potential fragmentation and alienation of land, allowing continued agricultural practices by the landowner during and after the operation of the Proposal. The proposed subdivision would not have a negative impact on surrounding land uses, would not be incompatible with a preferred land use, and would facilitate the management of an approved land use on the Development Site. The proposed subdivision and consolidation plan is also consistent with WSC strategic objectives such as economic development. **Land Capability** It is important to note that the inherent capability of the land in the region would not be affected as the Proposal would not significantly impact the agricultural operations of neighbouring landholders given the relatively low impacts associated with the Proposal, as explained in Section 7 of the EIS. The current use of the land as RU1, would still be possible achievable under the proposed solar farm use and after decommissioning. **Potential agricultural use during operations and reinstatement after decommissioning** It is important to note that the development of a solar farm does not exclude the potential use of the land for agricultural activities, due largely to the minimal earthwork required to construct and operate a solar farm. The area around the solar panel's may be usable for some agricultural activities during operations and once the facility is decommissioned, land use can be restored to the use immediately prior to construction commencing.

Issue	Detail of issue	Proponent Response
NSW ENVIRONMENTAL PROTECTION AUTHORITY (EPA)		
Clarity on who the applicant is.	• Some documentation specifies the applicant is ib vogt GmbH, while others including the EIS, lists Sun Spot 4 Pty Ltd	Sun Spot 4 Pty Ltd is a registered subsidiary of ib vogt GmbH, created for Dunedoo Solar Farm. Ib vogt GmbH is the parent company based in Germany. The Proponent for this project is ib vogt GmbH.
Consult WSC in relation to environmental pollution	• Consultation with Warrumbungle Shire Council should be conducted in relation to any environmental pollution matters associated with the Proposal.	The Proponent has maintained regular communication with WSC in relation to this Proposal, and has considered WSC's advice in the preparation of the EIS. The proponent will continue to engage with WSC in any future pollution matter if it arises, in accordance with the *Protection of the Environmental Operations Act 1997,* as WSC is the appropriate regulatory authority on this matter.
WATER NSW		
Protection of and access to bores required	• Water NSW owns a telemetered monitoring bore (GW096124) on a road along the southern boundary of the development site • Water NSW should not have any restrictions to the site when wanting to take reference measurements or conduct instrument servicing • Bore itself must be protected • Monitoring sites GW096126 and GW096123 also fall within the 1500m	The closest groundwater bore to the development footprint is GW096124. This bore is south of All Weather Road, as shown in figure 9-11 of the EIS. This and all other bores are outside the development footprint and will not be affected by the Proposal. In addition, the Proponent will not restrict access to the groundwater bores identified in the EIS.

Issue	Detail of issue	Proponent Response
	buffer zone. Water NSW requires these not be impacted	
DEPARTMENT OF PRIMARY INDUSTRIES – FISHERIES		
In support of the Proposal	• No further comments made	**Noted**
BIODIVERSITY AND CONSERVATION DIVISION		

BAM requirements not met	• Several requirements of the BAM not met at time of lodgement
	  ○ Requirement that the Proponent provide digital shape files for all maps, spatial data and plot field data
	  ○ Requirement that the credit calculator be submitted
	• These were not submitted at time of lodgement
		The Proponent notes that as requested by the Biodiversity and Conservation Division, the shapefiles, field data sheets and access to the calculator were provided on 19 and 20 October 2020.
		This is also noted by BCS in their submission for the Proposal.
		The Proponent believes there are no additional matters to address on this submission.

DEPARTMENT OF REGIONAL NSW – MINING, EXPLORATION AND GEOSCIENCE (MEG)		
Resource Sterilisation	• After a review of the EIS, MEG has no issues regarding resource or mineral sterilisation	**Noted**

Issue	Detail of issue	Proponent Response
CROWN LANDS		
	• Facilitation pathway for the solar farm easement is by acquisition which should be served to WSC, as the appointed Crown land manager and Crown Lands as the Administrators of the Talbragar River • If there is no construction in the bed or bank of the river then no interim licence will be required	The Proponent will continue to engage with WSC which is the crown land manager and with Essential Energy in relation to the acquisition of the easement. Also, the Proponent confirms that there will not be any construction or works undertaken in the bed or bank of the river.
DEPARTMENT OF PRIMARY INDUSTRIES – AGRICULTURE		
Use of agricultural land (1st Class, BSAL)	• As per the Large Scale Solar Guidelines government's position is that solar developments should be located to avoid high quality agricultural land where possible. As such DPI requests information as to why the development footprint has not avoided that BSAL in this instance.	The Proponent has taken in consideration the *Large-Scale Solar Energy Guidelines for State Significant Developments 2018* (the Guidelines) in the preparation of this Proposal and its EIS, including the avoidance, where possible. The Proponent has undertaken a number of steps to reduce impact on BSAL as far as possible. **BSAL soil test** BSAL and Critical Industry Cluster Maps have replaced agricultural land classification maps so reference to prime agricultural land has been replaced with BSAL in this response. As described in the EIS, approximately 90% of the Proposal is proposed on BSAL according to NSW government BSAL maps, as shown in Appendix A. As part of efforts to minimise impact on BSAL, detailed soil investigations were undertaken at site to verify BSAL mapping. This site specific testing found that only 30% of the Development Site reached the requirements of BSAL as shown in Appendix B, significantly reducing the impact of the development on BSAL. **Site design and iteration to avoid and minimise BSAL impacts**

Issue	Detail of issue	Proponent Response
		In addition, significant site optimisation and design was performed to further reduce BSAL impacts while still resulting in an economically viable project. Some design steps that were used to avoid and minimise BSAL impacts are outlined below: 1. Attempts were made to involve land owners to the north of the current Proposal (as noted by Altomonte (Nominees) Pty Ltd in their submission) which would have shifted the Development Footprint outside of the BSAL mapped area shown in Appendix A. 2. The original Proposal, as shown in Appendix B, included land south of All Weather Road. This land is generally considered higher quality in soil testing than north of All Weather Road and was avoided in the final Development Footprint as far as possible so as to avoid BSAL impacts as far as reasonable. **Potential agricultural use during operations and reinstatement after decommissioning** It is important to note that the development of a solar farm does not exclude the potential use of the land for agricultural activities, due largely to the minimal earthwork required to construct and operate a solar farm. More specifically, disturbance usually occurs in the top 2 metres of soil. This excavation is very localised and restricted to the area of the mounting frames that supports the solar panels and other ancillary infrastructure. The land below the solar panel's may be usable for some agricultural activities during operations. Once the facility is decommissioned, the land can be restored to its original use and land classification.
Further detail on cropping and grazing	• Request information regarding the areas of the development utilised for irrigated cropping, dryland cropping and grazing is present on the development site	The 2020 eSPADE's land use map, as shown in Appendix C, indicates that the Development Footprint is currently used for cropping. It is also noted that section 12 of the EIS states that the Subject Land is currently used for irrigated cropping and grazing. However, based on eSPADE and discussions with the landowners, irrigation for cropping has not recently been used on the Development Footprint and instead dryland cropping is employed. The landowner has also

Issue	Detail of issue	Proponent Response
	• Request further details on options to avoid the irrigated cropping land that have been considered	confirmed that the dryland cropping is used to grow feed for grazing and this dryland cropping/grazing approach is the dominant current land use in the Development Footprint. It is important to note that land south of All Weather Road, which has had some irrigation in the past, will only be impacted by the powerline connection to the Dunedoo Zone Substation and therefore will maintain its existing land use. More generally, impact from the facility has been minimised as far as possible within the constraints of the site. Also, no water rights would be sterilised if the Proposal becomes operational, some agriculture may be possible between the solar panels during operations and after decommissioning takes place, the land would be returned to its agricultural use immediately prior to construction commencing.
Weed management, erosion and sedimentation	• Request for a pasture management regime to be implemented to ensure soil is protected from erosion and degradation • Recommends that the weed management plan is linked to a groundcover management plan in consultation with the Central West Local Land Services and the adjacent landholders	The Proponent committed in the EIS to the preparation of a Construction Environmental Management Plan (CEMP) to manage runoff, soil erosion and sedimentation and pollution risks at the site (Table 9-3 of the EIS). The CEMP would be prepared in accordance with the 'Blue Book' Volume 1 Managing Urban Stormwater: Soils and Construction (Landcom 2004), Volume 2A Installation of Services (DECC 2008a) and Volume 2C Unsealed Roads (DECC 2008b). The Proponent supports the recommendations provided by the various agencies and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the Proposal is approved.
Decommissioning	• Recommends that the decommissioning environmental management plan include an outline of how pre-construction land use and land quality can be achieved. Including current productivity measures over a number of seasons and yields on identical soil landscapes	The Proponent committed in the EIS to the preparation of a Decommissioning Environmental Management Plan (DEMP), submitted to DPIE for approval prior to decommissioning (Table 9-10 of the EIS). The DEMP would include a Site Rehabilitation Plan covering: • Criteria and indicators for the restoration of land capability and agricultural potential based on pre-works soil survey results

Issue	Detail of issue	Proponent Response
	• Recommends that all below ground infrastructure be removed to allow unrestricted use of the land post solar farm use.	• Details of rehabilitation actions such as removal of infrastructure, remediation of soils, reinstatement of dams and irrigation/drainage channels as required and establishment of suitable groundcover vegetation on bare areas • A monitoring and assessment process to demonstrate that the target state has been achieved • An expected timeline for the rehabilitation program The Proponent supports the recommendations provided by the various agencies and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the proposal is approved.
FIRE RESCUE NSW		

Emergency Response Plan (ERP) be required	• Requested that an ERP be developed for the site and that it specifically addresses
	  ○ Foreseeable on-site and off-site fire events and other emergency incidents
	  ○ Risk control measures to mitigate risks to firefighters and first responders (PPE, evacuation zones)
	  ○ Other risk control measures
	• Two copies of the ERP be stored in a prominent 'Emergency Information Cabinet' located in a position directly adjacent to the site's main entry
	• Prior to operation the Proponent to contact the relevant local emergency management committee to develop inter agency local emergency procedures
		The Proponent has committed in the EIS to the preparation of an ERP which includes the recommendations made by FRNSW (Table 8-23 of the EIS).
		
		The Proponent supports the recommendations provided by the various agencies and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the Proposal is approved.

Issue	Detail of issue	Proponent Response
Fire Safety Study for batteries	• As a Condition of Consent, a Fire Safety Study be prepared for the Battery Energy Storage part of the site and submitted to FRNSW for review	The Proponent has committed in the EIS to the preparation of an ERP (Table 8-23 of the EIS). The Proponent has also committed to the management of associated fire risks for batteries in Table 9-51 of the EIS, and for the implementation of a Bush Fire Management Plan consultation with the local NSW RFS District Fire Control Centre. The Proponent supports the recommendations provided by the various agencies and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the Proposal is approved.
TRANSPORT FOR NSW		
Castlereagh Hwy and All Weather Road junction use	• Requires Basic Left turn and a Basic Right turn treatment in accordance with Figure A 10 of Austroads Guide to Road Design Part(s) 4 & 4A at the intersection of All Weather Road and Castlereagh Highway • Access via this intersection prior to the intersection upgrade is not suitable to TfNSW • TfNSW cannot concur, according to s138(2) of the Roads Act 1993, to the use by vehicles required to access the site via the intersection of Castlereagh Highway and All Weather Road • Alternatively suggests additional works required on the Digilah East Road Golden Highway intersection to then be	As discussed in Section 3.3.1, further consultation has been undertaken with TfNSW. as summarised in the list below and in more detail in Appendix F. The list below summarises the Stantec memo (dated 11/2/2021) which captures the agreed solution from the meeting dated 28/1/2021 between TfNSW, WSC, Stantec and the Proponent. • Requirements of the Austroads Guide to Road Design on minimum Approach Sight Distance (ASD), Safe Intersection Sight Distance (SISD), and Minimum Gap Sight Distance (MGSD) are exceeded at the Castlereagh Highway and All Weather Road intersection. (Section A of Appendix F) • Junction treatment requirement according to the Austroads Guide to Road Design at the intersection is a basic left turn treatment (BAL) when applying Left Turns Only Access. Furthermore, based on the site specific details (including the Left Turn Only Access), there is no requirements (such as a slip in or out) in addition to the BAL. (Section B of Appendix F) • Based on Austroads Guide to Road Design Part 4A, a median on Castlereagh Highway or All Weather Road would be substandard and therefore not recommended. (Section C of Appendix F)

Issue	Detail of issue	Proponent Response
	utilised by heavy vehicles as the only access option remaining • TfNSW seeks following conditions be met before the Digilah East Road and Golden Highway intersection can be utilised ○ Structural assessment of the Digilah East Road pavement including Golden Highway and intersection with All Weather Road ○ The assessment would need to assume road pavement is to be constructed to a suitable capacity to enable the safe passage of all loads required to access the site through construction and operation ○ Structural assessment of the bridge located along Digilah East Road ○ Intersection of Digilah East Road and Castlereagh Highway is to be upgraded to cater for increase in traffic. A revised traffic impact assessment is to be developed ○ The intersection is to be designed in accordance with Austroads Guide to Road Design and relevant TfNSW supplements. An application with a concept design is to be referred to TfNSW ○ Intersection should be designed to include Safe Intersection Sight	• TfNSW generally supports the AUL(S) proposed at the intersection as a significant safety upgrade, including the concept design presented using a 26 m B-Double. TfNSW will provide further comments subsequent to their final review, normally undertaken during detailed design, of the design against Austroads Guidelines. The Proponent supports the inclusion of a condition of consent requiring the AUL(S) upgrade at the Castlereagh Highway and All Weather Road intersection. (Section D of Appendix F) • TfNSW and WSC accepted the proposed construction route options for heavy vehicle entering and exiting site during construction. The Proponent supports the recommendation for a condition of consent for heavy vehicle routes, including the inclusions and requirements of figures 4, 5, 6 and 7 of the memo and a prohibition of right turns at the intersection. (Section E of Appendix F) • TfNSW agrees with the inbound and outbound construction access options. This also showed that implementing the Left Turn Only Access adds journey time from the major supply centres considered. This is, however, considered a reasonable trade off to allow for safer operation at the All Weather Road and Castlereagh Highway intersection. (Section F of Appendix F) • As stated in the EIS, the volume of light vehicles/shuttle buses requiring to turn right into All Weather Road during Talbragar River flood events is expected to be minor and the risk to other road users is expected to be minimal given the small number of vehicle movement each day. During periods when Digilah Road is flooded, it is proposed that light vehicles and shuttle buses would be able to turn right at the intersection of All Weather Road and Castlereagh Highway. (Section G of Appendix F) • TfNSW does not support the provision of ‘no right turn’ signs at the intersection. Notwithstanding, TfNSW supports that signage form part of the preparation of the Construction Transport Management Plan (CTMP), in consultation with TfNSW and WSC to ensure that it appropriately addresses transport and traffic risks. The Proponents supports this approach and for this recommendation to be included as a condition of consent. (Section H of Appendix F)

Issue	Detail of issue	Proponent Response
	Distance (Part 4A Austroads Guide to Road Design) ○ A Road Occupancy Licence is required ○ Use of local roads by heavy vehicles will require consent from Warrumbungle Shire Council ○ Any oversize/overmass vehicles will require a special permit via the National heavy Vehicle Regulator ○ Prior to commencement the applicant is to submit a Construction Traffic Management Plan including a Traffic Management Plan, prepared in consultation with TfNSW and Warrumbungle Shire Council ○ Traffic Management Plan and Driver Code of Conduct is to outline issues associated with all stages of development (construction, operation, maintenance, decommissioning)	• The largest heavy vehicle that will be used during the construction of the proposal, will be reduced from a 30 m A-Double to a 26 m B-Double. This responds to RAVMAP requirements. Swept paths at the intersection have been updated to reflect the new requirements and demonstrate the smaller design vehicle can safely negotiate the concept AUL(S).(Section D and Attachment C of Appendix F) Note: Traffic volume calculations considered a more conservative heavy vehicle than the current 26 m B-Double. Therefore, traffic volume impacts considered in the impact assessment are worst case and no update to the traffic volumes is required.
DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT, WATER AND THE NATURAL RESOURCES ACCESS REGULATOR		
Recommendations for Pre-Approval	• Pre-approval clarification on the ability to obtain the necessary water volumes from the site or confirm a viable supply is	**Water provision** The Proponent has decided to remove the opening of a new bores can commit to using authorised water sources. The Proponent would utilise the existing licensed water supply as

Issue	Detail of issue	Proponent Response
	available via an agreement from a water supplier • Where the water is to be sourced from a currently unauthorised source, an impact assessment and confirmation that the necessary entitlement can be obtained will be required • Proponent should conduct an impact assessment on the proposed bore and note the close presence of nearby bores and the responsibilities in the event of the release of contaminants	available when construction occurs and during operation. There are a number of licensed water sources in the region and, given the relatively small volume and short duration of water needs, it is expected that water can be sourced from these existing sources. Transport of water to site from within the region is included in the volumes assessed in the traffic and transport impact assessment and so potential impacts on the road network are already included in the EIS. At this stage, the Proponent will commence engagement with relevant providers for the necessary water quantities once a detailed design has been completed and construction has been scheduled. **Impact assessment** The Proponent will not create a new bore and therefore will not be required to undertake an impact assessment. The Proponent is fully aware of the responsibilities should the Proposal result in events of contaminant spills. Tables 9-3 and 9-14 of the EIS detail the relevant mitigation measures.
Recommendations for Post Approval	• Proponent should obtain relevant approvals and licences under the *Water Management Act 2000* before commencing any works with any intercepted or extraction of groundwater or surface water • If groundwater is to be intercepted at any stage the Proponent must obtain the relevant entitlement and approval where required prior to any extraction or interception. • Proponent should prepare a Construction and Operational Environmental	**New bore and groundwater interception** The Proponent has decided to remove the opening of a new bore and surface water extraction from the proposal and will utilise existing licensed water supply within the region. The Proposal is not scheduled to intercept any groundwater sources on the basis of not opening a new bore. **CEMP** The Proponent has committed to the preparation of a Construction Environmental Management Plan (CEMP) to manage runoff, soil erosion and sedimentation and pollution risks at the site. The CEMP would be prepared in accordance with the 'Blue Book' Volume 1 Managing Urban Stormwater: Soils and Construction (Landcom 2004), Volume 2A Installation of Services (DECC 2008a) and Volume 2C Unsealed Roads (DECC 2008b). **Buffers around Talbragar River**

Issue	Detail of issue	Proponent Response
	Management Plan including erosion and sediment control plans prior to commencement • Further information is required to understand how buffers are to be implemented to the Talbragar River and what the design and permanency of the track across the river is to be.	The Proponent notes that there is a potential miscommunication in relation to the buffers and tracks for the transmission line upgrade. The Proposal will utilise the existing transmission lines access tracks to undertake the transmission line works where possible. No access tracks are proposed on or across the Talbragar River and no works are proposed in the river or on river bank. In addition, the proposed internal access tracks will only occur within the solar array area, which sits wholly north of All Weather Road and therefore well north of the Talbragar River. Works within waterfront land will be undertaken in accordance with the Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).
Requirement to undertake a Preliminary Hazard Assessment (PHA)	The PHA must be undertaken in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' (HIPAP 6)* and Multi-Level Risk Assessment (MLRA), and must: • consider the comments that Fire and Rescue NSW (FRNSW) have provided regarding the EIS; • address the related risk of the battery storage facility; • address the related risk of the high pressure dangerous goods pipeline located within the • consider the development site, including an assessment of whether the development can be designed, and operated safely with the existing pipeline.	The Proponent has undertaken the PHA in accordance with the required advisory paper and considerations. The PHA concluded that: there is no potential for offsite fatality or injury identified and therefore the project meets the land use planning criteria; and that: • the risk profile for the project is considered to be tolerable if So Far As Reasonably Practicable (SFARP). • the majority of the medium risk events relate to fire events. • the exposure to fire events will primarily be to the project's construction and operations workforce. • offsite impacts will be minimal. Further information can be found in the PHA, appended to this report in Appendix D.

Issue	Detail of issue	Proponent Response
HERITAGE NSW		
Engage with the RAPs on the way in which the RAPs wish all salvaged Aboriginal objects to be buried on-site.	• The management of the salvaged objects can be further explored and facilitated in a manner suitable to the RAPs through the development of the Cultural Heritage Management Plan, post project approval.	The Proponent supports this recommendation. This measure would be included in the Aboriginal Cultural Heritage Management Plan already committed to in the EIS.
RURAL FIRE SERVICE		
The NSW RFS recommends the following conditions be included in any approvals granted:	• A Fire Management Plan (FMP) shall be prepared in consultation with NSW RFS Castlereagh Fire Control Centre. The FMP shall include: ○ 24 hour emergency contact details including alternative telephone contact; ○ Site infrastructure plan; ○ Fire fighting water supply plan; ○ Site access and internal road plan; ○ Construction of Asset Protection Zones (APZ) and their continued maintenance; ○ Location of hazards (Physical, Chemical and Electrical) that will impact on fire fighting operations and procedures to manage identified hazards during fire fighting operations;	The Proponent has committed in the EIS to the preparation of a Bush Fire Management Plan (BFMP) in consultation with the local NSW RFS District Fire Control Centre. This was an outcome resulting from the early consultation with the NSW RFS which is captured in Table 6-1 and Section 9.8 of the EIS. The NSW RFS District Fire Control Centre for the area is the Castlereagh office, which covers Gilgandra and Warrumbungle LGAs. The BFMP will form part of the Emergency Response Plan and will include a Fire Response Plan as stated in the mitigation measures specifically in Section 9.8.3 and Table 9-51 of the EIS. The Proponent has also committed to the management of associated fire risks in accordance with Appendix 4 of Planning for Bush Fire Protection 2019 (the PBP) in section 9.8.1 of the EIS. Provision of a water tank of up to 20,000 litres, identification of APZ, location of physical, chemical and electrical hazards, and allowing emergency service personnel to undertake property protection activities with the 10 metre trafficable defendable space (APZ) to permit unobstructed vehicle access around the perimeter of each of the solar arrays and associated infrastructure are committed to in Table 9-51 of the EIS.

Issue	Detail of issue	Proponent Response
	○ Such additional matters as required by the NSW RFS District Office (FMP review and updates). • The entire solar array development footprint to be managed as an Asset Protection Zone as outlined within Appendix 4 of 'Planning for Bush Fire Protection 2019' and the NSW Rural Fire Service's document 'Standards for Asset Protection Zones'. • A 20,000 litre water supply (tank) fitted with a 65mm storz fitting shall be located adjoining the internal property access road within the required APZ. • To allow for emergency service personnel to undertake property protection activities, a 10 metre trafficable defendable space (APZ) that permits unobstructed vehicle access is to be provided around the perimeter of each of the solar array development sites including associated infrastructure.	The Proponent supports the recommendations provided by the various agencies and will engage with the DPIE to include or reference additional requirements through the appropriate mechanisms in the conditions of consent if the Proposal is approved.
ESSENTIAL ENERGY		
Lodging Preliminary enquiry	EE provided details on lodging a Preliminary Enquiry through their online portal	**Noted**

5. ENVIRONMENTAL MANAGEMENT CHANGES

In response to community and agency submissions and as a result of more intensive investigations traffic and transport, as well as safety and fire risk, a number of changes to the safeguards and mitigation measures detailed in the EIS are now proposed. Table 5-1 to Table 5-5 provide the relevant safeguards and mitigation measures with those amended highlighted in grey. New text is shown underlined and removed text shown with ~~strikethrough~~. Table 5-1 provides the full list of safeguards and mitigation measures as amended in relation to water use and water quality as a result of removing use of or creation of bore water on site. Table 5-5 shows the updated list of safeguards and mitigation measures for Aboriginal Heritage.

*PC = Pre-Construction C = Construction Phase, O = Operational Phase and D = Decommission Phase

Table 5-1 Revised safeguards and mitigation measures for Water Use and Water Quality

No.	WATER USE AND WATER QUALITY	PC	C	O	D
1	The Spill and Contamination Response Plan prepared as part of the Emergency Response Plan will include measures to: • Respond to the discovery of existing contaminants at the site (e.g. Pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements • Manage the storage of any potential contaminants on-site • Mitigate the effects of soil and water contamination by fuels or other chemicals (including emergency response and EPA notification procedures) • Ensure that machinery and materials arrive on site in a clean and secure condition • Prevent contaminants affecting adjacent pastures, irrigation channels, dams and native vegetation • Monitor and maintain spill equipment including spill kits in relevant machinery • Induct and train site staff. • Detail fuels, chemicals, and liquids storage locations that are at least 50 metres from any waterways or drainage lines, in an appropriate bunded area • Disposal process for contaminated materials.		X	X	X
2	If the substation is oil-cooled, the layout, design, size etc of the oil containment bunding and drainage would comply with the relevant standards and guidelines. The bund would be regularly inspected and cleaned, including removal of rainwater.	X	X	X	
3	A Soil and Water Management Plan will be developed to incorporate the following: • That no detergents or other chemicals would be added to the solar panel cleaning water • Specify concrete washout process and location • Specify the procedures for testing, treatment and discharge of construction wastewater		X	X	

No.	WATER USE AND WATER QUALITY	PC	C	O	D
	• Detail staff training required				
4	~~If ground water is to be used, A Groundwater Management Plan would be incorporated into the CEMP to manage impacts on groundwater. This would be informed by onsite survey by an appropriately trained expert and include:~~ ~~• Pollution controls~~ ~~• Management of dewatering.~~	~~X~~			
5	~~If a new bore is to be constructed, the construction and maintenance of the groundwater extraction bore will be in accordance with the *Minimum Construction Requirements for Water Bores in Australia (3rd edition)* produced by the National Uniform Drillers Licencing Committee (NUDLC). The minimum requirements for consideration include:~~ ~~• Only a licensed driller shall carry out the bore installation works and shall be present at all times during bore construction activities.~~ ~~• The bore design should aim to ensure the protection of the groundwater resource from surface contamination. The headworks and casing are sealed so that there is no potential for flow outside the casing.~~ ~~• To minimise the possibility of contaminating the bore and any surrounding bores, the new bore should be located away from existing bores, surface water sources and any sources of pollution (e.g. dairies, septic tanks and absorption trenches, refuse dumps, landfill, effluent discharges from drainage ditches, cattle/stock dips).~~ ~~• Chemicals and other drilling fluid additives that could leave a residual toxicity should not be added to any drilling fluids or cement slurries (i.e. grouts) used to drill and complete any water bore.~~	~~X~~	~~X~~	~~X~~	~~X~~

Table 5-2 Revised safeguards and mitigation measures for Traffic and Transport

No.	Traffic and Transport Mitigation Measures	PC	C	O	D
1	A Construction Traffic Management Plan (CTMP) would be developed as part of the CEMP and DEMP, in consultation with Warrumbungle Shire Council and TfNSW. The plan would include: • Confirmation of designated routes for construction and haulage traffic • Install 'Trucks Turning' signs, during construction, on the Castlereagh Highway approaches to the Castlereagh Highway and All Weather Road intersection • Evaluation of any additional road or intersection upgrade requirements and associated traffic controls, apart from the AUL(s) agreed in the Stantec Memo, in consultation with Council and TfNSW (and consistent with Austroads guides and TfNSW supplements) • Install a VMS board, during construction, along the southern approach to the Castlereagh Highway and All Weather Road intersection, approx. 1.0km distance, which informs drivers of 'No Right Turn for Construction Vehicles at All Weather Road' • Scheduling of deliveries • Carpooling/shuttle bus arrangements changes required from Milling Park to site to minimise staff vehicle movements in the event of flooding • Consultation and notification arrangements regarding traffic impacts for nearby residents and local road users, particularly when traffic delays are expected • Arrangements and locations for traffic controls (speed limits, signage, stop/go) • Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts • Provision of a contact phone number for stakeholders and the public to obtain information and to enable rapid response to any issues or concerns • Assessment of road condition prior to construction on all local roads that would be utilised (All Weather Road and relevant section of Digilah Road),a road condition monitoring program, and process for rectifying road conditions should deterioration in road quality be attributable to the proposal. • Details of the traffic management measures to be implemented at the Castlereagh Highway and All Weather Road intersection for heavy vehicles during construction are to be included in the Construction Traffic Management Plan developed prior to construction commencing in consultation with TfNSW and WSC. Traffic Control Plans will also be included in the Construction Traffic Management Plan. • Address the temporary increase in traffic across the low-level bridge crossing on Digilah Road to the north of Golden Highway • Reduce predicted impact (where possible) from transport during peak tourism periods (such as during local festivals), and morning and evening commuting or school bus operating periods • Link with the requirements of the Flood Response Plan	X	X		X

No.	Traffic and Transport Mitigation Measures	PC	C	O	D
2	Invite TfNSW education staff to provide information, guidance and discussion on fatigue management and road safety to site staff.	X	X		X
3	Consultation with stakeholders including TfNSW, Warrumbungle Shire Council, local landholders and emergency services would continue during construction and decommissioning to advise of any changes to road use and conditions.		X		X

Table 5-3 Revised safeguards and mitigation measures for Soils and Landforms

No.	Soils and Landform Mitigation measures	PC	C	O	D
1	The solar array would be designed and installed to allow sufficient space between panels to establish and maintain perennial groundcover (subject to climatic conditions). Groundcover management details (including stocking levels etc) and rehabilitation of civil work completed during construction are to be included in the Construction Environmental Management Plan and Operational Environmental Management Plan.	X	X	X	
2	A Construction Environmental Management Plan (CEMP) would be implemented to manage runoff, soil erosion and sedimentation and pollution risks at the site. The CEMP would be prepared in accordance with the 'Blue Book' Volume 1 Managing Urban Stormwater: Soils and Construction (Landcom 2004), Volume 2A Installation of Services (DECC 2008a) and Volume 2C Unsealed Roads (DECC 2008b).	X	X		
3	Prior to the commencement of any works on the land within 50 metres of the pipeline easement, a construction management plan must be submitted to and approved by APA. The plan must: • Prohibit the use of rippers or horizontal direction drills unless otherwise agreed by APA. • Avoid significant vibration, heavy loadings stored over the pipeline and heavy vehicle / plant crossings of the pipeline within the easement. • Be endorsed by APA where the works are within or crossing the pipeline alignment. All plans for the electrical transmission line to Essential Energy Substation must have the gas pipeline easement clearly identified with hatching on the full width of the easement. The easement must also be clearly labelled as 'high pressure gas pipeline easement – no works to occur without the prior authorisation of the pipeline operator'. The ability of the pipeline operator to access the pipeline easement must be maintained at all times to facilitate prompt maintenance and repairs. APA field officers will undertake any necessary site induction to facilitate unaccompanied access.	X	X	X	X

No.	Soils and Landform Mitigation measures	PC	C	O	D
4	Buildings, structures, roadways, pavement, pipeline, cable, fence, on-site waste treatment (or irrigation area), or any other improvement on or under the land within the gas transmission pipeline easement must not be constructed without prior consent in writing from APA. No structure or vegetation will be permitted on the easement that prohibits maintenance online of sight along the pipeline easement.	X	X	X	X
5	As part of the CEMP, a Soil and Water Management Plan (incorporating a Site Drainage Plan and Erosion and Sediment Control Plan) would be prepared, implemented and monitored during the Proposal to minimise soil and water impacts. These plans would include provisions to: • Install, monitor and maintain erosion controls • Identify and protect sensitive features such as native vegetation, dams and Talbragar River • Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads • Manage topsoil: in all excavation activities, separate subsoils and topsoils to restore natural soil profiles and assist revegetation, guided by the findings of the pre-works soil survey. Topsoils stockpiled for extended periods would be managed to avoid contact with overland runoff, minimise weed risks, and maintain soil organic matter, soil structure and microbial activity • Minimise the area of disturbance from excavation and compaction and rationalise vehicle movements to minimise soil impacts Ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met as far as practicable, ensure excavations are not scheduled when heavy rainfall events are predicted, or soils are saturated.	X	X		
6	The Spill and Contamination Response Plan prepared as part of the Emergency Response Plan would include measures to: • Respond to the discovery of existing contaminants at the site (e.g. Pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements • Manage the storage of any potential contaminants on-site • Mitigate the effects of soil and water contamination by fuels or other chemicals (including emergency response and EPA notification procedures) • Ensure that machinery and materials arrive on site in a clean and secure condition • Prevent contaminants affecting adjacent pastures, irrigation channels, dams and native vegetation • Monitor and maintain spill equipment including spill kits in relevant machinery • Induct and train site staff. • Detail fuels, chemicals, and liquids storage locations that are at least 50 metres from any waterways or drainage lines, in an appropriate bunded area Disposal process for contaminated materials.		X	X	X

No.	Soils and Landform Mitigation measures	PC	C	O	D
7	The site design and, if required the CEMP, OEMP and DEMP and relevant sub-plans should incorporate where possible the management recommendations in the site soil survey report (Soil Management Designs 2018), including: • Maintain protective ground cover in the north-western corner (3%-slope) where possible • Maintain protection with perennial ground cover on Brown Chromosols in the vicinity of Pit 4 • Consider engineering and design solutions for the installation of the piles in all Vertosol areas, which have a high shrink-swell potential in top and sub soils • Apply Gypsum (6t/ha) in areas with Grey and Brown Vertosols, to improve drainage and avoid trafficability issues following heavy rain events. • Apply Gypsum (3t/ha) for the remainder of the area • Apply lime at a rate of 2t/ha to help overcome a slight acidity issue that will be difficult to treat once the solar panels have been installed • Apply fertilizer produce rich in nitrogen and zinc for the Vertosol zone represented by Pit 5 Moderate salinity in the depth interval 60-100 cm was observed at Pits 2 and 3; this may have an impact on susceptibility to corrosion of piles.	X	X	X	X

Table 5-4 Revised safeguards and mitigation measures for Hazards

No.	Hazards Mitigation Measures	PC	C	O	D
1	An Emergency Response Plan, incorporating an Evacuation Plan, Fire Response Plan, Flood Response Plan and Spill and Contamination Response Plan, would be developed prior to construction the solar farm. A copy of the plan would be kept on site.	X	X	X	X
	Hazardous materials and development				
2	Dangerous or hazardous materials would be transported, stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids* and the ADG Code where relevant. All potential pollutants kept on-site would be stored in accordance with relevant HAZMAT requirements and bunded.		X	X	X
3	The transportation of new and waste lithium-ion batteries would comply with the requirements of the Dangerous Goods Code, including specific 'special provisions' and 'packing instructions' applying to the transportation of Li-ion batteries.		X	X	X
	EMF				
4	All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia.	X	X		

No.	Hazards Mitigation Measures	PC	C	O	D
5	All design and engineering would be undertaken by qualified and competent person/s with the support of specialists as required and would aim to minimise EMFs.	X	X		
6	Prior to the development commencing, and to inform the detailed design, the applicant must conduct an electrical hazards studies in accordance with (the requirements of) Australian Standard 4853 – 2012 (for Low Frequency Induction and Earth Potential Rise threats for personnel and pipe corrosion). The applicant must address any relevant requirements and any recommendations and/or actions must be implemented to the satisfaction of APA. All cost associated with the study and implementing its recommendations and/or actions are to be borne by the applicant. The applicant must complete validation testing upon completion of construction.	X			
7	The applicant must conduct electrical interference studies in accordance with the requirements of AS 2832 once detailed design is complete.	X			
8	The applicant must design to comply with the applicable Australian Standard as required and provide copies of the electrical interference studies and electrical hazard studies to APA.	X			
9	The applicant must make good (at the applicant's cost) any hazards or risks to the Central Ranges Pipeline (including cathodic protection systems), caused by any powerlines.	X	X	X	X
	Aviation				
10	The materials and colour of on-site infrastructure would, where practical, be low reflectivity and in keeping with the colouring of the local landscape.	X	X		

Table 5-5 Revised safeguards and mitigation measures for Aboriginal Heritage

No.	Aboriginal Heritage	PC	C	O	D
1	The sites Dunedoo Solar AFT 1 to Dunedoo Solar AFT 14 which are located within the Development Footprint for the Dunedoo Solar Farm must be salvaged via surface collection prior to construction works commencing for the Dunedoo Solar Farm. Until surface collection salvage has occurred at the sites a minimum 5-metre buffer must be observed to ensure no inadvertent impacts occur.	X			
2	The collection and relocation of the surface artefacts within the Dunedoo Solar Farm Subject land should be undertaken by an archaeologist with representatives of the registered Aboriginal parties and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New*	X			

No.	Aboriginal Heritage	PC	C	O	D
	South Wales. The salvage of Aboriginal objects can only occur following development consent that is issued for State Significant Developments and must occur prior to any construction works commencing.				
3	No mitigation is required prior to impacts to the previously recorded site AHIMS# 36-2-0049/ DTG/OC27 - Dunedoo 1. Following development consent that is issued for State Significant Development to allow impacts to the Aboriginal site AHIMS# 36-2-0049 an *Aboriginal Site Impact Recording Form* must be completed to list the site as destroyed.	X			
4	The sites Dunedoo Solar AFT 15 to Dunedoo Solar AFT 23 which are located outside the Dunedoo Solar Farm Subject land must not be impacted. Any future activities that may potentially pose a risk of impacts to these sites by this project would need to be assessed by an archaeologist and additional consultation with the registered Aboriginal parties would be required.	X			
5	An *Aboriginal Site Impact Recording Form* must be completed and submitted to AHIMS following harm for each site collected or destroyed from salvage and/or construction works as approved for impacts in line the development consent for this State Significant Development.	X			
6	For any additional impacts to sites and areas outside the Subject land, as assessed in this report a modification application would need to be submitted to the to the Department of Planning, Industry and Environment (DPIE) for this State Significant Development which includes consideration of impacts on Aboriginal Heritage as determined by an archaeologist, additional Aboriginal consultation and survey may be required.	X			
7	The Proponent should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Dunedoo Solar Farm and for the management of known sites and artefacts within the Subject land. The Plan should include the unexpected finds procedure to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal parties.	X			
8	In the unlikely event that human remains are discovered during the construction of the Dunedoo Solar Farm, all work must cease in the immediate vicinity. The appropriate heritage team within the Department of Planning, Industry and Environment (DPIE) and the local police should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in origin the Registered Aboriginal Parties should be advised of the find as directed by the appropriate heritage team within DPIE.		X		
9	The significance of the Black Swans nesting area and the potential for any mitigation measures to be included in the management plan would be discussed with the WVWAC during the development of the relevant plan.	x	x		x
10	Further archaeological assessment would be required if the proposal activity extends beyond the area assessed in this report. This would include consultation with the registered Aboriginal parties and may include further field survey.	X			

5.1. AMENDMENT REPORT - CHANGES PROPOSED TO THE PROJECT

5.1.1. Key areas of additional investigation

Table 5-6 Key areas of additional investigation and outcomes for the proposal

Additional investigation				Resultant changes to the proposal, based on investigation outcomes
	Study	**Motivation**	**Outcome**	
1	Preliminary Hazards Assessment (PHA)	DPIE's requirement following exhibition of the EIS.	The risk assessment determined that the risk profile for the project is considered to be tolerable if So Far As Reasonably Practicable (SFARP). The majority of the medium risk events relate to fire events. The exposure to fire events will primarily be to the project's construction and operations workforce. Offsite impacts will be minimal. The risk assessment concluded that there is no potential for offsite fatality or injury identified and therefore the project meets the land use planning criteria.	PHA results should be used as inputs into other safety studies required before commencement of construction including: • Emergency Response Plan prepared in accordance with the FRNSW requirements. • Fire Safety Study (FSS) prepared for the BESS and submitted to FRNSW for review and determination. • Fire management plan. FRNSW also require that the operator of the facility contacts the relevant Local Emergency Management Committee (LEMC) once construction has started and prior to operation of the facility. Construction and operation of the Dunedoo Solar Farm 66k transmission network connection will need to be carried out in accordance with APA statutory requirements. The Proponent supports for this recommendation to be included in the conditions of consent.
2	Transport Memo	Submission from TfNSW on requirements further	It has been determined that a BAR is not able to be constructed at the intersection	• The BAL treatment at the intersection has been increased to an AUL(S) for additional safety and has been accepted by TfNSW and

Additional investigation				Resultant changes to the proposal, based on investigation outcomes
	Study	**Motivation**	**Outcome**	
		consultation for safer and more efficient transport and traffic controls for heavy and light vehicles, construction access and further analysis on the proposed intersection upgrades at Castlereagh Highway and All Weather Road.	of the Castlereagh Highway and All Weather Road. In consultation with TfNSW and WSC a left in and out solution for heavy vehicles during construction has been agreed to facilitate safest reasonable use of the site entry point. .	WSC during consultation after submissions were received to the EIS. A concept design of an AUL(S) has been presented to demonstrate simultaneous exit and entry of the largest design vehicle (26m B-Double), including a 42m slip lane for additional safety of other south bound road users. This is considered a significant safety upgrade to reasonably reduce risk at the intersection. • A heavy vehicle construction transport route using Left Turn Only Access has been presented which includes Left Turn Only Access, with right turns into and out of All Weather Road prohibited and safe turn around locations in Mendooran and Dunedoo presented. This has been accepted by TfNSW and WSC during consultation after submissions were received to the EIS. • Preparation, prior to commencement of construction, of a Construction Traffic Management Plan that specifically addresses traffic management to be used during construction (such as transport routes, signage etc.). This has been accepted by TfNSW and WSC during consultation after submissions were received to the EIS. • Passing bay remains part of the proposal.

6. CONCLUSION

6.1. SUBMISSIONS RAISED

This Submissions Report has been prepared by NGH on behalf of the Proponent.

In relation to public, organisation and public authority submissions:

- Three public submissions were received, two of which were in support of the proposal. General comments in support of the proposal included:
  - provide better power infrastructure;
  - help the community; and
  - creation of job opportunities.
- One of the three public submissions received was in opposition of the proposal. The comments received included:
  - objections to the location of the proposal on prime agricultural land (1st Class Land) and the loss of agricultural land
- Three submissions from community groups and organisations were received, two in support of the proposal. General comments included:
  - avoidance of pipelines in the vicinity; and
  - any improvements or alterations to the proposal must be in accordance with current avoidance of pipelines and pipeline access routes.
- One submission received from an organisation was in objection to the proposal. The comments received included:
  - a reduction in the visual amenity of the site;
  - loss of prime agricultural land;
  - concern about threatened species and habitats;
  - concern about the reflection and glare caused by the panels, particularly on drivers along Mendooran Road; and
  - concern over the size and scale of the proposal so close to the township.
- Fourteen submissions from public authorities were received. Key comments, some of which required further assessment and mitigation, included:
  - traffic impacts;
  - road access and upgrades;
  - decommissioning and rehabilitation;
  - adequate access to water bores within a 1500m radius of the site;
  - adequate assessment of biodiversity and ecosystem impacts; and
  - adequate flood prone land management.

10 additional mitigation measures have been added and now form part of the proposal's environmental mitigation and management commitments. These mitigations address Aboriginal heritage, hazards, traffic and transport, and soils and landforms.

Two mitigation measures have been removed in relation to the use of ground water bores and creation of a water bore which are no longer part of the proposal.

Outcomes from the consultation with TfNSW resulted in the requirement for an AUL(S) upgrade at the Castlereagh Highway and All Weather Road. In addition, heavy vehicle construction transport would use a route with Left Turn Only Access with right turns into and out of All Weather Road prohibited, and with passing bays remaining as part of the proposal.

Safe turn around locations in Mendooran and Dunedoo are also included in the agreement and the requirement for the preparation, prior to commencement of construction, of a Construction Traffic Management Plan that specifically addresses traffic management.

6.2. JUSTIFICATION FOR THE PROPOSAL

The benefits of the Dunedoo Solar Farm remain unchanged. The proposed Dunedoo Solar Farm would result in numerous benefits including:

- Supporting Commonwealth and NSW climate change commitments.
- Contributing enough clean renewable energy to provide electricity to about 24,415 average NSW homes and displace approximately 48,236 metric tonnes of carbon dioxide annually.
- Enhancing electricity reliability and security by contributing 144,540 MWh of clean energy to the national grid and supporting the energy transition from coal fired to renewables.
- Direct and indirect employment opportunities during all phases of the proposal, including around 100 direct construction jobs and 160 indirect supply chain jobs during the peak construction phase and around 3 equivalent direct full time jobs and 9 indirect service contractors once the proposal is operational.
- Investment of about $76M in capital expenditure in total.
- Development of a new land use thereby diversifying local land uses within the locality and offering host landholders an alternative income stream.

In consideration of the assessment of the impacts from the proposal contained in the EIS, and the updated assessments contained in this report, it is considered that the proposal still offers a number of significant benefits and can be constructed with minimal impact to the existing environment, subject to the proper implementation of the mitigation measures.

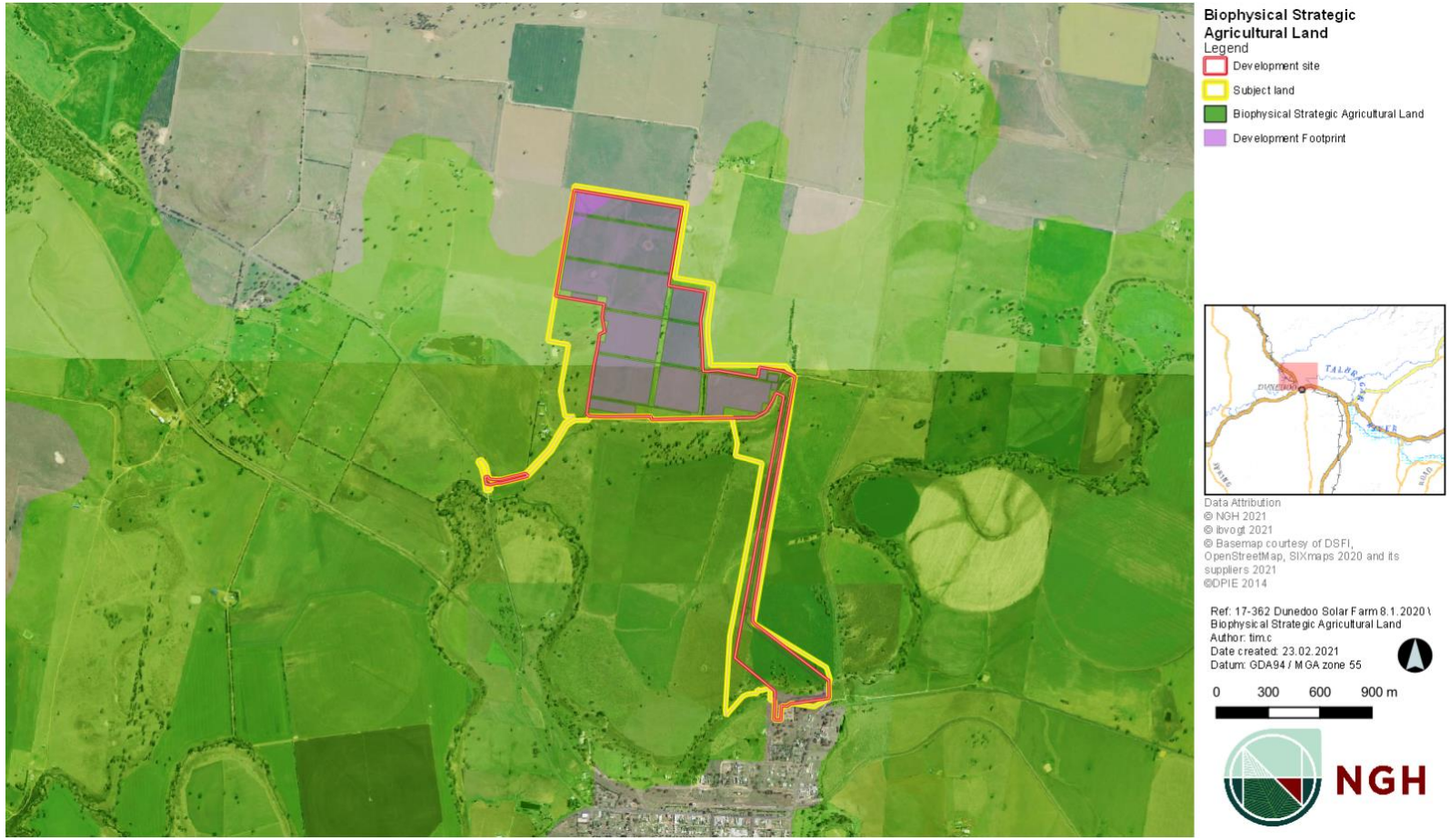
7. REFERENCES

Department of the Environment and Energy (DEE) (2016) National Inventory Report 2014 (revised). The Australian Government Submission to the United Nations Framework Convention on Climate Change. <http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/national-inventory-report-2014-revised>

NGH Consulting (NGH) (2020) Dunedoo Solar Farm Environmental Impact Statement. Prepared for ib vogt GmbH.

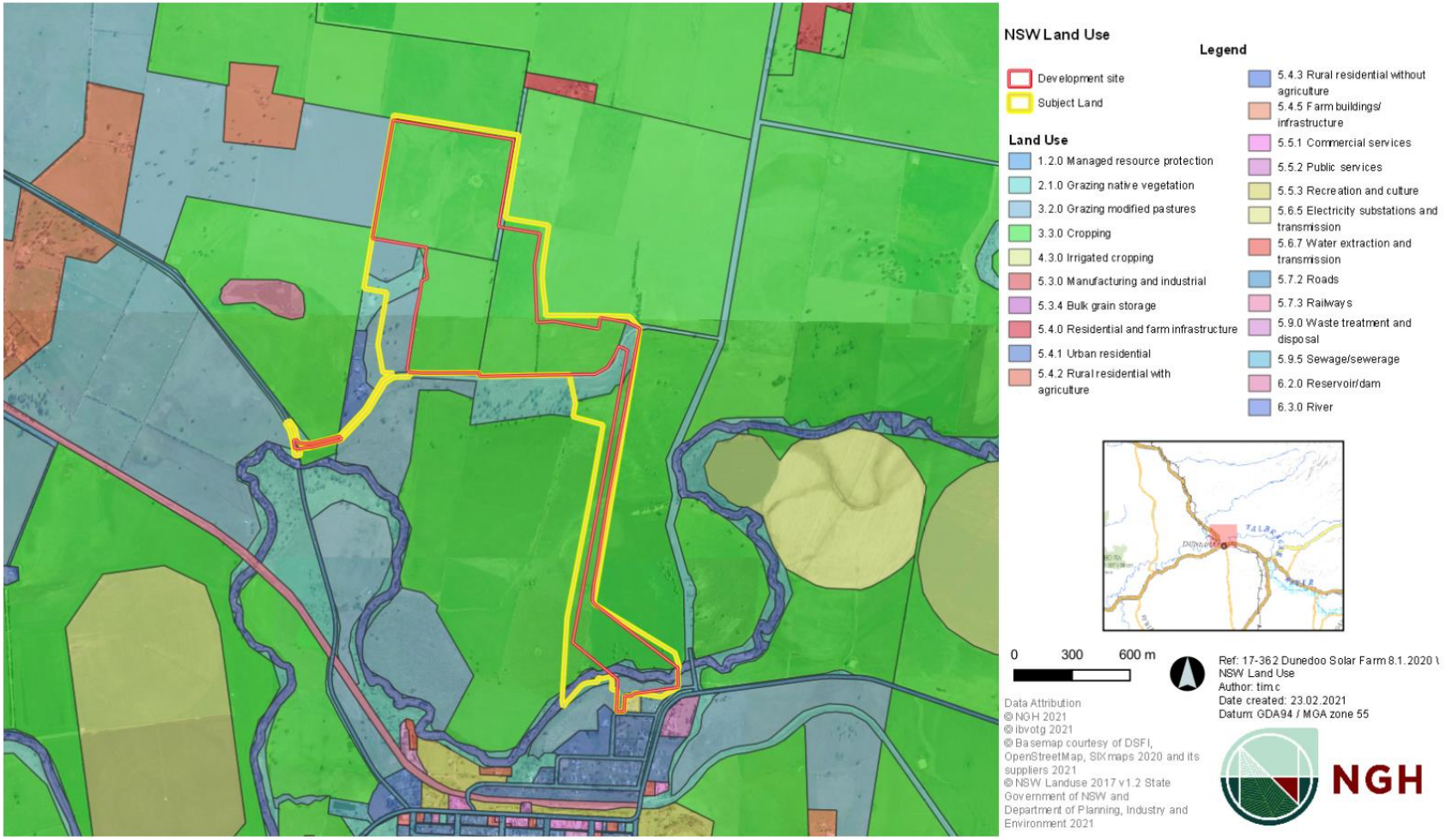
NSW Government (2013) NSW Renewable Energy Action Plan. Accessed January 2017.

APPENDIX A NSW DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT BSAL MAPPING (IN GREEN) INCLUDING THE PROPOSAL



APPENDIX B REDUCED SITE AND BSAL CLASSIFICATION BASED ON SOIL TEST ON SITE

APPENDIX C ESPADE LAND USE 2020



APPENDIX D PRELIMINARY HAZARD ANALYSIS

PRELIMINARY HAZARD ANALYSIS

Dunedoo Solar Farm

February 2021

Project Number: 20-764

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DOCUMENT VERIFICATION

Project Title:	Dunedoo Solar Farm
Project Number:	20-764
Project File Name:	20-764 Dunedoo SF PHA V3

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1	11/01/2021	S. McGrath	J. Van Den Brande	S. McGrath
Draft V2	20/01/2021	S. McGrath	J. Van Den Brande	S. McGrath
Draft V3	4/02/2021	S. McGrath	Minor edits	S. McGrath

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1. INTRODUCTION

1.1. Background

A photovoltaic (PV) solar farm is proposed approximately 2 kilometres (km) north of the township of Dunedoo in Central Western NSW by Sun Spot 4 Pty Ltd (the Proponent) on behalf of ib vogt GmbH. The solar farm would generate approximately 55 Megawatt (MW) of Alternating Current (AC) and would sit on 79-hectares (ha) of land (Development Footprint) comprised of a number of lots zoned RU1 Primary Production under the Warrumbungle LEP. For the purpose of this report, the solar farm and its associated infrastructure is collectively known as the Proposal.

NGH prepared an Environmental Impact Statement (EIS) on behalf of the Proponent. The EIS was prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The EIS was submitted to the Department of Planning, Industry and Environment (DPIE) in September 2020 and placed on public exhibition from Tuesday 20 October 2020 until Tuesday 17 November 2020.

1.2. Scope

This PHA has been prepared to address the request in the letter from the DPIE to the Proponent dated 20 November 2020 and the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Dunedoo Solar Farm.

DPIE requested, based on submissions received, the preparation of this Preliminary Hazard Analysis (PHA) that the Proponent submit a PHA that:

- Is prepared in accordance with *Hazard Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DoP, 2011) (HIPAP 6) and *Multi-Level Risk Assessment* (DoP, 2011) (MLRA)
- Considers the comments that Fire and Rescue NSW (FRNSW) have provided regarding the EIS
- Addresses the related risk of the battery storage facility
- Addresses the related risk of the high-pressure dangerous goods pipeline located within the development site, including an assessment of whether the development can be designed and operated safely with the existing pipeline.

The comments from FRNSW concern effective hazard control measures required in the event of a fire or hazardous material incident. These will be addressed in a comprehensive Emergency Response Plan (ERP). The ERP, and other recommendations from FRNSW, are included in section 8 of this report.

1.3. Objectives

The objective of this PHA is to develop a comprehensive understanding of the hazards and risks associated with the operation of the Dunedoo Solar Farm including the Battery Storage (BS) (also known as Battery Energy Storage System (BESS)) and the adequacy of safeguards.

1.4. Exclusion and limitations

This PHA is based on limited information since complete data on the design and precise safeguards is not available at this initial stage.

The scope of this PHA does not include:

- A transport route analysis since the proposed development does not exceed transport volumes of dangerous goods exceeding the SEPP 33 guideline thresholds (see EIS Section 9.7.1).
- Assessment of other risks, including, but not limited to, aviation safety, health, landslide/subsidence and telecommunications.
- Quantitative risk data as BS technology is relatively new and data is not yet available.
- Updating the PHA to a Final Hazard Analysis (FHA) during the design stage.

2. SITE LOCATION AND DESCRIPTION

2.1. Site location

The Proposal is located approximately 2 km north of the township of Dunedoo and approximately 90 km northeast of the city of Dubbo, within the Warrumbungle Shire LGA. All Weather Road runs east-west along the southern boundary of the Development Site, therefore providing direct access. All Weather Road connects to Digilah Road to the east and the Castlereagh Highway to the west.

The Proposal's Development Site is the land that would be used for the construction and operation of the solar farm and has a total approximate area of 112 ha (Development Footprint is 79 ha when operational). This comprises the land required to construct the facility connection substation, the solar array, proposed internal access tracks and other onsite ancillary infrastructure. The intersection of Castlereagh Highway and All-Weather Road is proposed to be upgraded to facilitate construction vehicle movements.

2.2. Surrounds

The Warrumbungle Shire LGA is located in the Far West and Orana region of Central Western Region of NSW, approximately 340 km northwest of Sydney. It encompasses the townships of Baradine, Binnaway, Coolah, Coonabarabran, Dunedoo, and Mendooran (Warrumbungle Shire Council 2016). The Warrumbungle LGA has a population of 9,541 people covering an area of 12,380 km^2 (ABS and Warrumbungle Shire Council 2016).

Warrumbungle Shire is a largely rural area, and the primary land use is sheep and cattle grazing, and crop growing, with some viticulture and horticulture. Tourism is also an important industry.

2.3. Sensitive receivers

The Development Footprint is located approximately 2 km north of the northern extent of the town of Dunedoo. Dunedoo is a rural community on the Golden Highway, 90 km east of Dubbo, and 230 km west of Singleton, and approximately 77 km north west of Mudgee, NSW. The majority of Dunedoo residences are located 2 to 3.5 km south from the Development Footprint.

3. PROJECT DESCRIPTION

The Proposal is to construct and operate solar photovoltaic panels solar farm that would have a capacity of up to 55 MW AC to generate power from a renewable source. The Proposal layout is presented in Figure 3-1.

The Proposal includes:

- Approximately 173,000 PV solar panels, mounted on single axis tracking systems, powered by approximately 2,850 tracker motors.

- Electrical cables and conduits.
- Up to 18 inverter/transformer stations, containerised or skid mounted, distributed across the site.
- Battery storage units, containerised, distributed across the site.
- On site substation containing transformer, synchronous condenser, associated HV switchgear, switch room, control room and lightning protection masts.
- Communications tower (up to 25 metres high), within the facility connection substation fenced area.
- Site office, compounds, storage shed, parking, access tracks and perimeter fencing.
- Two (2) access points via All Weather Road.
- Internal access tracks.
- Lighting, CCTV system, security fencing.
- Vegetative screening.
- A new hybrid Transmission Line (TL) to connect the solar farm into the Essential Energy transmission network, which will be handed to Essential Energy upon completion. Two (2) TL options are being considered.
- Construction of a passing bay along All Weather Road and upgrade to the Castlereagh Highway and All-Weather Road junction.
- Subdivision and consolidation of lots.
- A new bay in the Dunedoo Substation and any required augmentation within the existing Dunedoo Substation. A new communication tower up to 15m tall.

Figure 3-1 Proposal layout

3.1. Solar Arrays

The solar array would comprise approximately 173,000 PV panels mounted in rows on a single axis tracking system. The solar panels would be arranged in rows mounted on metal or similar frames with a maximum height of approximately 3 metres above the natural ground level (Figure 3-2). The PV mounting structure would comprise piles driven approximately 2.5 metres into the ground.

A single axis system illustrated in Figure 3-3 and Figure 3-4 would be powered by approximately 2,850 tracker motors. A single axis tracker would have a typical maximum height of 3 metres, based on a 2-metre vertical height panel and 2-metre-high support posts. Row lengths would depend on the detailed design but could be up to 100 metres. Spaces between rows (edges of panel) may vary between approximately 3 metres and 9 metres. The indicative size of each PV panel is approximately 2x1 metres.

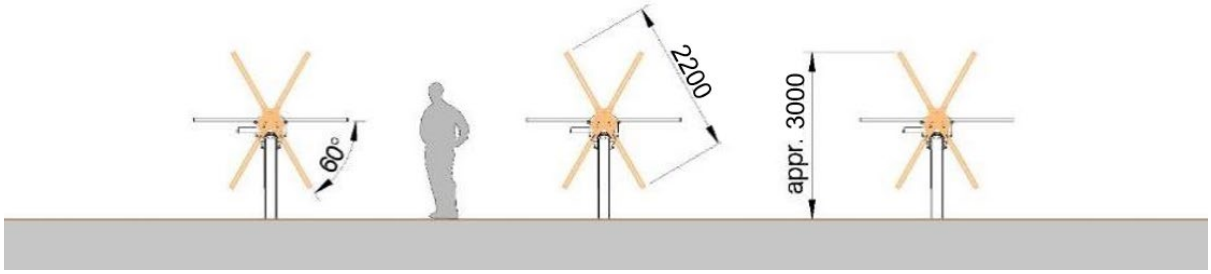


Figure 3-2 Schematic of a mounted PV panel

Figure 3-3 Example single axis tracking system (NexTracker)

Figure 3-4 Example single axis mounting system from Mount Majura solar farm, ACT

As solar panel technology evolves rapidly, specification of the exact make of the solar panels will be defined during detailed design. Notwithstanding, solar panels being considered for the Proposal would absorb 82% to 93% of the sun's light and not involve any reflective surfaces material that would cause glint and glare or loss of the resource.

3.2. Inverter/transformer stations

The Proposal includes up to 18 containerised inverter/transformer stations across the solar array site. Figure 3-5 illustrates an example of the internal elements of the equipment. The majority of the inverter/transformer stations would be constructed on concrete footings.

Power from the solar panels would generate direct current (DC) electricity that would be inverted to alternating current (AC) via the inverters, with the voltages stepped up to 33 kV by the transformers. There would be one (1) large high voltage transformer located within the facility connection substation which would step-up voltage to 66 kV.

Subject to detailed design and equipment selection, the containers would be installed across the site, each containing:

- A transformer to step the AC voltage up to high voltage for transmission to the substation
- Inverters
- HV switchgear
- Communications and ancillary equipment.

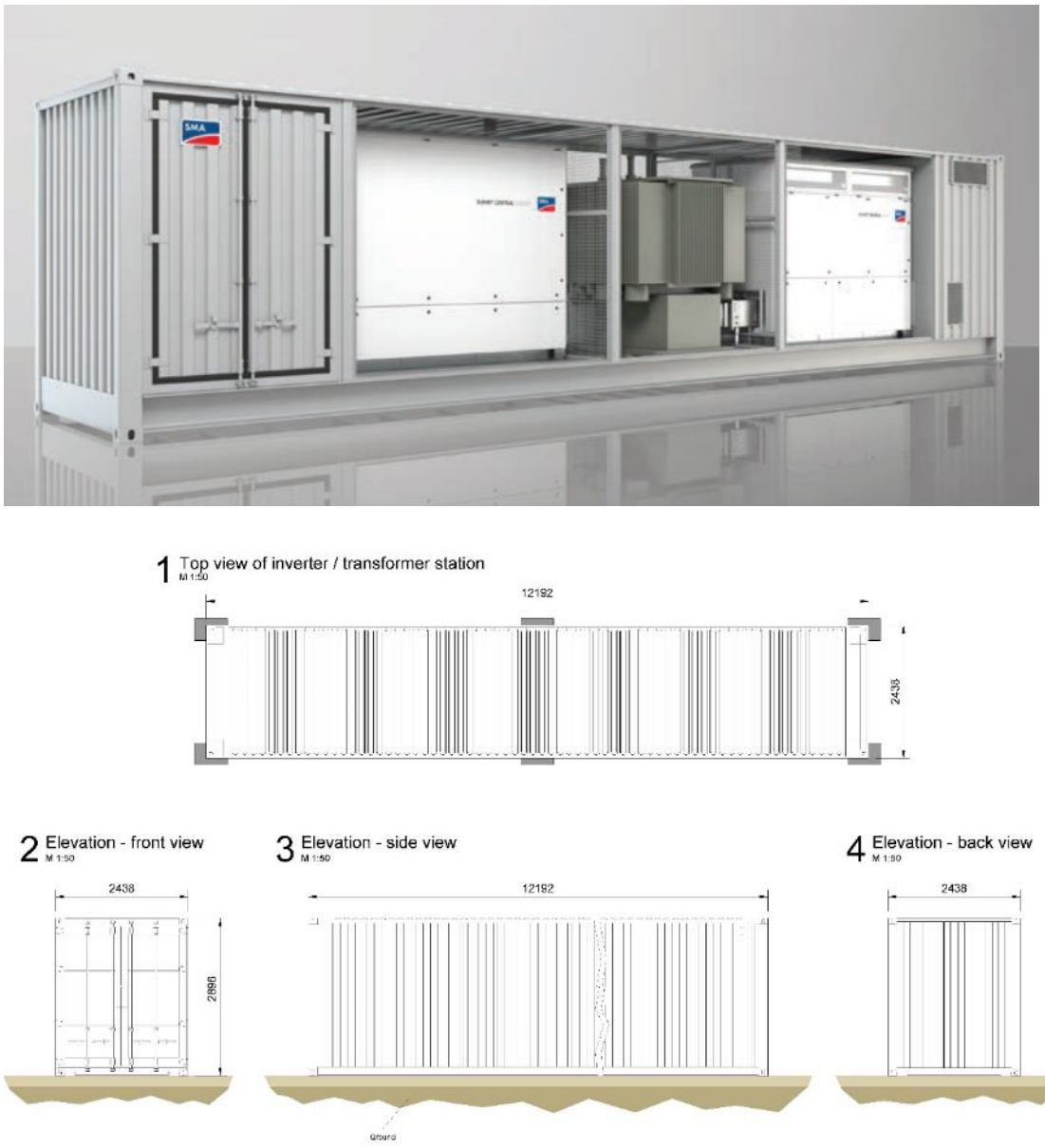


Figure 3-5 Typical container housing transformer, inverters, and switchgear (source SMA)

3.3. Battery Storage

The Proposal would include approximately 85.88 MWh / 60.48 MW rated capacity battery storage units. The Proposal would comprise Li-ion batteries housed across the site in up to 18 customised containers. The batteries would be actively cooled by air-conditioning units, with spare air-conditioning units in storage on-site for replacement. Each container would be temperature monitored, and the automated control system would stop their operation if the temperature exceeds pre-set levels to prevent overheating (e.g. if all aircon units fail).

The Battery Storage (BS) (also known as Battery Energy Storage System (BESS)) unit would include an integrated fire suppression system involving the storage and release of an inert gas within each battery container, using either electrical detectors/ionisers, or a mechanical system in which the heat destroys a seal to release the gas.

The BS unit and Inverter/Transformer containers would also be surrounded by an Asset Protection Zone (APZ) including gravel surfacing to minimise the risk of fire escaping from the Proposal and the risk of external fire affecting the Proposal.

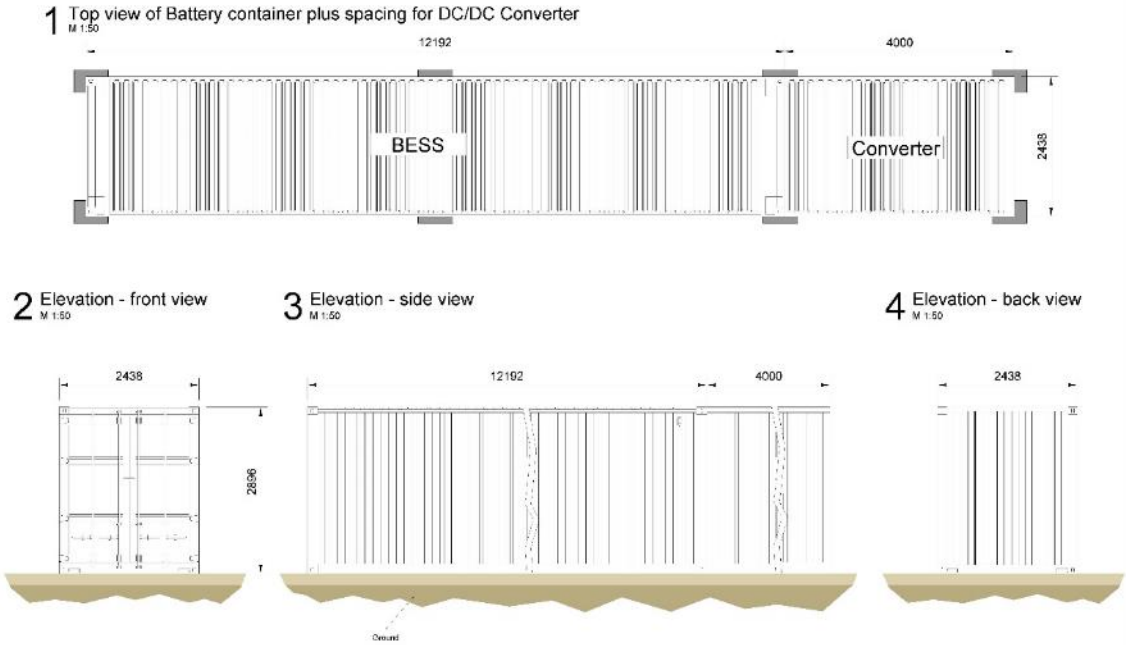


Figure 3-6 Container dimensions of BS unit

3.4. Overhead and underground cabling

Most cabling at the site would be buried and located along the access tracks. Underground cabling would be installed at a depth of at least 500 mm with the electrical reticulation typically buried to either 600 mm (low voltage) or 800 mm (high voltage) depth, in accordance with the relevant Australian Standard. Underground cables and pipes would be buried to ensure agricultural land capabilities are not reduced if underground infrastructure is left in situ after decommissioning.

Cables would be protected in accordance with *Australian Standard (AS) 3000:2007 Electrical Installations*.

3.5. Facility connection substation

A facility connection substation would be constructed in the Development Footprint to step up the solar farm electrical output to match the transmission grid voltage (66 kV). While the design is yet to be finalised, it is expected that the substation would occupy approximately 60 x 40 metres (approximately 0.24 ha) and contain transformer, a synchronous condenser, associated high voltage switchgear and control and protection equipment as well as a communication tower, and drainage and oil containment system. The substation would be surrounded by a security fence. Gravel hardstand would be placed under and around the substation compound to restrict vegetation growth and provide a safe working environment in accordance with the relevant Australian Standards.

Internal structures include:

- Control building/control room, switch room – height approximately 5 metres.
- 66/33 kV power transformer – approximately 10 x 6 metres, height approximately 6 metres.

- 6 lightning protection masts – 20 metres high.
- Associated high voltage switchgear including busbars, circuit breakers, disconnectors – each with a height of approximately 8 metres.
- Communication tower (up to 25 metres high).

3.6. Associated Operations Buildings

Separate buildings would be required to provide control, switch room and storage facilities for the solar farm. Indicative descriptions of these buildings are provided below and the locations of the buildings at the Development Footprint are shown on Figure 3-1. The control room, switch room and storage shed would each contain essential fire safety equipment as required by relevant standards.

Control Room and Site Office

A single storey building up to approximately 30 x 20 metres with appropriately designed foundations, finishing's and other features as required by relevant standards. Guttering and a water tank would be installed to collect rainwater. The control room building would contain an office and staff amenities (toilet, kitchen, first aid, potable water supply, etc.) as required for the safe operation of the site.

The control room and site office facility would include water supply as required for the services installed (including a septic system). Fire detection and suppression will be installed as required by relevant standards. Permanent parking facilities would be provided adjacent to the control building to facilitate up to 10 cars and light vehicles on site. The parking ground cover would be formed of crushed rock or similar.

Switch room

A building footprint of approximately 20 x 5 metres and approximately 5 metres high would be constructed for the HV switch room, with services, protection, and control facilities. The building may be installed on stilts and will be designed and constructed to meet relevant standards. A communications tower could be installed adjacent to the building, approximately 25 metres high.

Storage Shed

A storage shed with footprint of approximately 20 x 15 metres and approximately 6 metres high would be constructed at the Development Site. The building will have appropriately designed foundations, finishing's and other features as required by relevant standards. Guttering and a water tank would be installed to collect rainwater. Appropriate fire detection and suppression will be installed if required by relevant standards.

Synchronous Condenser

A synchronous condenser and associated auxiliary supply may be required within the switching station (depending on the outcome of the grid connection requirements). This would have a footprint of up to 20 x 30 metres, contained within a generator house of up to approximately 8 metres high.

3.7. Transmission Network Connection and Substation Extension

Additional electrical transmission infrastructure would be required to connect the solar panel infrastructure to the existing Essential Energy Dunedoo Zone Substation. The Proponent is currently considering two (2) connection options using either making part of Essential Energy 85A 66-kV Transmission Line (TL) infrastructure that traverses the southeast region of the Development Site double circuit or making use of the existing Essential Energy 852 66-kV TL easement and/or infrastructure (refer to Figure 3-1).

3.8. Central Ranges Pipeline

APA Group operates the Central Ranges Pipeline, a High Pressure Gas Transmission Pipeline (HPGTP), located on an east-west alignment through Lot 37 and 80 on DP754309.

All of the Infrastructure required for the Proposal is outside the Measurement Length (ML) and HPGTP easement with the exception of the electrical transmission infrastructure, required to connect the solar panel infrastructure to the existing Essential Energy Dunedoo Zone Substation. The proposed 66kV powerline would cross the HPGTP easement and ML.

The ML area is the site-specific heat radiation zone associated with a full-bore pipeline rupture. The ML of the HPGTP intersecting the Development Site is 191 metres.

4. PRELIMINARY HAZARD ANALYSIS

4.1. PHA methodology

The methodology undertaken to prepare this PHA includes:

- Identification of the nature and scale of all hazards at the Proposal, and the selection of representative incident scenarios.
- Analysis of the consequences of these incidents on people, property, and the biophysical environment.
- Evaluation of the likelihood of such events occurring and the adequacy of safeguards.
- Calculation of the resulting risk levels of the facility.
- Comparison of these risk levels with established risk criteria and identification of opportunities for risk reduction.

A schematic of the hazard analysis process is included below in Figure 4-1.

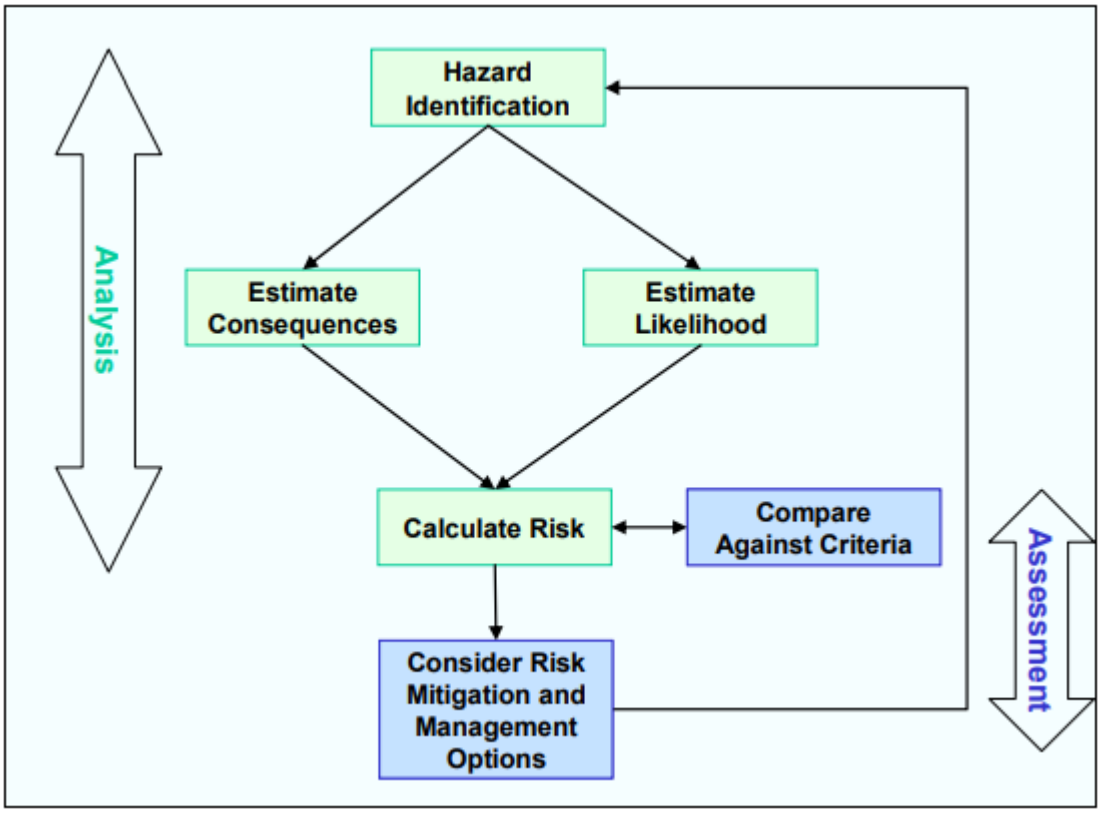


Figure 4-1 Basic methodology for hazard analysis (Source: HIPAP 6)

4.2. Hazard identification

Hazard identification includes the systematic identification of possible hazards, both on-site and off-site including:

- Activities and infrastructure at the Proposal
- Type of equipment
- Hazardous materials present

- Natural events such as floods, cyclones, earthquakes, or lightning strikes
- Hazardous events on neighbouring sites.

The identified hazards and events are presented in Table 4-1. A summary of the hazards and the relevant project infrastructure (where the hazards are applicable) is provided in Table 4-2.

Table 4-1 Identified hazards and events

Hazard	Event
Electrical	Exposure to voltage
Arc flash	Release of energy
Electric and Magnetic Fields (EMF)	Exposure to EMF
Fire	Infrastructure fire
Chemical	Release of hazardous materials
Reaction	Battery thermal runaway, ruptured HPGTP
External factors	Vandalism, lightning storm

Table 4-2 Hazards by project infrastructure

Project Infrastructure	Hazards					
	Electrical	Arc Flash	EMF	Fire	Chemical	Reaction
Solar arrays	✓	✓	✓	✓	-	-
Inverter/transformers	✓	✓	✓	✓	-	-
Overhead and underground cabling	✓	✓	✓	✓	-	-
Transmission network connection	✓	✓	✓	✓	-	-
Substation	✓	✓	✓	✓	-	-
Battery storage system	✓	✓	✓	✓	✓	✓
Associated operations buildings: • Control room and site office • Switch room • Storage shed	✓	-	-	✓	✓	-
Transmission network connection and substation extension	✓	✓	✓	✓	-	-
Central Ranges Pipeline	-	-	-	✓	-	✓

4.3. Consequence analysis

Consequence

For each identified event, the resulting consequence was qualitatively described. These include impacts to personnel (e.g., fatality/injury), environment and/or assets.

Likelihood

Using a qualitative approach, the likelihood of an event was estimated using the category scale shown in Table 4-3. The likelihood ratings were assigned based on quantitative knowledge of historical incidents in the industry. The likelihood ratings were assigned accounting for the initiating causes, resulting consequences with controls (prevention and mitigation) in place.

Table 4-3 Likelihood category

Category	Description
1. Extremely Unlikely	Never heard of in the industry, not realistically expected to occur
2. Very Unlikely	Heard of in the industry, but not expected to occur
3. Unlikely	Could occur in the next 10 years
4. Likely	Could occur in the next year

4.4. Hazard register

The identified hazards, events, applicable infrastructure and the relationships with causes, consequences, controls, and likelihood ratings are summarised in the hazard register. Information contained in the hazard register is provided in Table 4-4.

The hazard register is presented in Table 4-5.

Table 4-4 Information used in hazard register

Column Heading	Description
Hazard	Description of the source of potential harm
Event	Description of mechanism by which the hazard potential is realised
Cause	Description of the potential ways in which the event could arise
Consequence	Description of consequences of the event and potential impact to people, environment and/or asset
Controls	Any existing aspects of the design which prevent and/or mitigate against the event and resulting consequences

Column Heading	Description
Likelihood Rating	Likelihood rating assigned for the event accounting for the initiating causes, resulting consequences with controls in place

Table 4-5 Hazard register

ID	Hazard	Event	Cause	Consequence	Controls	Likelihood Rating
1	Electrical	Exposure to voltage	<u>Short circuit/electrical connection failure</u> • Faulty equipment • Incorrect installation • Incorrect maintenance • Human error during maintenance • Safety device/circuit compromised • Battery casing/enclosure damage	• Electrocution • Injury and/or fatality • Fire	• Equipment and systems will be designed and tested to comply with industry standards and guidelines • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Electrical lockout/tagout • Temperature monitoring and automated shutoff • Fire suppression system • Warning signs (electrical hazards, arc flash) • Emergency Response Plan • Fire Safety Study • Fire Management Plan • External assistance for firefighting (FRNSW & RFS) • Use of appropriate PPE • Rescue kits (i.e. insulated rescue hooks) • Bury cables and pipe (if practicable)	Very Unlikely
2	Arc flash	Arc flash	• Incorrect procedure (i.e. installation/ maintenance) • Faulty equipment (e.g. corrosion on conductors) • Faulty design (e.g. equipment too close to each other) • Insulation damage • Human error during maintenance	• Burns • Injury and/or fatality • Exposure to intense light and noise • Arc blasts and resulting heat, may result in fires and pressure waves	• Equipment and systems will be designed and tested to comply with industry standards and guidelines • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Maintenance procedure (e.g. deenergize equipment; electrical lockout/tagout) • Preventative maintenance • Emergency Response Plan • Fire Safety Study • Fire Management Plan • External assistance for firefighting (FRNSW & RFS) • Warning signs (arc flash boundary) • Use of appropriate PPE for flash hazard	Very Unlikely
3	EMF	Exposure to electric and magnetic fields	• Operations of power generation equipment	• High level exposure (i.e. exceeding the reference limits) may affect function of the nervous system (i.e. direct stimulation of nerve and muscle tissue and the induction of retinal phosphenes) • Personnel injury	• Location siting and selection (incl. separation distance) • Optimising equipment layout and orientation • Reducing conductor spacing • Balancing phases and minimising residual current • Equipment and systems will be designed and tested to comply with industry standards and guidelines • Exposure to personnel is short duration in nature (transient) • Physical warning signs (e.g. danger or restricted access)	Extremely Unlikely
4	Fire	Fire	• Encroachment of off-site bushfire • Escalated event from facility fire	• Injury/fatality • Asset damage	• Fire suppression system • Water supply on-site (including rainwater tanks) • Defendable boundary for firefighting will be established (i.e. APZ) • Emergency Response Plan	Very Unlikely

ID	Hazard	Event	Cause	Consequence	Controls	Likelihood Rating
					• Fire Safety Study • Fire Management Plan • External assistance for firefighting (FRNSW & RFS) • Use of appropriate PPE • Vegetation management on site to limit fire fuel loads	
5	Reaction	Thermal runaway in battery	<u>Elevated temperature</u> • Bushfire • External fire (e.g. substation, transformer) <u>Electrical failure</u> • Short circuit • Excessive current/voltage • Imbalance charge across cells <u>Mechanical failure</u> • Internal cell defect • Damage (crush/penetration/puncture) <u>Systems failure</u> • Battery Management System (BMS) failure • HVAC failure	• Fire in the battery cell • Injury/fatality • Escalation to the enclosure/ building • Escalation to the entire BESS	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • Voltage control • Charge-discharge current control • Temperature monitoring and automated shutoff • HVAC system (i.e. air conditioning) • Cell chemistry selection (minimise runaway) • Battery cell/pack design • BESS is housed in dedicated units • BESS is located in designated area • BESS fire protection system (enclosure/building) • Activation of emergency shutdown (ESD button; outside of BESS or remotely from the O&M building) • Emergency Response Plan • Fire Safety Study • Fire Management Plan • External assistance for firefighting (FRNSW & RFS)	Very Unlikely
6	Reaction	Pipeline rupture	Mechanical failure or damage to pipeline	• Explosion • Fire • Asset damage • Potential hazard to personnel • Toxic release of gas	• Infrastructure intersecting the ML of the HPGTP limited to transmission network connection • Receive approval following detailed design from the HPGTP owner • Follow HPGTP owner process and procedures • HPGTP easement to be clearly marked on construction, operations and decommissioning designs • Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel	Very unlikely
7	Chemical	Release of electrolyte (liquid/ vented gas) from the battery cell	<u>Mechanical failure/damage</u> • Dropped impact (installation/maintenance) • Damage (crush/penetration/puncture) <u>Abnormal heating/elevated temperature</u> • Thermal runaway • Bushfire • External fire (e.g. substation, transformer)	• Release of flammable liquid electrolyte • Vapourisation of liquid electrolyte • Release of vented gas from cells • Fire and/or explosion in battery enclosure/building • Release of toxic combustion products • Injury/fatality	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • BS unit design and materials used • Spill cleanup using dry absorbent material • Fault detection and shut-off function • HVAC system (i.e. air conditioning) • BESS fire suppression/protection system (enclosure/building)	Very Unlikely

ID	Hazard	Event	Cause	Consequence	Controls	Likelihood Rating
8	Chemical	Coolant leak	• Mechanical failure/damage • Incorrect maintenance	• Irritation/injury for personnel on exposure (inhalation)	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • BS unit design and materials used • Spill cleanup using dry absorbent material • Fault detection and shut-off function • PPE	Very Unlikely
9	Chemical	Refrigerant leak	• Mechanical failure/damage • Incorrect maintenance	• Irritation/injury for personnel on exposure (skin contact)	• Equipment and systems will be designed and tested to comply with the relevant industry standards and guidelines • Equipment will be procured from reputable supplier • Engagement of reputable engineering and construction designers/contractors • Installation and maintenance will be done by suitably qualified and experienced personnel • BS unit design and materials used • Fault detection and shut-off function	Very Unlikely
10	External factors	Fire	• Water ingress (e.g. rain, flood)	• Electrical fault/short circuit • Fire • Injury/fatality	• Location siting (i.e. outside of flood prone area) • Drainage system • Preventative maintenance (check for leaks)	Extremely Unlikely
11	External factors	Vandalism	• Unauthorised personnel access	• Asset damage • Potential hazard to unauthorized person (e.g. electrocution)	• Project infrastructures are located in secure fenced area • Onsite security protocol • Warning signs • During construction, the area will be patrolled, and fence will be installed	Unlikely

5. RISK ASSESSMENT

Risk is the likelihood of a defined adverse outcome. To calculate risk, it is necessary to consider the likelihood and the consequences of each of the hazardous scenarios identified.

Using a qualitative approach, the risk of an event was estimated using the study risk matrix shown in Figure 5-1.

For each identified hazard and associated event, the resulting consequences and likelihood pair was determined from the hazard register. The consequence and likelihood of the identified events are presented in

			Likelihood			
			1 Extremely Unlikely	2 Very Unlikely	3 Unlikely	4 Likely
			Never heard of in the industry, not realistically expected to occur	Heard of in the industry, but not expected to occur	Could occur in the next 10 years	Could occur in the next year
Severity	4 Major	Fatality / Permanent Injury				
	3 Moderate	Severe injury / Lost time				
	2 Minor	Minor Injury / Visit to Doctor				
	1 Insignificant	Slight injury / First aid				

Risk Acceptance Criteria

High	Unlikely to be tolerable - review if activity should proceed.
Medium	Tolerable, if so far as reasonably practicable
Low	Broadly acceptable

Figure 5-1 Qualitative risk matrix

Table 5-1 Risk assessment

Hazard	Event	Consequence (Impact to People)	Likelihood	Risk
Electrical	Exposure to voltage	Major	Very Unlikely	Medium
Arc flash	Arc flash	Major	Very Unlikely	Medium
EMF	Exposure to EMF	Insignificant	Extremely Unlikely	Low
Fire	Bushfire	Major	Very Unlikely	Medium
Reaction	Thermal runaway in battery	Major	Very Unlikely	Medium
Reaction	Pipeline (HPGTP) rupture	Major	Very Unlikely	Medium
Chemical	Release of electrolyte from the battery cell (liquid/vented gas) resulting in fire and/or explosion	Major	Very Unlikely	Medium
	Battery coolant leak	Minor	Very Unlikely	Low
	Refrigerant leak	Minor	Very Unlikely	Low
External factors	Water ingress resulting in fire	Major	Extremely Unlikely	Medium
	Vandalism due to unauthorised personnel access	Moderate	Unlikely	Medium

6. RISK ASSESSMENT RESULTS

6.1. Consequence

The risk assessment indicates that the worst-case consequence is a fire from a variety of causes (e.g. release of flammable materials, battery thermal runaway, infrastructure fire). These fires may have the potential to initiate bushfire to surrounding grasslands but is limited with appropriate control listed herein.

6.2. Likelihood

The risk assessment indicates that the highest likelihood rating for the identified events is unlikely (i.e. could occur in the next 10 years). This relates to unauthorised personnel access to the BS resulting in vandalism/asset damage to the project infrastructure.

6.3. Risk assessment

A total of 11 risk events were identified. The breakdown of these events according to their risk ratings are as follows:

- 8 medium risk events
- 3 low risk events.

Based on the risk acceptance criteria used for the study, the risk profile for the project, subject to the implementation of controls described in Table 4-5, is considered to be tolerable if So Far As Reasonably Practicable (SFARP).

The majority of the medium risk events relate to fire events resulting from a variety of causes (e.g. release of flammable materials, battery thermal runaway, infrastructure fire, bushfire, etc). The study identified proposed prevention controls to reduce the likelihood of these fire events and mitigation controls to contain the fires to minimise potential for escalated events (e.g. fire management plan, APZs, vegetation management etc.). Based on the identified controls, the highest likelihood for these events were rated as very unlikely (i.e. heard of in the industry, but not expected to occur).

Based on the size of the Development Footprint, proposed location for project infrastructure within the Development Site, proposed controls and distance to neighbouring land uses (including neighbouring properties and agricultural operations), the exposure to fire events will primarily be to the project's construction and operations workforce. Offsite impacts would be expected to be minimal.

The risk assessment concluded that there is no potential for offsite fatality or injury. Therefore, the project meets the land use planning criteria. Risk events identified are onsite impacts and assessed against *Work Health and Safety* (WHS) *Act* requirements to reduce risk to SFARP. Risks were assessed by the project as tolerable if SFARP.

7. CONCLUSION

This PHA has been undertaken to respond to the SEARs and request from DPIE by demonstrating that BS risk levels do not preclude approval. This PHA did not identify any major offsite consequences or societal risk. Therefore, a qualitative analysis is suitable.

This PHA has:

- Identified all hazards at the Facility, analysed the possible incident scenarios that could result from a hazardous incident and the consequences of these to people, property, and the biophysical environment.
- Estimated the likelihood of hazardous incidents that have the potential to result in significant consequences.
- Recommended controls to limit the consequences and likelihood of potentially hazardous incidents.

The risk assessment determined that the risk profile for the project, subject to the implementation of controls described in Table 4-5, is considered to be tolerable if SFARP. The majority of the medium risk events relate to fire events. The exposure to fire events will primarily be to the project's construction and operations workforce. Offsite impacts will be minimal. The risk assessment concluded that there is no potential for offsite fatality or injury identified and therefore the project meets the land use planning criteria.

8. RECOMMENDATIONS

It is recommended that the results of this PHA should be used as inputs into other safety studies required before commencement of construction including:

- Emergency Response Plan prepared in accordance with the FRNSW requirements.
- Fire Safety Study (FSS) prepared for the BESS and submitted to FRNSW for review and determination
- Fire management plan.

FRNSW also require that the operator of the facility contacts the relevant Local Emergency Management Committee (LEMC) once construction has started and prior to operation of the facility.

8.1. Central Ranges Pipeline

Construction and operation of the Dunedoo Solar Farm 66k transmission network connection will be carried out in accordance with APA statutory requirements including, but not limited to:

- Any works within three metres of the pipeline must be approved by APA Networks throughout Third Party Works Authorisation process
- Additional consultation and review with APA will be undertaken during detailed design
- Details of all proposed crossings and works within the pipeline easement, must be submitted to APA for consideration. No crossings may occur without the prior approval of APA, and must be completed in accordance with any conditions imposed by APA.

Construction and operation of the Dunedoo Solar Farm will be carried out in accordance with APA conditions of approval including:

1. **No Improvements within Easement**
   Buildings, structures, roadways, pavement, pipeline, cable, fence, on-site waste treatment (or irrigation area), or any other improvement on or under the land within the gas transmission pipeline easement must not be constructed without prior consent in writing from APA. No structure or vegetation will be permitted on the easement that prohibits maintenance online of sight along the pipeline easement.
2. **Risk Assessment Required**
   Prior to the development commencing, and to inform the detailed design, the applicant must conduct an electrical hazards studies in accordance with (the requirements of) Australian Standard 4853 – 2012 (for Low Frequency Induction and Earth Potential Rise threats for personnel and pipe corrosion). The applicant must address any relevant requirements and any recommendations and/or actions must be implemented to the satisfaction of APA. All cost associated with the study and implementing its recommendations and/or actions are to be borne by the applicant. The applicant must complete validation testing upon completion of construction.
3. **Electrical Interference Studies**
   The applicant must conduct electrical interference studies in accordance with the requirements of AS 2832 once detailed design is complete.
4. **Design to Comply with Australian Standards**
   The applicant must design to comply with the applicable Australian Standard as required and provide copies of the electrical interference studies and electrical hazard studies to APA.
5. **High Voltage Powerlines**
   The applicant must make good (at the applicant's cost) any hazards or risks to the Central Ranges Pipeline (including cathodic protection systems), caused by any powerlines.
6. **Construction Management Plan**
   Prior to the commencement of any works on the land within 50 metres of the pipeline easement, a construction management plan must be submitted to and approved by APA. The plan must:
   - Prohibit the use of rippers or horizontal direction drills unless otherwise agreed by APA.
   - Avoid significant vibration, heavy loadings stored over the pipeline and heavy vehicle / plant crossings of the pipeline within the easement.
   - Be endorsed by APA where the works are within or crossing the pipeline alignment.
7. **Easement Delineation on Plans**
   All plans for the electrical transmission line to Essential Energy Substation must have the gas pipeline easement clearly identified with hatching on the full width of the easement. The easement must also be clearly labelled as 'high pressure gas pipeline easement – no works to occur without the prior authorisation of the pipeline operator'.
8. **Pipeline Operator Access**
   The ability of the pipeline operator to access the pipeline easement must be maintained at all times to facilitate prompt maintenance and repairs. APA field officers will undertake any necessary site induction to facilitate unaccompanied access.

APPENDIX E TFNSW AND WSC MEETING 28/01/2021 MINUTES

Meeting minutes

Project: Dunedoo Solar Farm – Review of memo proposing left only access via the Castlereagh Highway and All Weather Road (The Junction).

Date: 28/1/2021.

Attendees:

Transport for NSW (TfNSW) –Alexandra Power (AP) and Andrew McIntyre (AM)

Warrumbungle Shire Council (WSC) –Kevin Tighe (KT)

ib vogt (IBV) – Hugh Sangster (HS) and Lin Hwong (LH)

Stantec – Sunny Hong (SH)

Meeting summary:

1. AP thanked everyone for attending the meeting HS and SH for preparation of the memo circulated on 21st January 2021.
2. TfNSW has reviewed the memo and had the following comments:
    a. Generally supports a condition of consent requiring the increase in junction treatment at The Junction from BAL to AUL* as presented in Section D of the memo. Specific feedback to follow subject to concept design review currently underway.
    b. Supports the memo conclusion that a median is not required as presented in Section C of the memo.
    c. Supports the use of a condition of consent to require left turn only at The Junction, including safe turn around locations and prohibition on right turn movements as presented in Section E of the memo.
    d. Agrees there are feasible access routes to the Castlereagh Highway. Clarification required from TfNSW as the current maximum vehicle lengths applicable to Castlereagh Highway.
    e. Supports the requirement for preparation of a construction traffic management plan (to be developed in consultation with TfNSW) to be a condition of consent. All parties agreed that this document would be very important to combine the actions used to maximise the safe use of The Junction during construction.
    f. Does not support the use of 'no right turn' signage at The Junction and is satisfied that other signage that that may be required can be agreed in the construction traffic management plan.
3. TfNSW led discussion of operational scenarios of The Junction (particularly for existing road users turning right in and out of All Weather Road).
    a. A run through described how the design allows for simultaneous in and out bound largest vehicles via the width of the AUL, the passing bay on All Weather Road, AUL slip exit (which is not available in the BAL treatment required at the site but adds significantly to the safe use of The Junction) and construction traffic management plan.
    b. Existing All Weather Road user volumes are very low and there is existing risk in using The Junction prior to the solar farm (particularly in turning right into All Weather Road). A number of these existing users are involved with the project.

c. Some residual risk, generally similar to existing conditions, does remain for the small number of existing All Weather road users using The Junction, particularly those turning right.

4. KT from Warrumbungle Shire Council asked some questions:
    a. Where is the seal to end? - HS took this on notice but pointed out the extent of the existing seal on the concept design.
    b. Existing culvert in shown as being extended to the north. Southern edge of the road is not expected to change due to land boundary immediately south of The Junction.
    c. Talked through the expected distribution of heavy vehicle during the approximately 12 month construction. Peak numbers of deliveries are expected in the middle with a ramp up and ramp down in approximately the first and last 3 months respectively.
5. The following next steps were agreed
    a. IBV to finalise the relevant sections of the Response to Submissions on the basis of the above and the remainder of the memo and TfNSW to formally respond to the memo on the basis of the above to be attached to the Response to Submissions.
    b. Actions itemised below would be progressed by relevant parties.
6. Actions:
    a. TfNSW to perform design review of the concept AUL* of The Junction during detailed design. TfNSW may revert with some design comments after the Response to Submission is submitted.
    b. TfNSW to clarify the current maximum vehicle length applicable to Castlereagh Highway. **TfNSW confirmed after the meeting that Castlereagh Highway is approved for maximum vehicle 26m B-Double including a request for IBV to update the design vehicle and swept paths at The Junction using a 26m B-Double design vehicle.**
    c. IBV to clarify length of seal from The Junction along All Weather Road.
    d. IBV to finalise relevant sections of the Response to Submissions (which may include Stantec updating the memo) on the basis if these minutes and remainder of the memo.
    e. TfNSW to provide a formal response to the memo on the basis of the above, IBV intend to attach this to the Response to Submissions.

*IBV clarified after the meeting to TfNSW that the AUL should be replaced with AUL(S)

APPENDIX F STANTEC MEMO

Stantec

Memo

To:	Hugh Sangster Level 6, 201 Kent Street, Sydney	From:	Sunny Hong Level 4, 99 Walker Street, North Sydney
File:	RTS submission to DPIE (traffic)	Date:	11 February 2021

Reference: Dunedoo Solar Farm TA

Dear Hugh,

Stantec has been engaged to assess construction access for heavy vehicles to the Dunedoo Solar Farm. It has been determined that a BAR is not able to be constructed at the intersection of the Castlereagh Highway and All Weather Road (The Intersection). Further investigation into heavy vehicles using left hand only turns into and out of All Weather Road off and onto the Castlereagh Highway respectively (Left Turn Only Access), during construction, has been performed. A meeting was held between Transport for NSW (TfNSW), Warrumbungle Shire Council (WSC), IBV and Stantec on the 28th January 2021 to discuss the investigation and this memo is to capture the outcome of the meeting and define the agreed path forward for inclusion in the Response to Submissions (RTS) Report which will be submitted to the Department of Planning, Industry and Environment (DPIE).

The assessment includes the following:

A. Sight distance assessment of The Intersection according to the Austroad Guide to Road Design;
B. Determination of the treatment required at The Intersection according to the Austroads Guide to Road Design;
C. Determination of the requirements of a median to physically prevent right turns off/onto the Castlereagh Highway at The Intersection according to Austroads Guide to Road Design as requested by TfNSW;
D. Present a concept design of the recommended upgrade to The Intersection completed by LG Civil exceeding requirements of the Austroads Guide to Road Design;
E. Specify access routes from the Castlereagh Highway via The Intersection to the project required to implement the Left Turn Only Access for heavy vehicles during construction, including safe turn around locations;
F. Demonstrate the feasibility of the state and regional road network providing heavy vehicle construction access to the Castlereagh Highway;
G. Specify light vehicle and bus access routes during flooding on Digilah Road at the Talbragar River during construction;
H. Prepare an example Traffic Control Plan for The Intersection highlighting potential traffic management measures that could be implemented during construction to achieve acceptable safety levels (please note that the predicted traffic volumes from the project during the operational period are negligible and no traffic management is suggested during operations);
I. Conclusions of our assessment; and
J. Recommended approach to heavy vehicle access via The Intersection during construction to appropriately manage transports risks.

The following sections summarise our assessment and findings.

A. AUSTROADS SIGHT DISTANCE REQUIREMENTS

The sight distance requirements at an intersection is stipulated in the Austroads Guide to Road Design Part 4A, and is summarised as follows:

- Approach Sight Distance (ASD): Section 3.2.1 of Austroads Part 4A recommends a minimum ASD of 193 metres of sight distance to the intersection, preferably 209 metres, for a design speed of 110km/h;

- Safe Intersection Sight Distance (SISD): Section 3.2.2 of Austroads Part 4A recommends a minimum SISD of at least 285 metres, preferably 300 metres, for a design speed of 110 km/h; and
- Minimum Gap Sight Distance (MGSD): Section 3.2.3 of Austroads Part 4A recommends a minimum MGSD of at least 153 metres, which is based on a critical gap acceptance of 5 seconds (this will require the approaching vehicle to slow down). As such, the preferable MGSD for a design speed of 110 km/h is 305 metres, which is based on a critical gap acceptance of 14 seconds[1] (this does not require the approaching vehicle to slow down).

Our assessment (including consideration of Castlereagh Highway turn radius, terrain, vegetation etc.) using requirements of the Austroad Guide to Road Design concludes that minimum ASD, SISD and MGSD are exceeded at The Intersection.

B. AUSTROADS JUNCTION TREATMENT REQUIREMENT

Figure 2.26 of the Austroads' *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austroads Part 6) provides guidance on junction treatments on major roads at unsignalised rural intersections.

Figure 1 below defines the requirements for the Dunedoo Solar Farm construction period based on the following site specific details:

- Design speed assumed to be 110 km/h (road speed limit is 100 km/h);
- Hourly two-way traffic volumes on Castlereagh Highway is approximated at 97 veh/h (Q_m in **Figure 1**) as presented in the EIS dated September 2020; and
- Expected maximum turn volumes generated during the peak of construction of 10 veh/h (Q_L in **Figure 1**).

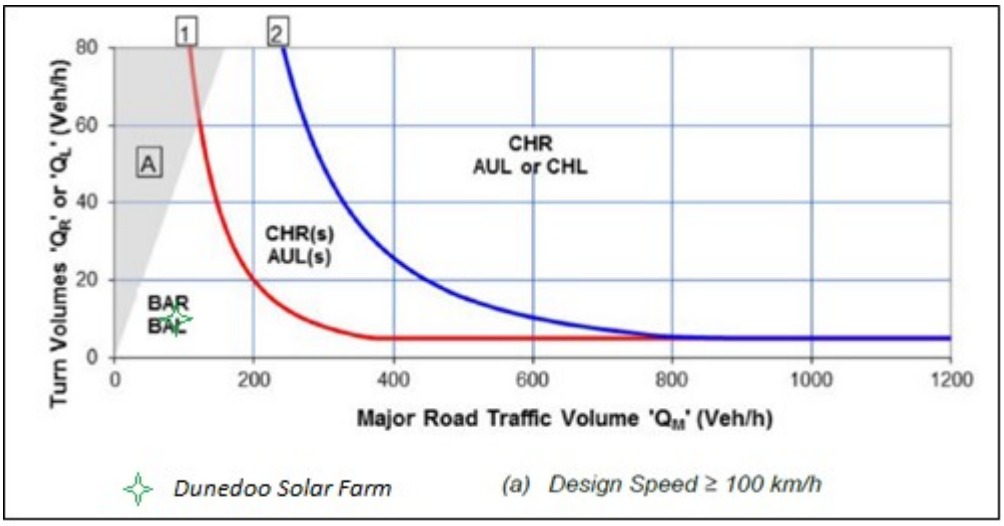


Figure 1: Figure 2.26(a) of Austroads Guide to Traffic Management Part 6

Therefore, as displayed in **Figure 1**, the junction treatment requirement at The Intersection according to Austroads Guide to Road Design is a basic left turn treatment (BAL) when applying Left Turns Only Access.

Furthermore, based on the site specific details (including the Left Turn Only Access), there is no requirements (such as a slip in or out) in addition to a BAL required by Austroads Guide to Road Design for The Intersection .

[1] Based on Table 3.5 of Austroads Guide to Road Design Part 4A

C. AUSTROADS MEDIAN REQUIREMENTS

TfNSW has requested an investigation into the possibility of installing a median at The Intersection. It is understood that TfNSW has requested a median to provide a physical barrier preventing right turns and since a BAR cannot be built at the Intersection.

Existing road environment, site restrictions, predicted solar farm traffic volumes and the requirements of the following relevant guidance have been considered in this assessment, including the Austroads Guide to Road Design Part 4A Unsignalised and Signalised Intersections.

- **Figure 2** shows the minimum median lengths for rural settings at different design speeds from Austroads Guide Part 4A. The minimum median length on the Castlereagh Highway is 40m and All Weather Road 10m.
- **Figure 3** shows the minimum median widths for rural settings from Austroads Guide Part 4A. The minimum median width on the Castlereagh Highway is 1.2m and All Weather Road 3.7m.

Design speed (km/h)	Length (m)
60	10
80	20
100	40

Figure 2: Minimum length requirements (Table 6.1 Austroads Guide Part 4A)

Median function	Desirable minimum width (*W*) (m)[1]
Separate traffic flows and a safety barrier	3.7[3]
Shelter a small sign	1.2
Shelter signal pedestals or lighting poles	2.0
Shelter pedestrians and traffic signals	2.5
Shelter pedestrians and TGSI[2] provision in median cut-through	2.5
Shelter turning vehicles and traffic signals	6.0[4]
Shelter crossing cars	7.0[5]

Figure 3: Minimum width requirements (Table 6.2 Austroads Guide Part 4A)

It should be noted that medians to prevent right hand turns are not specifically addressed in Austroads Guide Part 4A and the assessment has been prepared on a risk basis. An assessment of the median options at The Intersection against the Austroads Guide Part 4A and other requirements has been presented in **Table 1** overleaf.

Table 1: Assessment of a median to prevent right hand turns at The Intersection

Median Option	Concept considered	Benefits	Risks
Option 1 - Temporary median on All Weather Road during construction Refer **Attachment A** for details	• A low level concrete median 1m wide and 10 - 12m long at the western end of All Weather Road in between the in and out bound vehicle movements. • The swept path assessment, undertaken by LG Civil indicates that largest design vehicle will not be able to turn right into/out of All Weather Road without rolling over the median.	• Promotes Left Turn Only Access. • Low level physical impediment to heavy vehicles turning right at The Intersection. • To be removed at the completion of construction. • Low level concrete medians are approved for use by TfNSW. • Can be set back from Castlereagh Highway traffic lanes for safety. • Appropriate signage can accompany the median. • Maintains existing sight lines.	• Median substandard against Austroads requirements due to the swept path requirements of design vehicle. • Substandard width provides limited physical barrier and negligible benefit. • Additional project cost for negligible safety benefit and potential intersection risk increase due to substandard median, especially if existing road users try to dodge the median. • Adversely impacts existing road users particularly during Talbragar River flooding events where some land owners would not be able to access their dwellings.
Option 2 - Temporary median on Castlereagh Highway during construction Refer **Attachment B** for details	• Medians can be used between traffic directions. These are generally discussed in the context of preventing head on collisions and have been considered in the context of this project. • A narrow median housing a Sentryline-M Wire Rope Safety Barrier System was selected as a most likely solution due to the limited widening opportunity of the Castlereagh Highway at The Intersection.	• Promotes Left Turn Only Access. • Prevents all right turns at The Intersection. • To be removed at the completion of construction. • Sentryline-M Wire Rope Safety Barrier Systems are approved for use by TfNSW. • Physically keeps incoming or outgoing heavy vehicles from in the correct direction of travel when negotiating The Intersection. • Appropriate signage can accompany the median. • Maintains existing sight lines.	• Narrow median needs to be at least 1.2m wide (and possibly wider to account for wire rope deflection). Road widening in the order of 1.2m is not physically possible due to Talbragar river bridge (see **Attachment B** where the wire rope is only able to be placed along the centre of the road given width constraints). • A median narrower than 1.2m would be no-compliant with Austroads guidelines and decrease intersection safety and is not acceptable. • Adversely impacts existing road users, particularly during Talbragar River flooding events where some land owners would not be able to access their dwellings. • Prevents emergency vehicle access to site from Dunedoo, particularly during Talbragar River flooding.

It is concluded, based on Austroads Guide Part 4A, that a median on Castlereagh Highway or All Weather Road would be substandard and is therefore not recommended. In addition, installation of a median will impact existing road users such as emergency services use of The Intersection (particularly during Talbragar River floods) and may increase risks to other road users at The Intersection. A median at the intersection is therefore not recommended especially with the relatively low traffic volumes, short duration of construction and other recommendations herein.

D. CONCEPT DESIGN FOR UPGRADE OF THE INTERSECTION

LG Civil have prepared a concept design for the Intersection as shown in **Attachment C**. The key aspects of this design are as follows:

- AUL(S) design with slip exit. This is in advance of the BAL treatment requirement under the Austroads design requirements;
- Caters for the largest design vehicle, which is a 26m B-Double (refer to swept paths in **Attachment C**);
- Includes a 42m exit slip road for use by vehicles travelling south on Castlereagh Highway entering All Weather Road to minimise potential interactions with other south bound road users or stationary vehicles on the high speed carriageway of the Castlereagh Highway as far as reasonably possible and beyond what is required by Austroads;
- Swept paths, prepared by LG Civil, shows simultaneous in and out bound left turns of the largest design vehicle are maintained with the correct direction of travel, minimising the chance of stationary vehicles on the Castlereagh Highway as far as reasonably possible;
- Fits within the constraints at the intersection location such as bridge, culverts, barriers, lot boundaries etc; and
- The road will be sealed up to the existing seal location along All Weather Road.

The concept design is an appropriate treatment for The Intersection and significantly increases its safety during construction and in the long term.

E. CONSTRUCTION TRANSPORT ROUTE – HEAVY VEHICLE LEFT TURN ONLY ACCESS

The following heavy vehicle access route off the Castlereagh Highway via The Intersection are recommended to facilitate the Left Turn Only Access. We would consider that defined access protocol such as this are typical of major projects and transport operators would be well versed and well prepared to use these specific access arrangements to site during construction. We recommend details in this section be made a condition of consent in some form.

- Heavy vehicle entry during construction - Travel south along Castlereagh Highway and turn left via The Intersection into All Weather Road and left into the site entry as shown in **Figure 4**. Right turns from Castlereagh Highway via The Intersection into All Weather Road will be prohibited and vehicles approaching All Weather Road from the south travelling along the Castlereagh Highway will be required to travel north to Mendooran and turn around to allow entry to site from the north. Two options are proposed for the turnaround (see turn around detail in **Figure 5** and **Figure 6**); and
- Heavy vehicle exit during construction - Exit the site and turn right to travel west along All Weather Road and then turn left into Castlereagh Highway via The Intersection as shown in **Figure 4**. Right turn from All Weather Road into Castlereagh Highway via The Intersection will be prohibited and vehicles needing to travel north on the Castlereagh Highway will be required to travel south to Dunedoo and turn around (see turn around detail below in **Figure 7**) before re-entering the north bound Castlereagh Highway.

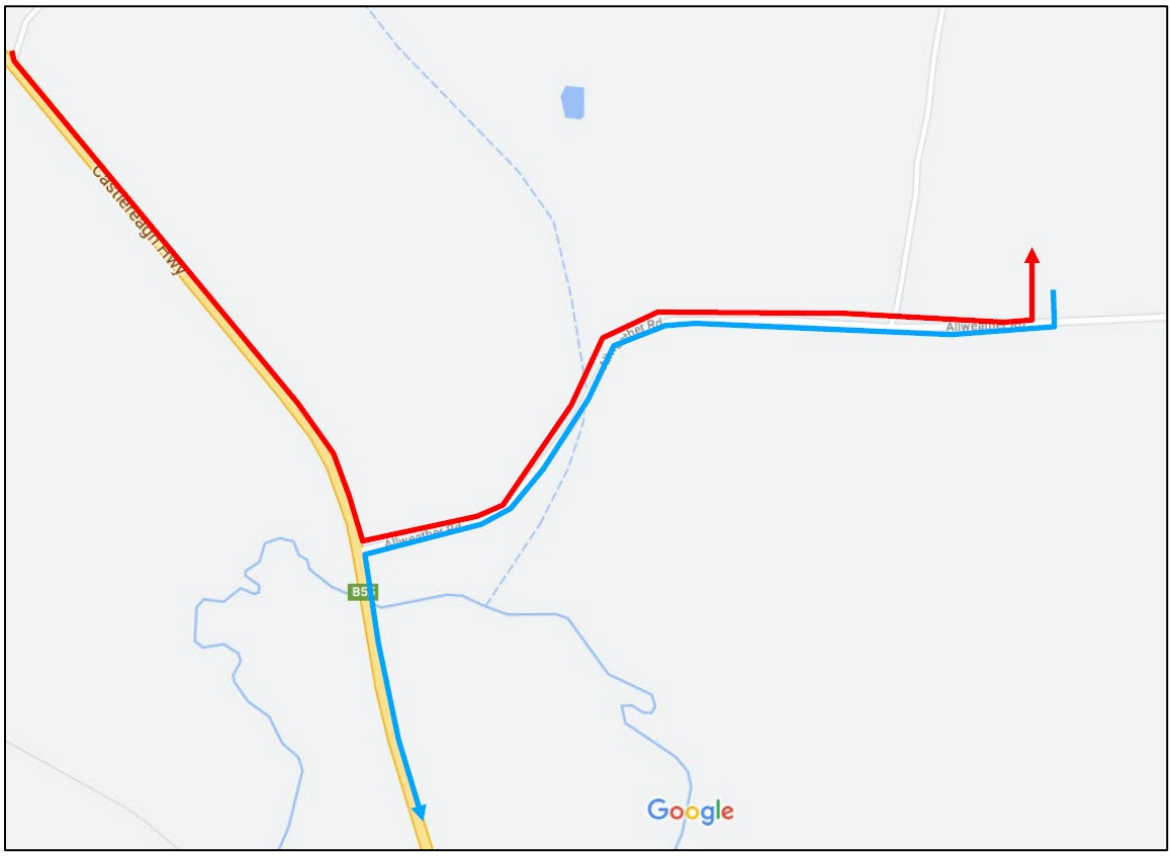


Figure 4: Heavy vehicle construction entry (red) and exit (blue) routes

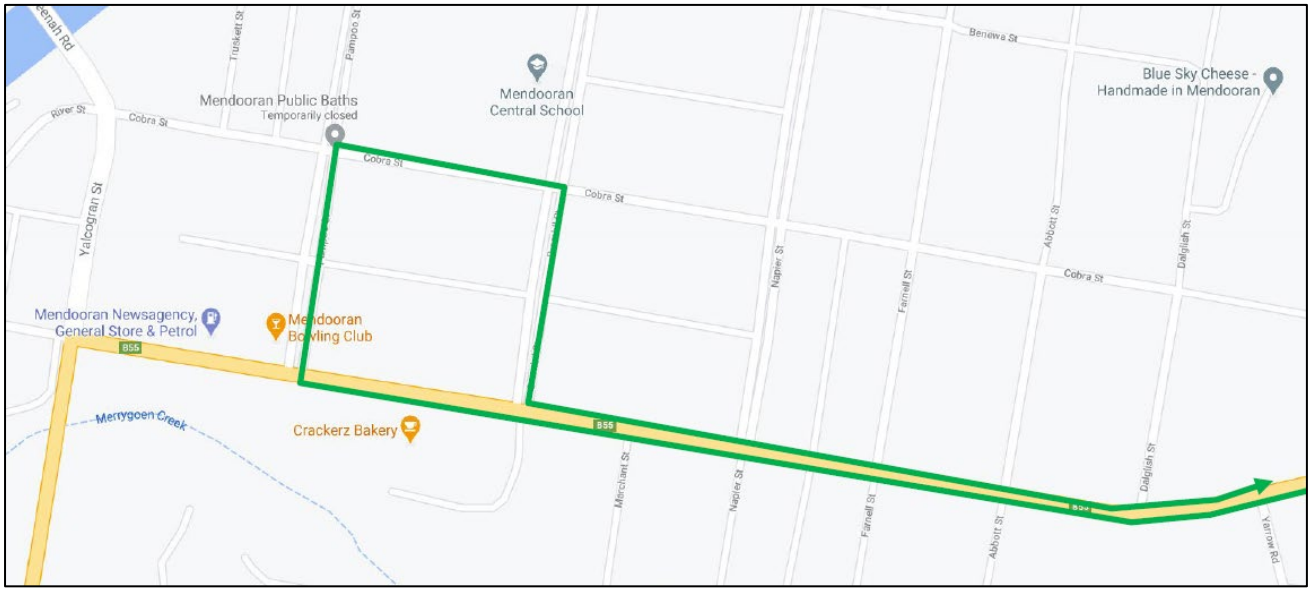


Figure 5: Mendooran turn around Option 1 detail (following Castlereagh Highway, Pampoo St, Cobra St, Brambil St and Castlereagh Highway)

Figure 6: Mendooran turn around Option 2 detail (following Castlereagh Highway, Denmire Road, Yarrow Road and Castlereagh Highway)

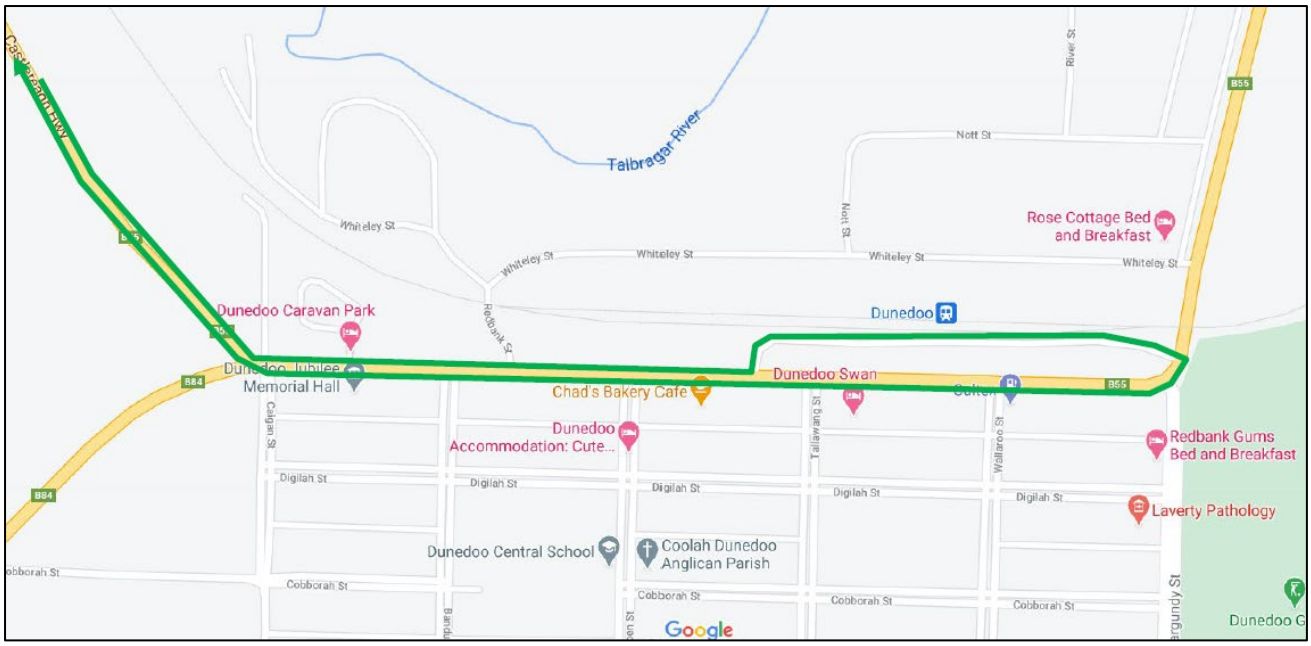


Figure 7: Dunedoo turn around detail (following Castlereagh Highway, Milling Park Heavy Vehicle Parking Area and Castlereagh Highway)

In Dunedoo it was determined that the use of the highway and existing heavy vehicle area was most appropriate in minimising impacts on the road network and local community. In Medooran, Pampoo St was selected as the preferred right turn location due to the passing lane to the left, avoidance of other obstacles such as low overhead wires and is a wide entry (see **Figure 5**). Similarly, the other three intersections have wide

and appropriate geometry. However, it is noted that this route will direct construction vehicles through residential streets of Mendooran, and as such, a second route is proposed which will require construction vehicles to use Denmire Road and turn right onto Castlereagh Highway from Yarrow Road (see **Figure 6**).

Further note that only a portion of heavy vehicle traffic would be expected to use the safe turn around locations in a single direction.

F. FEASIBLE REGIONAL AND STATE ROAD FOR HEAVY VEHICLES DURING CONSTRUCTION

Feasibility of construction access from Newcastle, Mudgee and Dubbo to the Castlereagh Highway has been assessed. Materials may be delivered from other locations but these are considered sufficient to demonstrate feasibility of the regional and state road networks to provide access to the Castlereagh Highway for use of the access arrangements in the previous section. It is recommended that regional and state access route options are excluded from any conditions of consent to allow transport operators to develop their own most efficient routes at time of construction. Routes have been split as follows:

- Inbound (i.e. getting to the site); and
- Outbound (i.e. getting off the site) – including north towards Coonabarabran

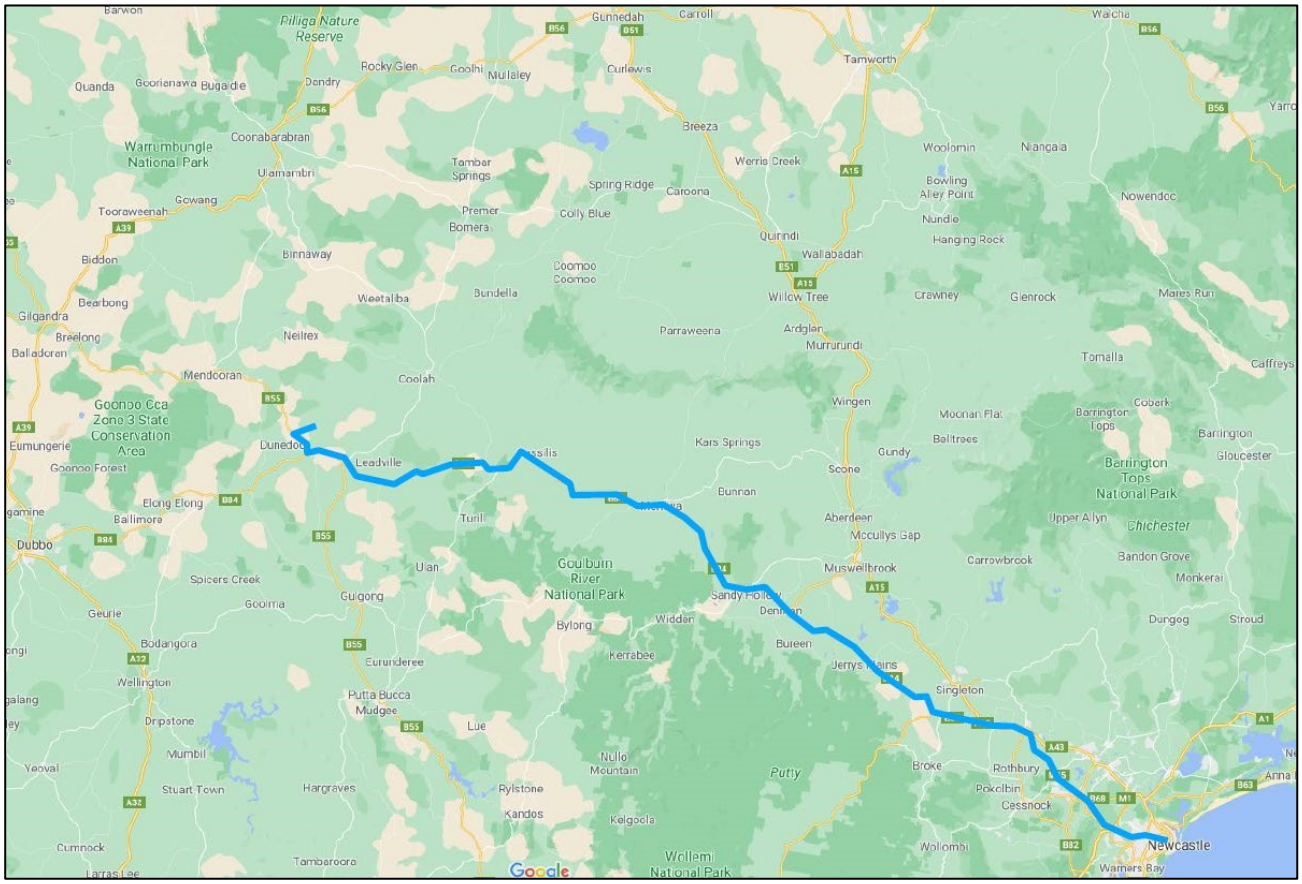
This analysis show that implementing the Left Turn Only Access at The Intersection does add journey time from the major supply centres considered. This is, however, considered a reasonable trade off to allow for safer operation of The Intersection.

INBOUND

Newcastle

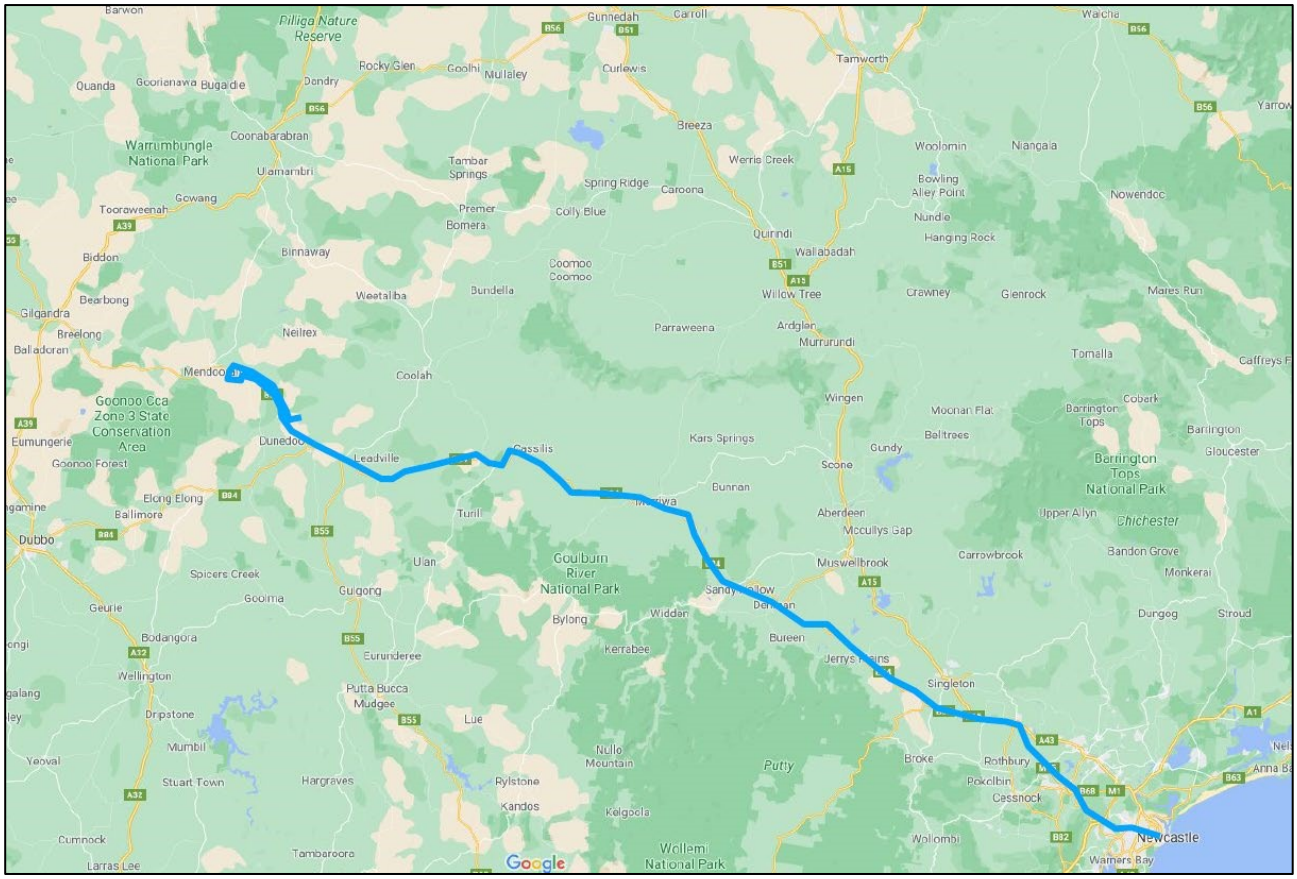
Option NI1 (baseline option for comparison with Left Turn Only Access options)

Estimated Travel Distance	300km
Estimated Travel Time	3 hrs 30 mins
Route Details	Vehicles can travel through Jerrys Plains, Denman, Sandy Hollow, Merriwa, Cassilis and then towards Dunedoo where they can turn right into Castlereagh Highway and then right into All Weather Road.
Benefits	Shortest route
Constraints	TfNSW is not supporting right turn into All Weather Road from Castlereagh Highway.



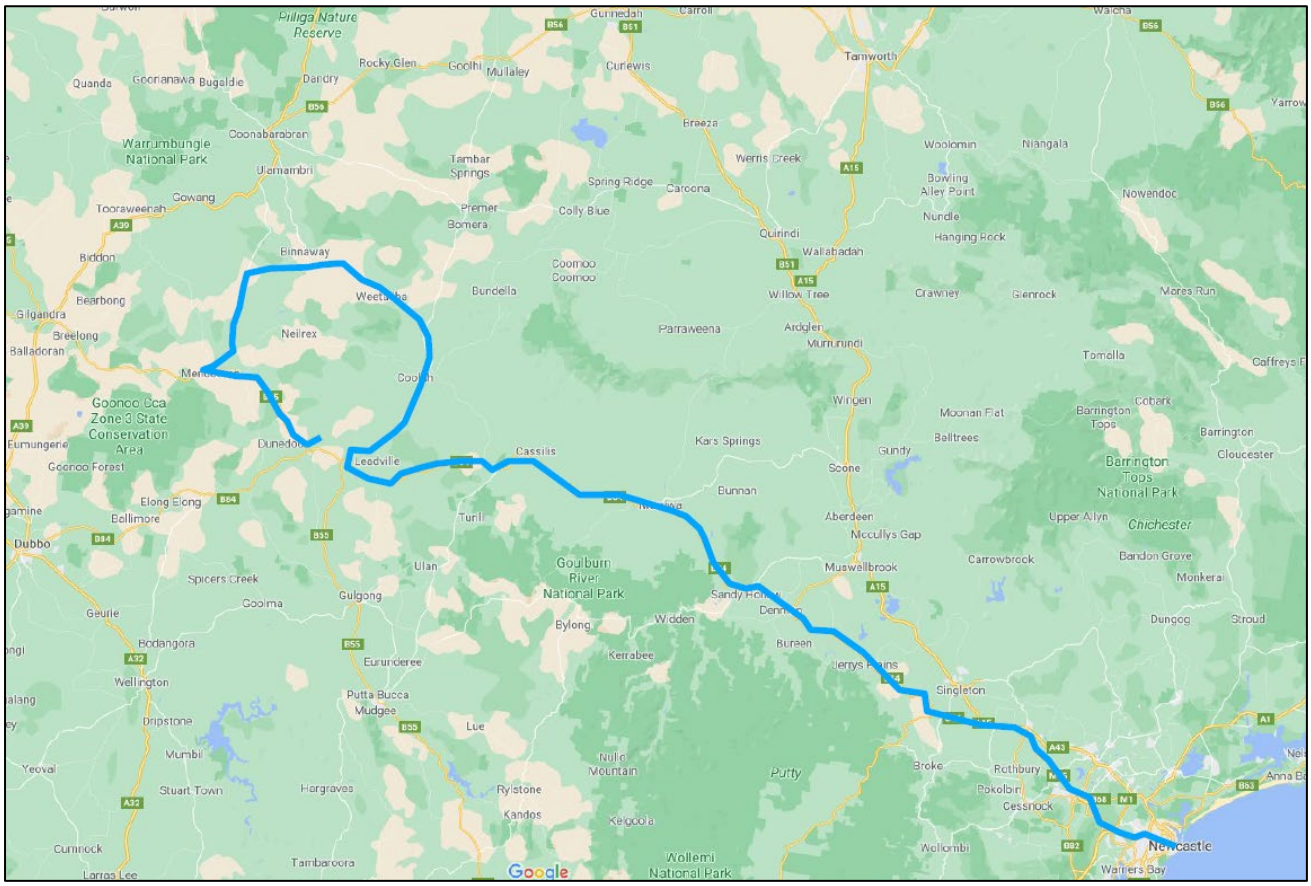
Option NI2

Estimated Travel Distance	370km
Estimated Travel Time	4 hrs 20 mins
Route Details	Same as Option 1, however instead of turning right into All Weather Road, vehicles can continue towards Mendooran where they can turn around and travel back towards Dunedoo via Castlereagh Highway and then turn left into All Weather Road.
Benefits	Vehicles can turn left into All Weather Road Relatively shorter route compared to other options
Constraints	Need to get approval from NHVR for heavy vehicles to use the local roads for turnaround at Mendooran (see **Figure 5** and **Figure 6** in Section E)



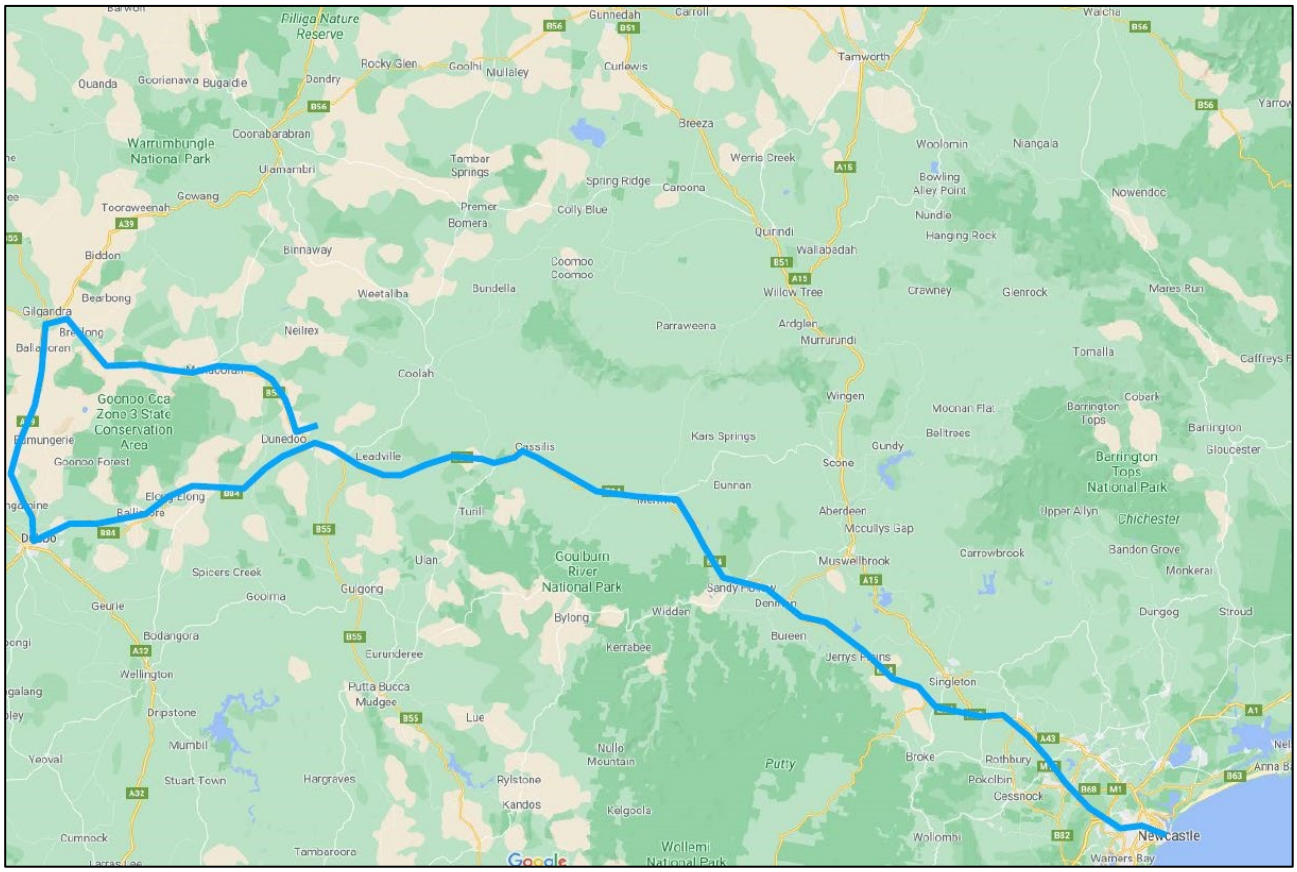
Option NI3

Estimated Travel Distance	407km
Estimated Travel Time	4 hrs 45 mins
Route Details	Same as Options 1, however vehicles can turn right at Cassilis and travel towards Coolah. Vehicles can travel through Weetaliba, Binnaway and Mollyan towards Mendooran where they can join back up with Castlereagh Highway. They can then travel southbound towards Dunedoo and turn left into All Weather Road.
Benefits	Vehicles will be able to turn left into All Weather Road. Vehicles can use the existing dedicated right turn lane to turn right into Black Stump Way from Golden Highway.
Constraints	Existing bridge located along Tooraweenah Road which crosses the Castlereagh River has a height limit of 4.9m but is not expected to limit transport to site. Need to get approval from NHVR for heavy vehicles to use some of the roads.



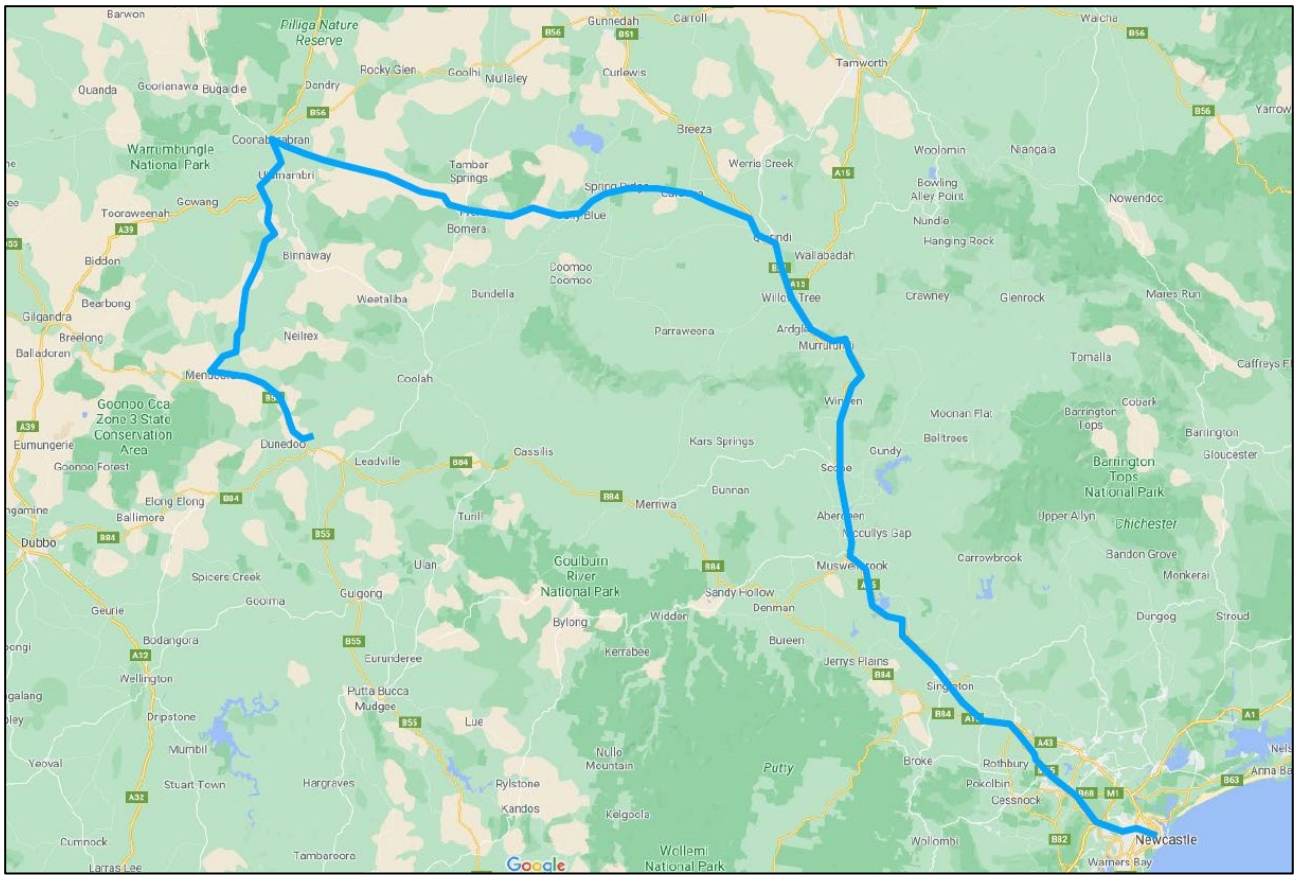
Option NI4

Estimated Travel Distance	532km
Estimated Travel Time	6 hrs
Route Details	Same as Option 1, however vehicles can pass Dunedoo and travel towards Dubbo where they can turn around, passing Gilgandra before making their way back towards Dunedoo via Castlereagh Highway and turn left into All Weather Road.
Benefits	Vehicles can turn left into All Weather Road Vehicles stay on state roads
Constraints	Much longer route



Option NI5

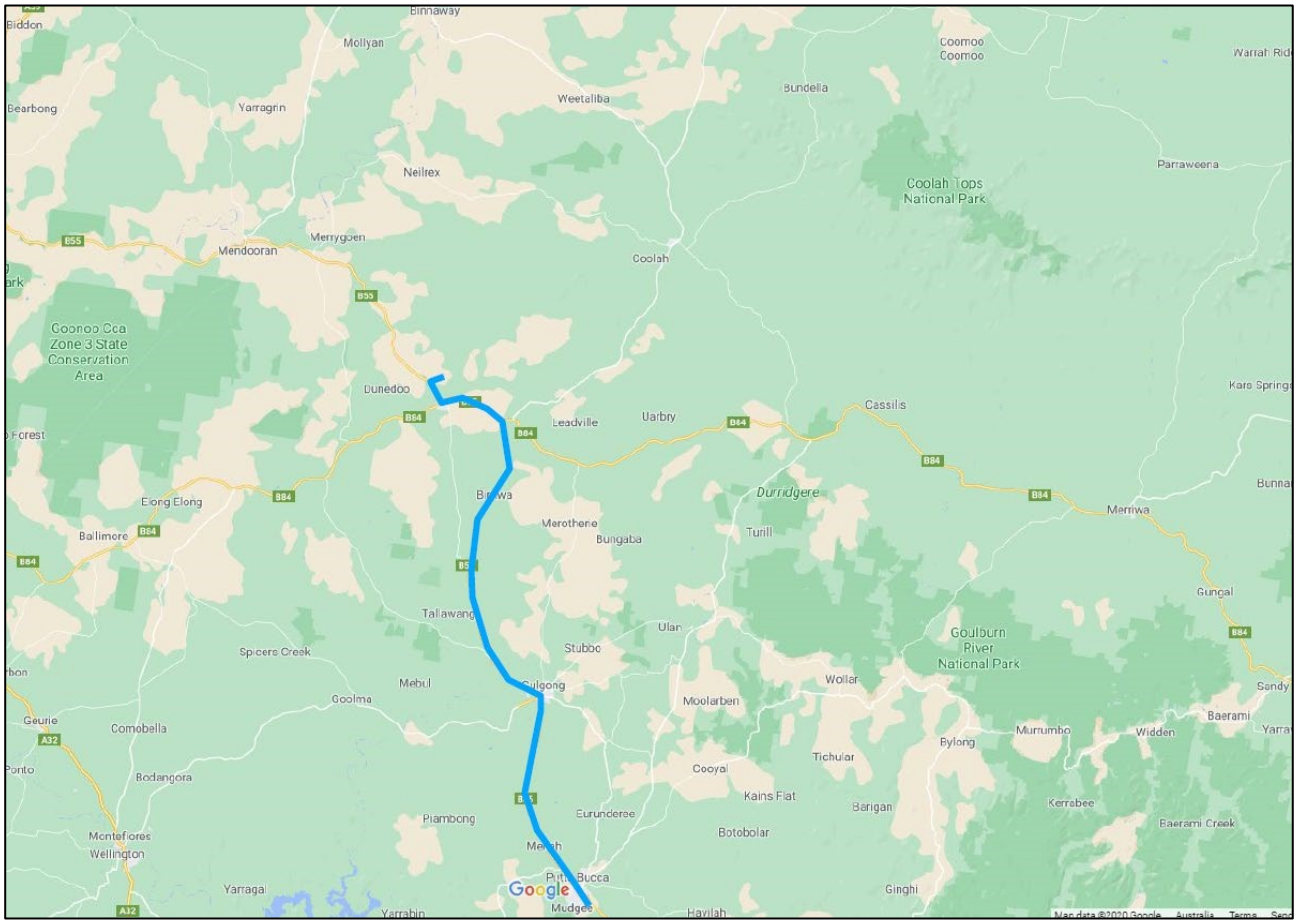
Estimated Travel Distance	480km
Estimated Travel Time	5 hrs 40 mins
Route Details	Vehicles can travel more north through Aberdeen, Scone and Murrundi before travelling west through Caroona and Premer, and then travelling south through Mendooran.
Benefits	Vehicles can turn left into All Weather Road
Constraints	Much longer route Existing bridge located along Tooraweenah Road which crosses the Castlereagh River has a height limit of 4.9m but is not expected to limit transport to site. Need to get approval from NHVR for heavy vehicles to use some of the roads.



MUDGEE

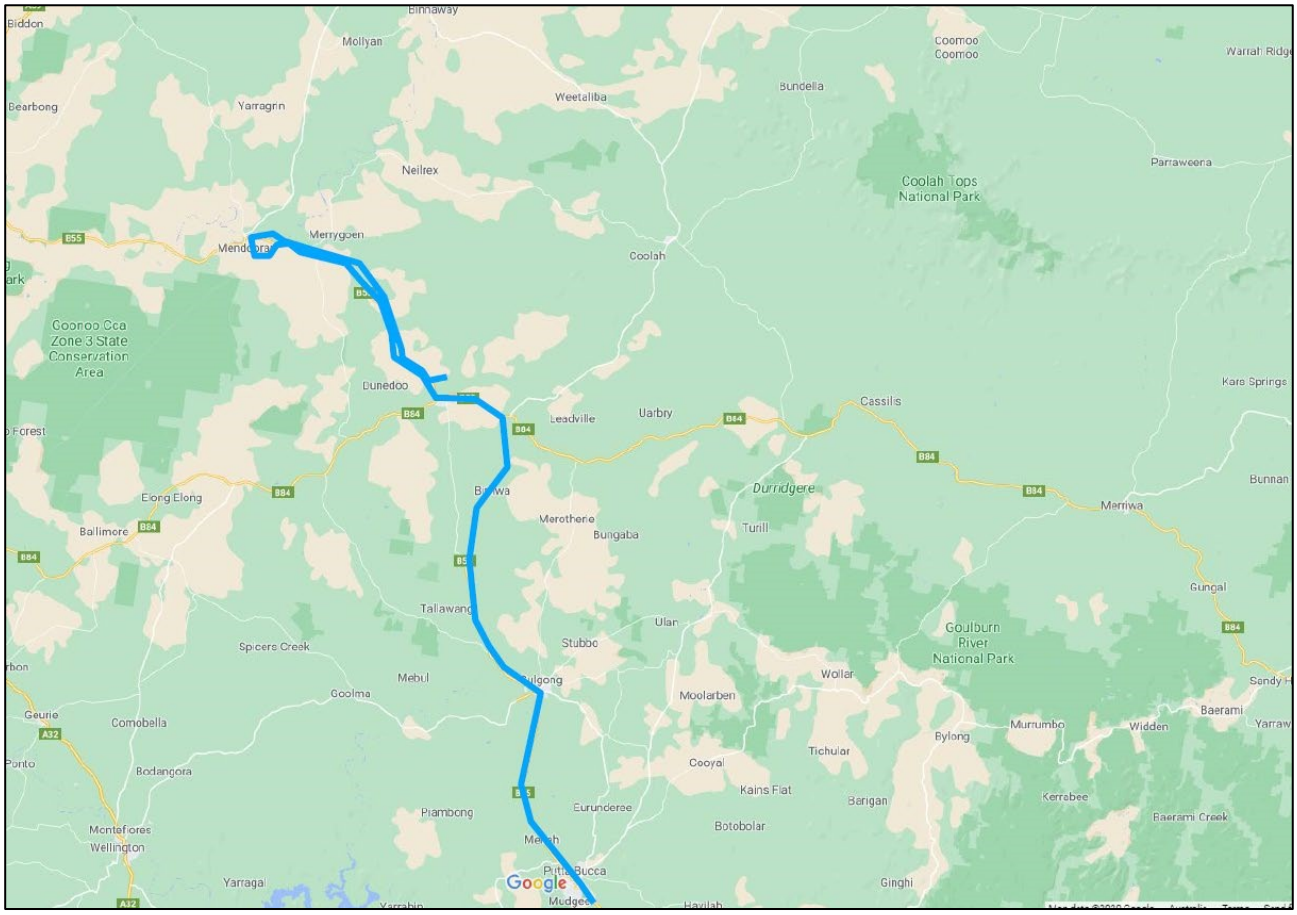
Option MI1 (baseline option for comparison with Left Turn Only Access options)

Estimated Travel Distance	85km
Estimated Travel Time	1 hr
Route Details	Travel north through Gulgong, Tallawang and Birriwa and then turn left onto Castlereagh Highway. Travel towards Dunedoo and then turn right into All Weather Road.
Benefits	Shortest route
Constraints	TfNSW is not supporting right turn into All Weather Road from Castlereagh Highway.



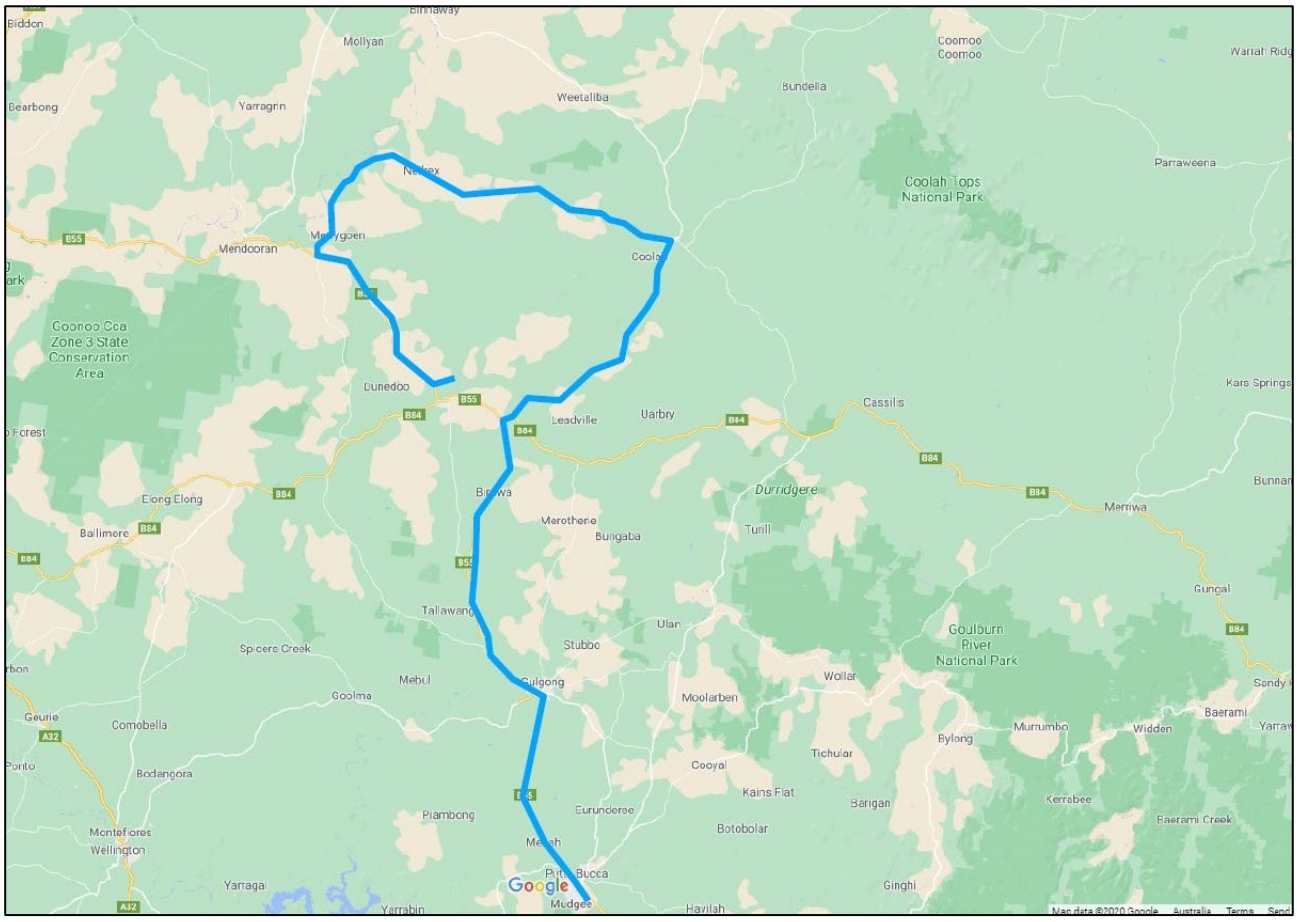
Option MI2

Estimated Travel Distance	160km
Estimated Travel Time	1 hr 50mins
Route Details	Same as Option 1, however instead of turning right into All Weather Road, vehicles can continue towards Mendooran where they can turn around and travel back towards Dunedoo via Castlereagh Highway and then turn left into All Weather Road.
Benefits	Vehicles can turn left into All Weather Road Relatively shorter route compared to other options
Constraints	Need to get approval from NHVR for heavy vehicles to use the local roads for turnaround at Mendooran (see **Figure 5** and **Figure 6** in Section E)



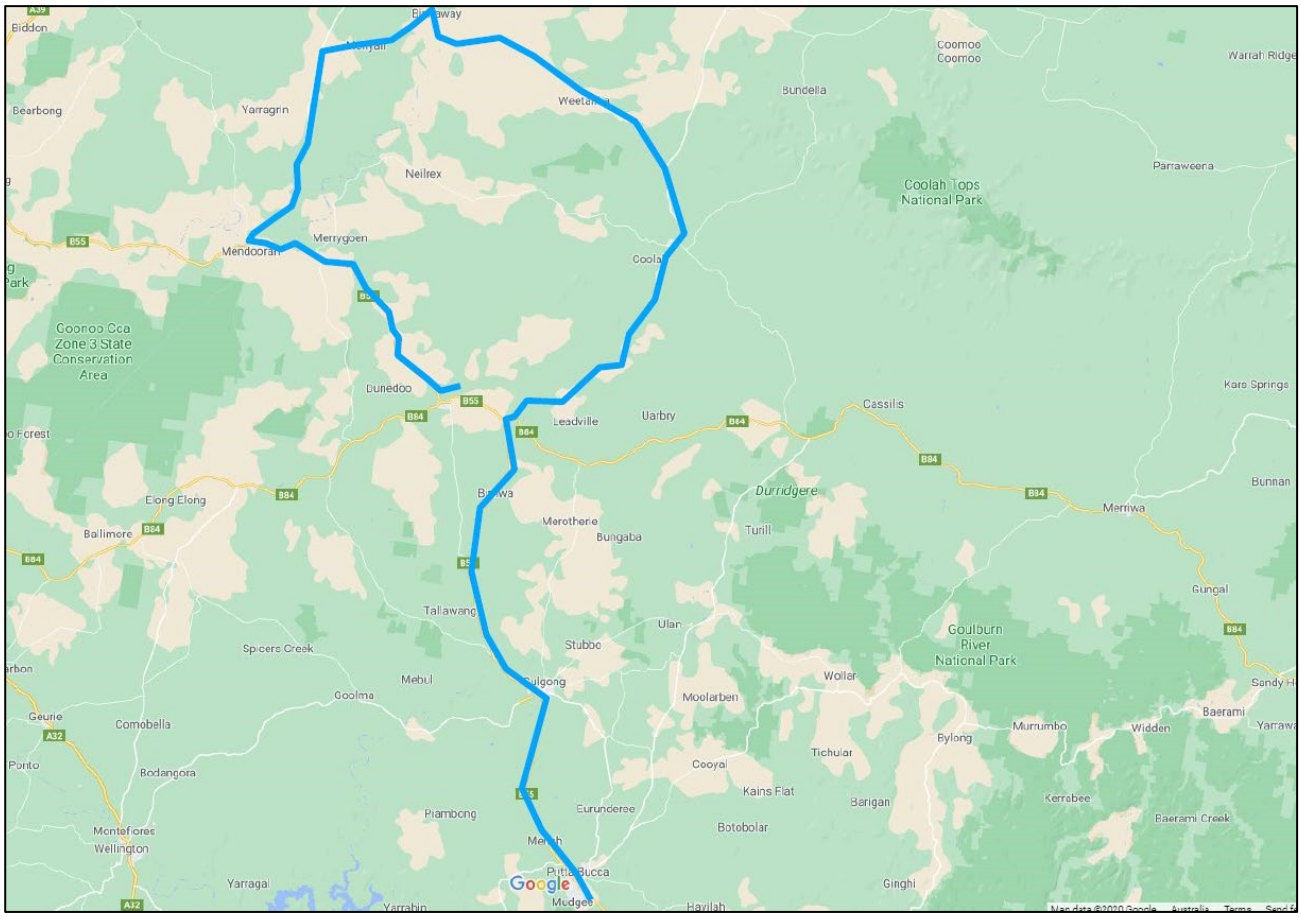
Option MI3

Estimated Travel Distance	197km
Estimated Travel Time	2 hrs 20 mins
Route Details	Travel north through Gulgong, Tallawang and Birriwa and then turn right at Castlereagh Highway. Vehicles can then turn right into Black Stump Way and travel towards Coolah and Neilrex before making their way back towards Castlereagh Highway and travelling southbound to turn left into All Weather Road.
Benefits	Vehicles can turn left into All Weather Road.
Constraints	Need approval from NHVR to use roads through Coolah, Neilrex and Merrygoen.



Option MI4

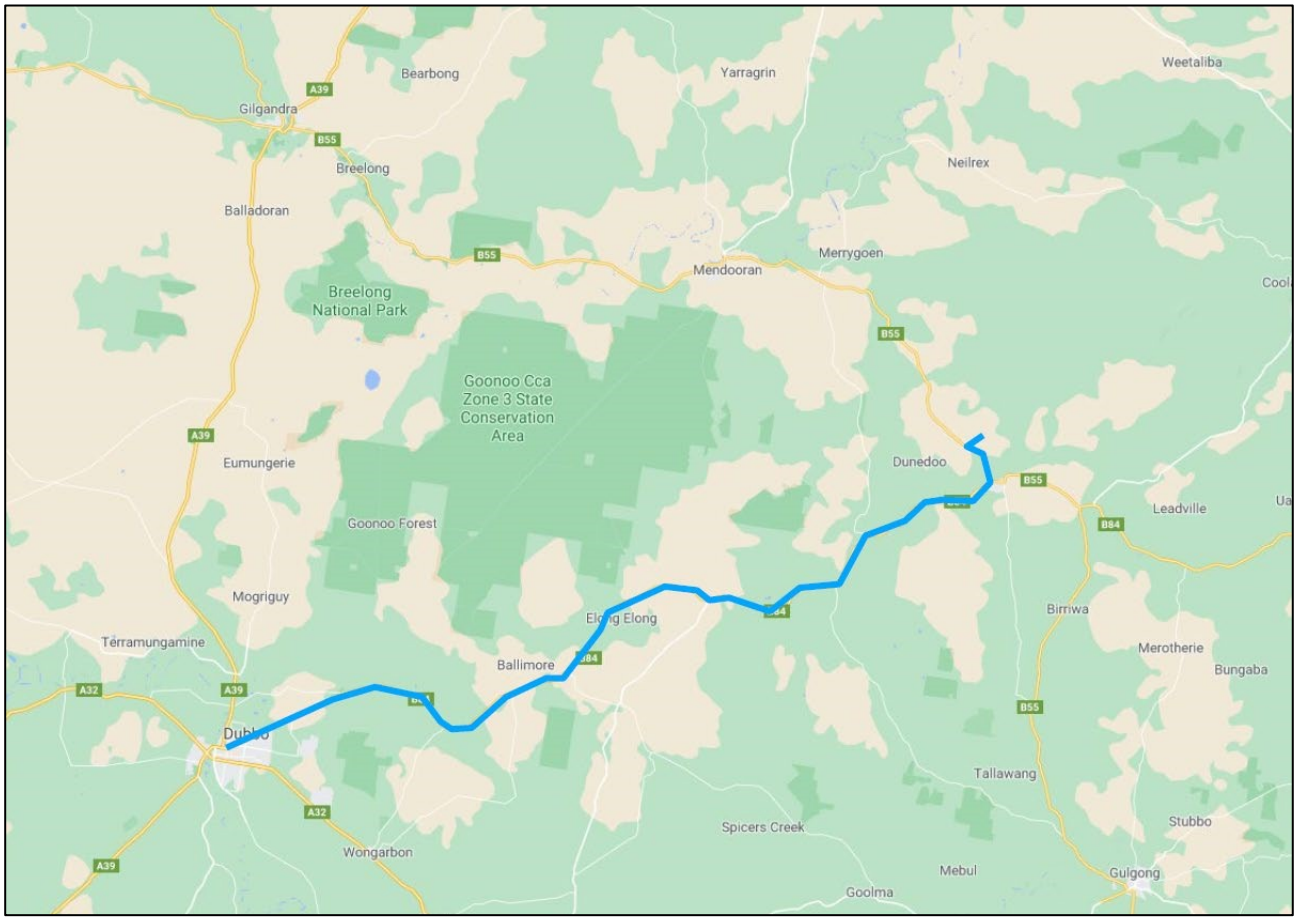
Estimated Travel Distance	240km
Estimated Travel Time	2 hr 40mins
Route Details	Same as Option 2, however vehicles can travel through Coolah, Weetaliba, Binnaway, Mollyan and then through Mendooran before joining back onto Castlereagh Highway and turning left into All Weather Road.
Benefits	Vehicles can turn left into All Weather Road
Constraints	Existing bridge located along Tooraweenah Road which crosses the Castlereagh River has a height limit of 4.9m but is not expected to limit transport to site. Need to get approval from NHVR for heavy vehicles to use some of the roads.



DUBBO

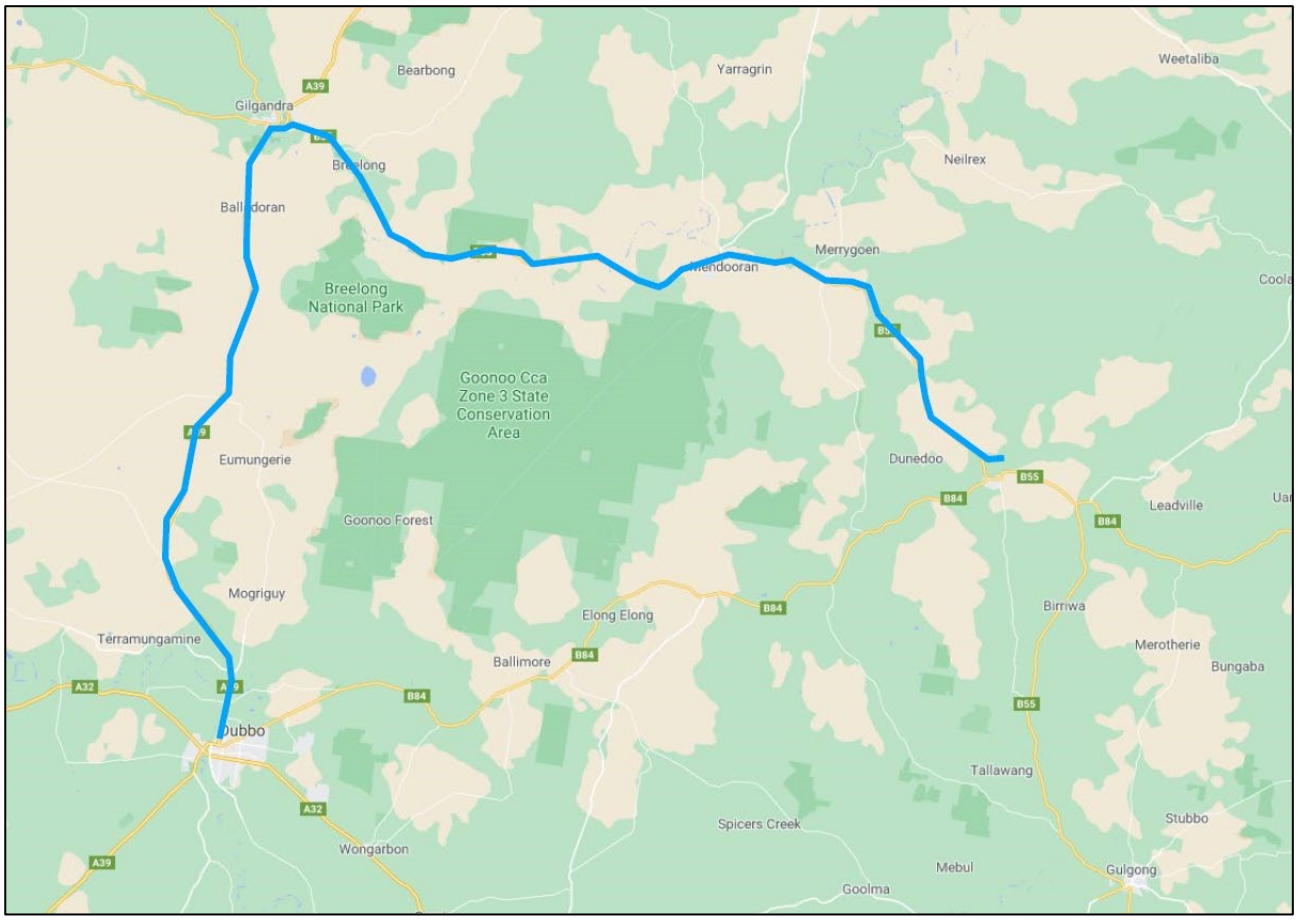
Option DI1 (baseline option for comparison with Left Turn Only Access options)

Estimated Travel Distance	88km
Estimated Travel Time	1 hr
Route Details	Vehicles can travel from Dubbo through Ballimore and Elong Elong via the B84 (Golden Highway) and then turn left into B55 (Castlereagh Highway) at Dunedoo before turning right into All Weather Road
Benefits	Shortest route
Constraints	TfNSW is not supporting right turn into All Weather Road from Castlereagh Highway.



Option DI2

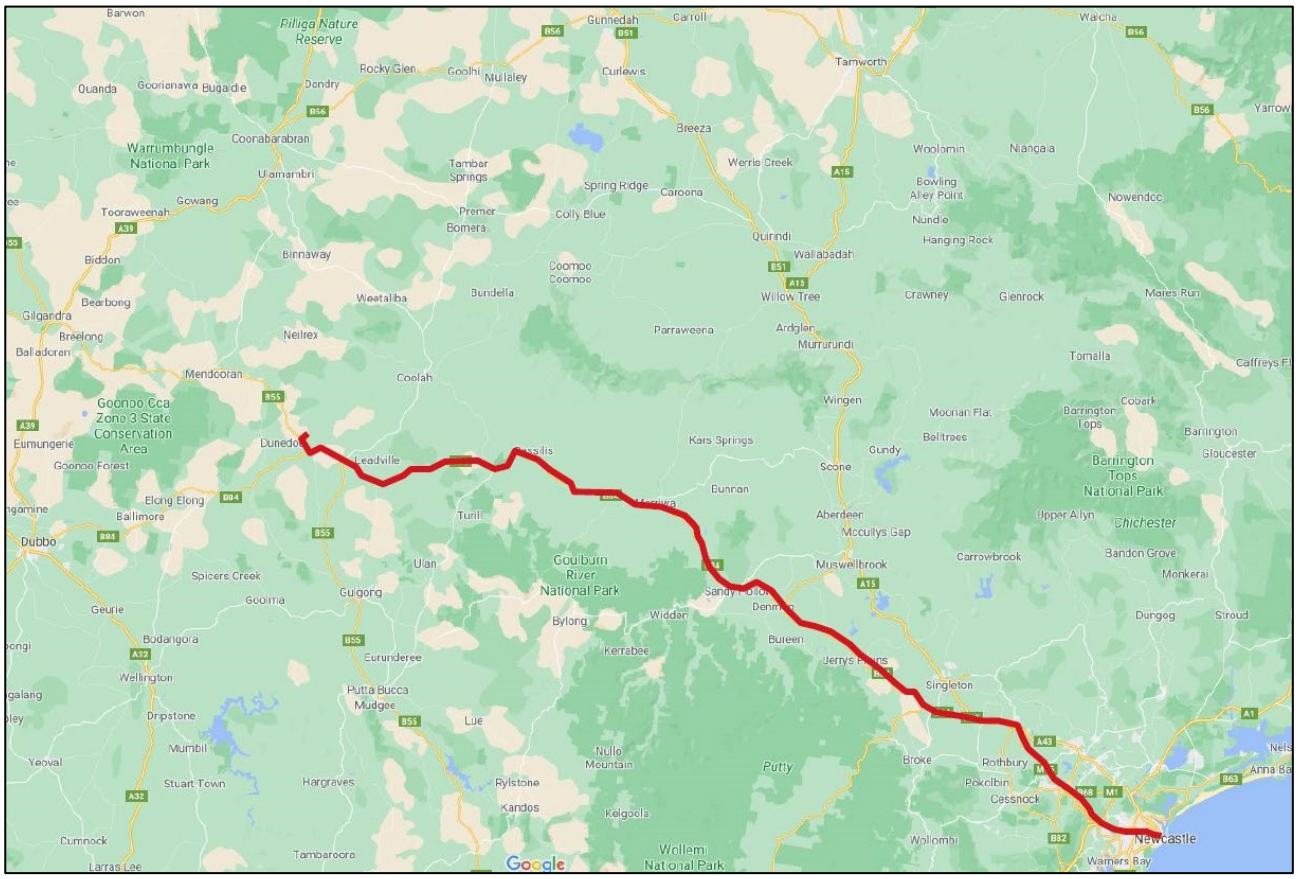
Estimated Travel Distance	153 km
Estimated Travel Time	1 hr 41 mins
Route Details	Vehicles can take a detour towards Gilgandra. At Gilgandra they can join up with Castlereagh Highway and travel towards Dunedoo where they can turn left into All Weather Road
Benefits	Vehicles can turn left into All Weather Road
Constraints	Longer Route



OUTBOUND

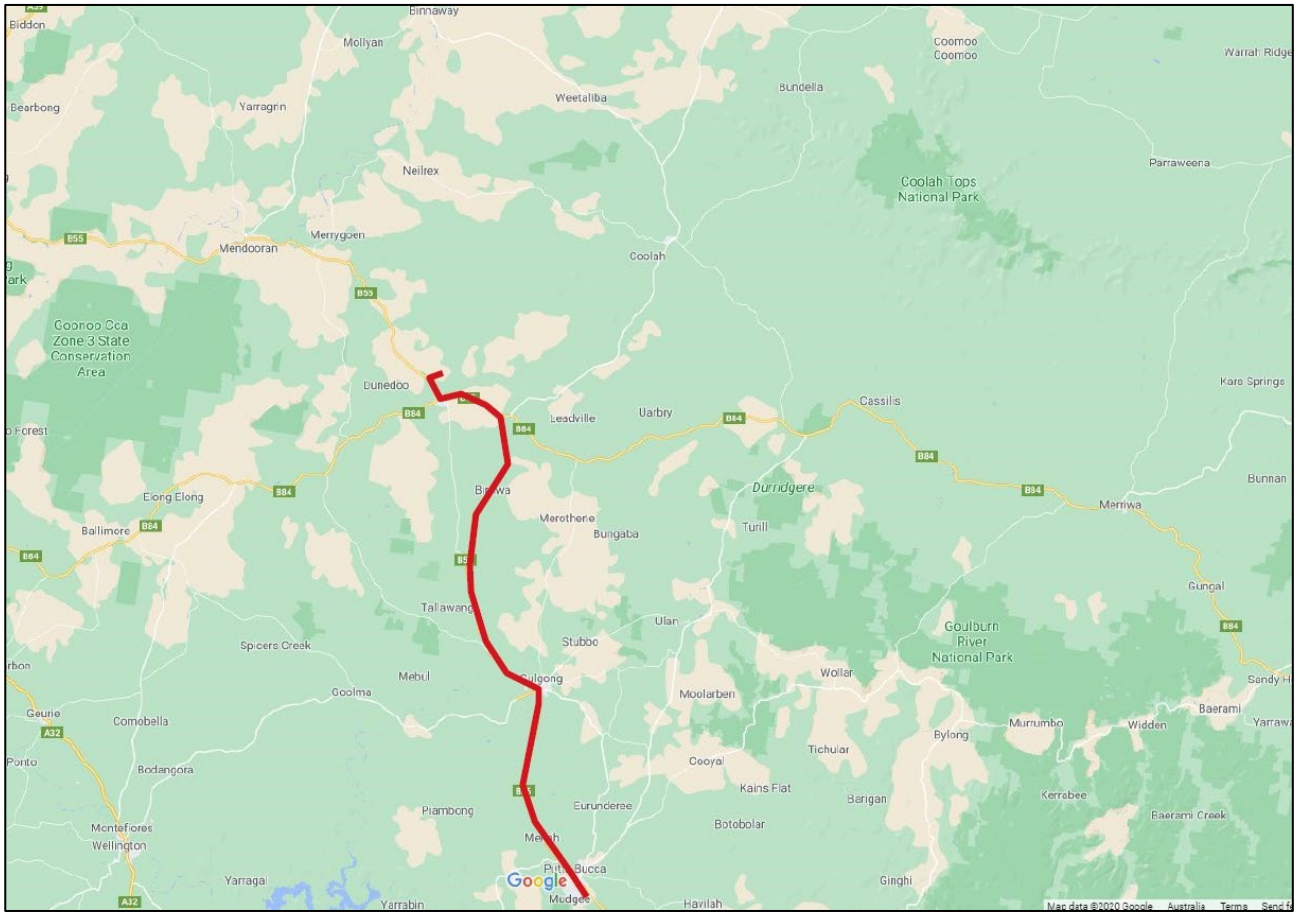
Newcastle NO1

Estimated Travel Distance	300km
Estimated Travel Time	3 hrs 30 mins
Route Details	Vehicles can turn left onto Castlereagh Highway from All Weather Road and then travel towards the east through Merriwa, Denman and Mt Thorley using the highways.



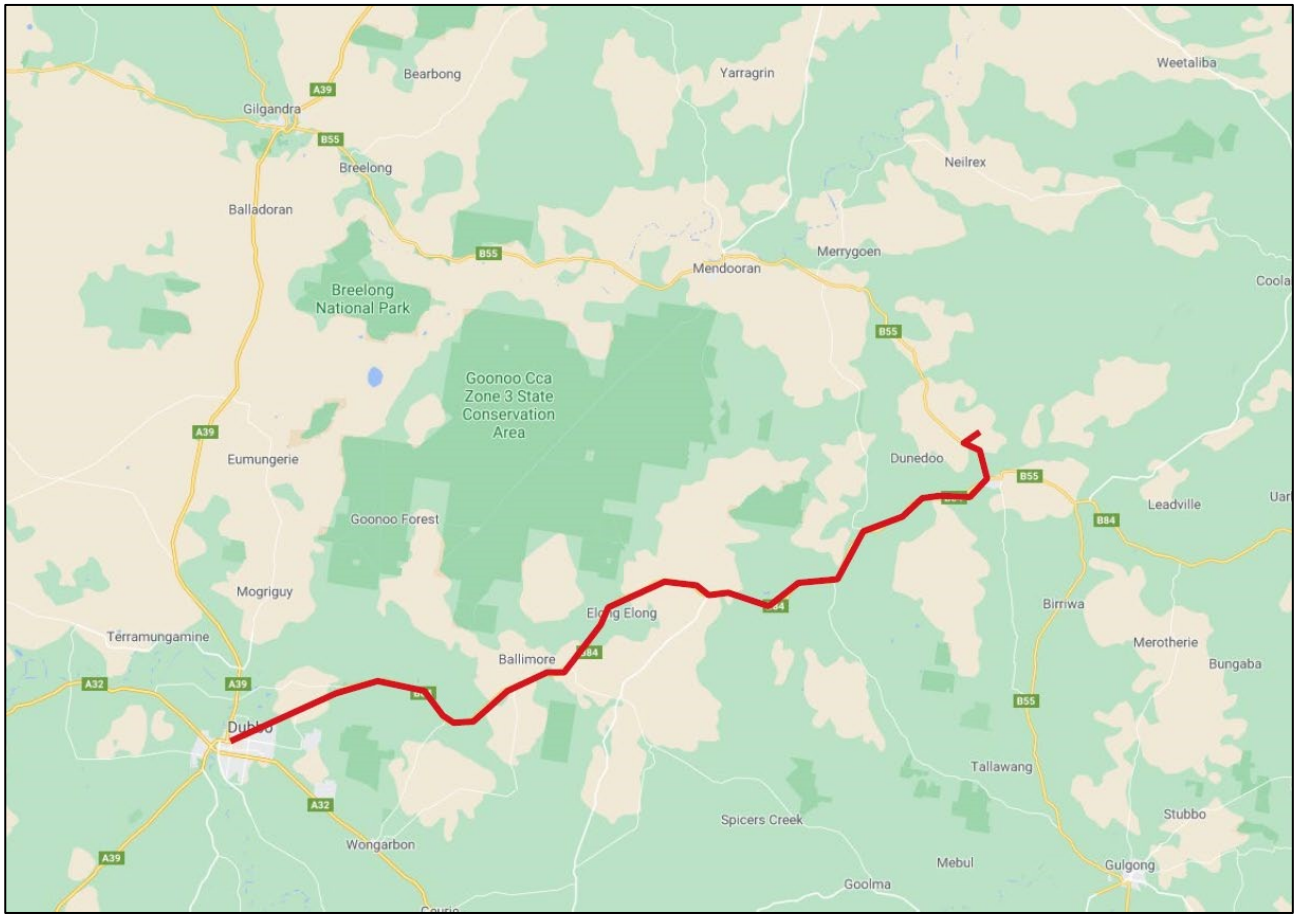
Mudgee MO1

Estimated Travel Distance	83km
Estimated Travel Time	1 hr
Route Details	Vehicles can turn left onto Castlereagh Highway from All Weather Road and then turn left onto B84 (Golden Highway) before continuing along B55 (Castlereagh Highway) and travelling through Birriwa, Gulong and Menah.



Dubbo DO1

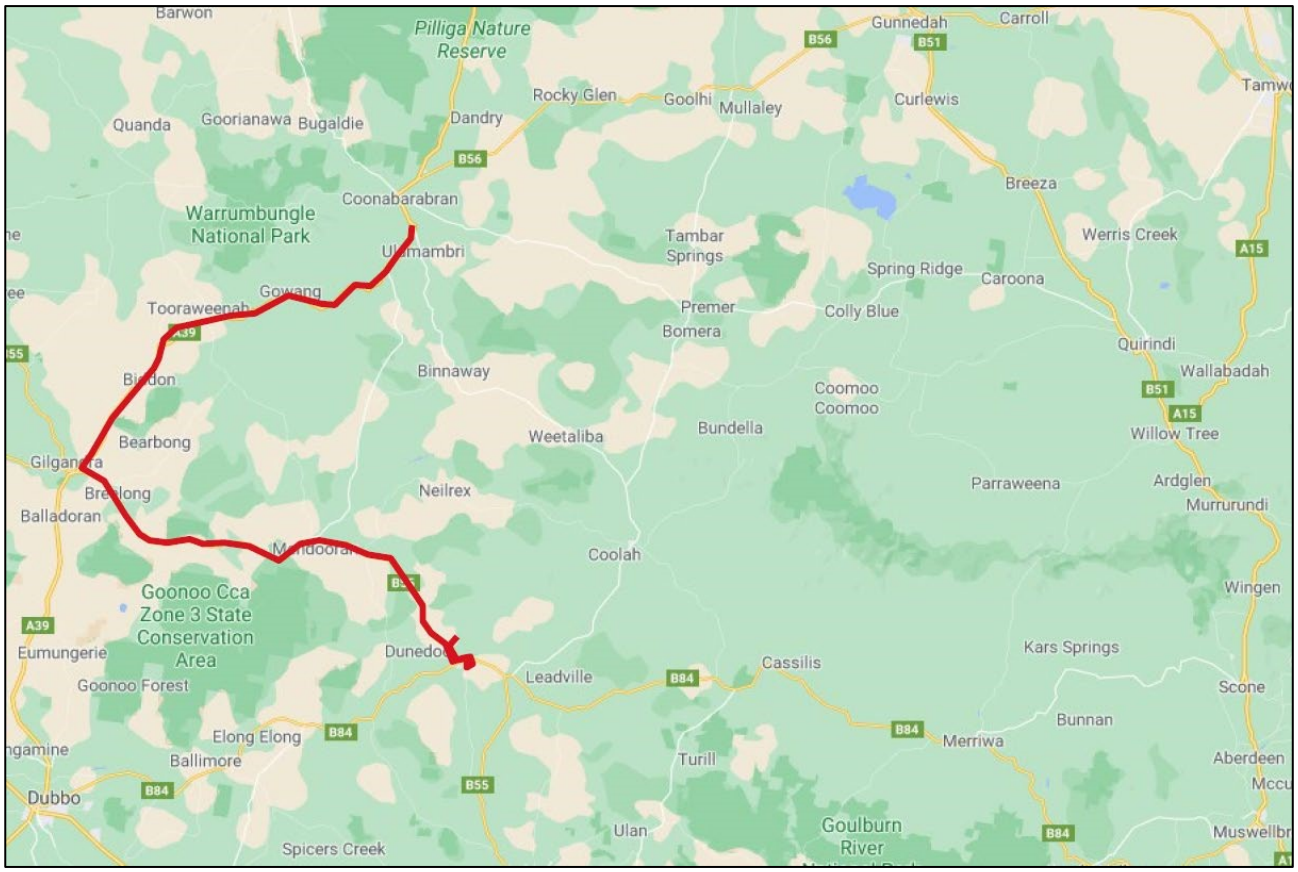
Estimated Travel Distance	88km
Estimated Travel Time	1 hr
Route Details	Vehicles can turn left onto Castlereagh Highway from All Weather Road and then turn right onto B84 (Golden Highway). They can continue along the B84 through Elong Elong and Ballimore before reaching Dubbo.



Heavy Vehicles Travelling Northbound to Coonabarabran

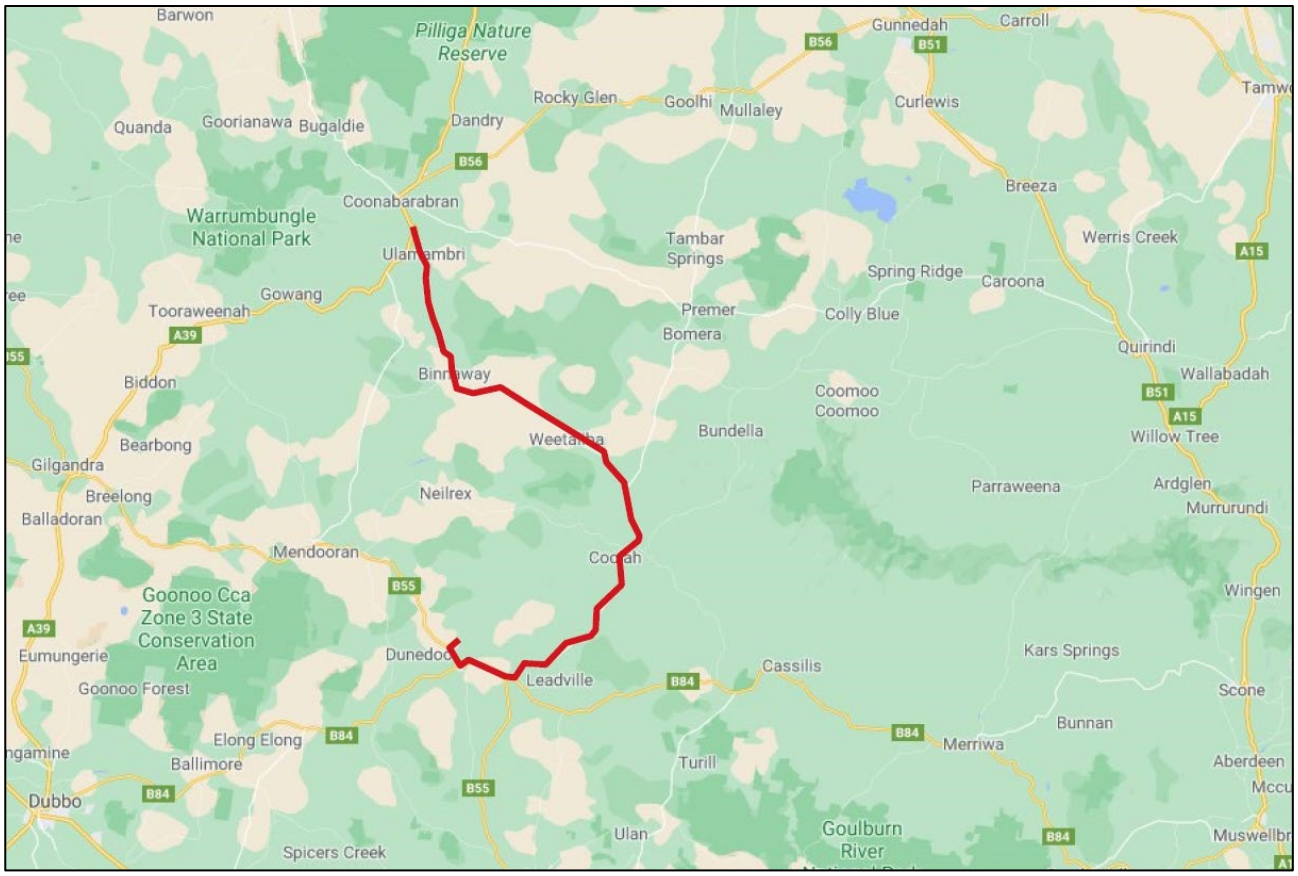
Option CO1

Estimated Travel Distance	180km
Estimated Travel Time	2 hrs
Route Details	Vehicles can turn left onto Castlereagh Highway from All Weather Road and then travel towards Dunedoo Town Centre. They can turn around at Dunedoo Town Centre by turning left into Mill Park Heavy Vehicle parking area and following it to the end before turning right back onto Castlereagh Highway and travel north
Benefits	Avoids right turns into major traffic stream from minor road. Vehicles will be able turnaround at Dunedoo Town Centre using existing heavy vehicle roadways/ facilities.
Constraints	Turnaround at Dunedoo will add to travel time.



Option CO2

Estimated Travel Distance	128km
Estimated Travel Time	1 hr 30 mins
Route Details	Vehicles can turn left onto Castlereagh Highway from All Weather Road and travel towards the east, using B84 (Golden Highway), before turning left onto Black Stump Way. They can then travel northbound through Coolah, Binnaway and Wattle Springs before joining A39 (Newell Highway)
Benefits	Shortest Route
Constraints	Need to get approval from NHVR for heavy vehicles to use some of the roads.



G. LIGHT VEHICLE AND BUS ACCESS DURING FLOODING OF DIGILAH ROAD

The proposal is for light vehicles and shuttle buses transporting workers to enter and exit site via Digilah Road and All Weather Road. During relatively minor flooding events, Digilah Road is inundated at the Talbragar River and the road can become unpassable for many days.

During periods where Digilah Road is flooded, it is proposed that light vehicles and shuttle buses are able to turn right at The Intersection. The volume of light vehicles/ shuttle buses requiring to turn right into All Weather Road is expected to be minor and the risk to other road users is expected to be minimal using this approach given the small number of vehicle movement each day. Majority of the light vehicle/ shuttle bus movements are expected to occur at the start and end of each construction day (workers arriving/ departing site). Moreover, the likelihood that river flooding may occur only accounts for a small percentage of days during construction.

H. TRAFFIC CONTROL PLAN FOR CONSTRUCTION

The major traffic management measures recommended to minimise The Intersection risk as far as reasonably possible (in conjunction with other recommendations) are as follows:

- Install 'Trucks Turning' signs, during construction, on the Castlereagh Highway approaches to The Intersection;
- Install a VMS board, during construction, along the southern approach to The Intersection, approx. 1.0km distance, which informs drivers of 'No Right Turn for Construction Vehicles at All Weather Road'; and

Details of the traffic management measures to be implemented at The Intersection for heavy vehicles during construction are to be included in the Construction Traffic Management Plan developed prior to construction commencing in consultation with TfNSW and WSC. Traffic Control Plans will also be included in the Construction Traffic Management Plan.

I. CONCLUSIONS

Stantec has analysed a number of elements of the Left Turn Only Access at The Intersection and draws to the following conclusions:

- The intersection exceeds sight distances as defined in the Austroads design requirements;
- Austroads design requirements specify a BAL treatment at the intersection;
- A median island on Castlereagh Highway or All Weather Road, to physically prevent right hand turns at The Intersection is not recommended as both are substandard with Austroad Guidelines and will adversely impact existing road users, particularly emergency services during Talbragar River flooding. Therefore it is not recommended, considering the low traffic volumes, short duration of construction and other recommendations herein;
- A concept design of an AUL(S) has been presented to demonstrate simultaneous exit and entry of the largest design vehicle (26m B-Double) and 42m slip lane for additional safety of other south bound road users. The increase in treatment to an AUL from the required BAL is considered significant safety upgrade to reasonably reduce risk at The Intersection;
- A heavy vehicle construction transport route using Left Turn Only Access has been presented. This includes Left Turn Only Access, right turns into and out of All Weather Road prohibited and safe turn around locations in Mendooran and Dunedoo;
- Feasible regional and state road routes are shown to provide appropriate access for heavy vehicles to the Castlereagh Highway during construction;
- During periods of flood inundating Digilah Road, light vehicles and buses transporting workers to site should be able to turn right off the Castlereagh Highway; and
- Traffic management options have been presented showing the management actions that could be implemented at The Intersection to further minimise the transport risk as far as reasonably possible.

J. RECOMMENDED RISK BASED SOLUTION

Based on the above analysis, the following is recommended for this project to appropriately reduce the risk at The Intersection as far as reasonably possible given the relatively low traffic volumes and short duration of construction:

- Require, via a condition of consent, The Intersection be upgraded to AUL(S) consistent with the concept design at **Attachment C** and Austroad Guidelines Part 4a. The Intersection will need to be upgraded to accommodate the largest vehicles (26m B-Double) to use the junction during construction;
- Require, via a condition of consent, a heavy vehicle construction transport route as presented in **Section E** of this document including the Left Turn Only Access, prohibition of right turns at The Intersection and provision of safe turn around locations in Mendooran and Dunedoo; and
- Require, via a condition of consent, a construction traffic management plan be implemented in line with **Section H** or as otherwise agreed with TfNSW and WSC.

We trust that the information provided will assist with preparing the RTS to be submitted to the DPIE. If there are any issues or queries you would like to discuss, please do not hesitate to contact the undersigned.

Yours sincerely,

Sunny Hong
Traffic Engineer
Phone: 9493 9741
sunny.hong@stantec.com

ATTACHMENTS

Attachment A – Median island along All Weather Road Concept Design by LG Civil

Attachment B – Median island along Castlereagh Highway Concept Design by LG Civil

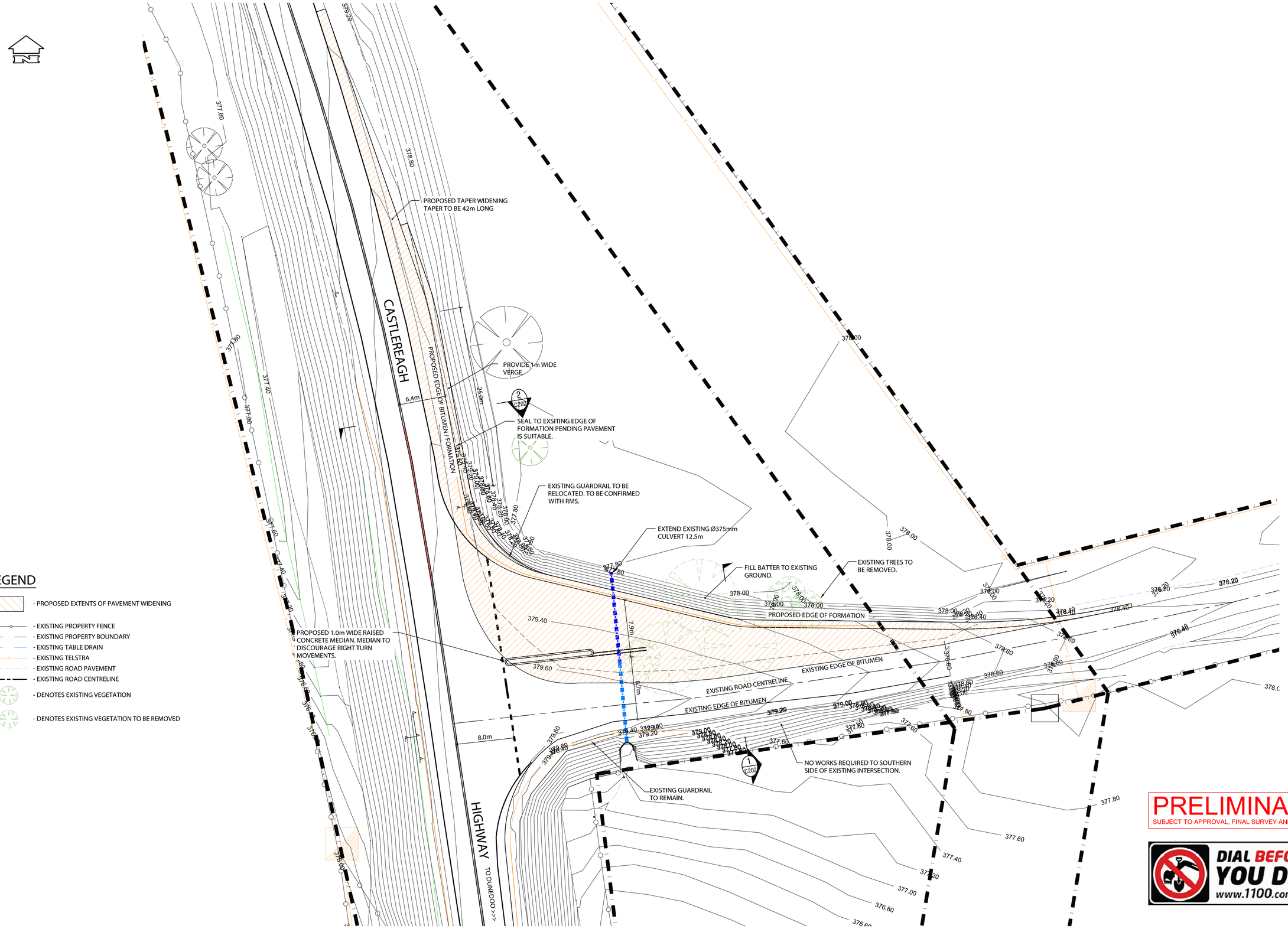
Attachment C – AUL concept design by LG Civil

Stantec

Memo

ATTACHMENT A
MEDIAN ISLAND ALONG ALL WEATHER ROAD CONCEPT DESIGN BY LG CIVIL

A1 SHEET



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

PRELIMINARY
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A	PRELIMINARY ISSUE.	07/01/21	MG				

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PROPOSED INTERSECTION CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

PROPOSED INTERSECTION LAYOUT PLAN

Scale
Horizontal:
0 2.5 5 7.5 10 12.5
SCALE 1:250 (A1)

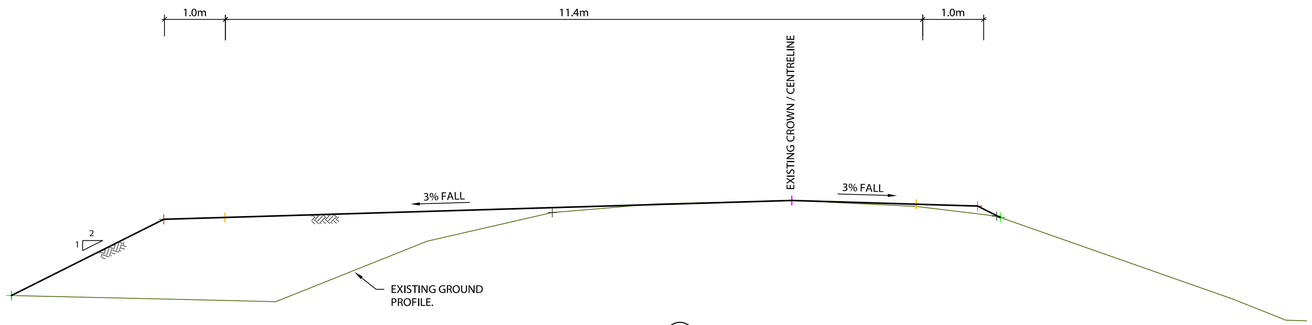
CIVIL DRAWING

Designed	GD
Drawn	MG
Datum	AHD
Date	SEP 19

Approved on behalf of RHM Consulting Engineers
Project Engineer/Director Date

Drawing No: - C200 Rev A

A1 SHEET



SECTION 1
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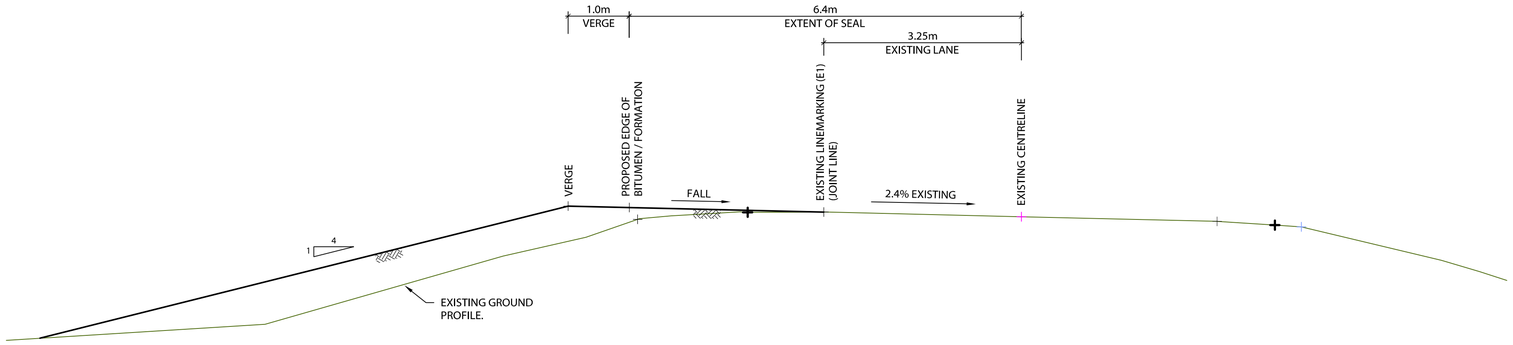

SECTION 2
SCALE 1:50 C200

CASTLEREAGH HIGHWAY

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A	AMENDED INTERSECTION - FOR DISCUSSION	07/01/21	MG				

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PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

CROSS SECTIONS

Scale
Horizontal:
0 2.5 5 7.5 10 12.5
SCALE 1:250 (A1)

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	- C202	A

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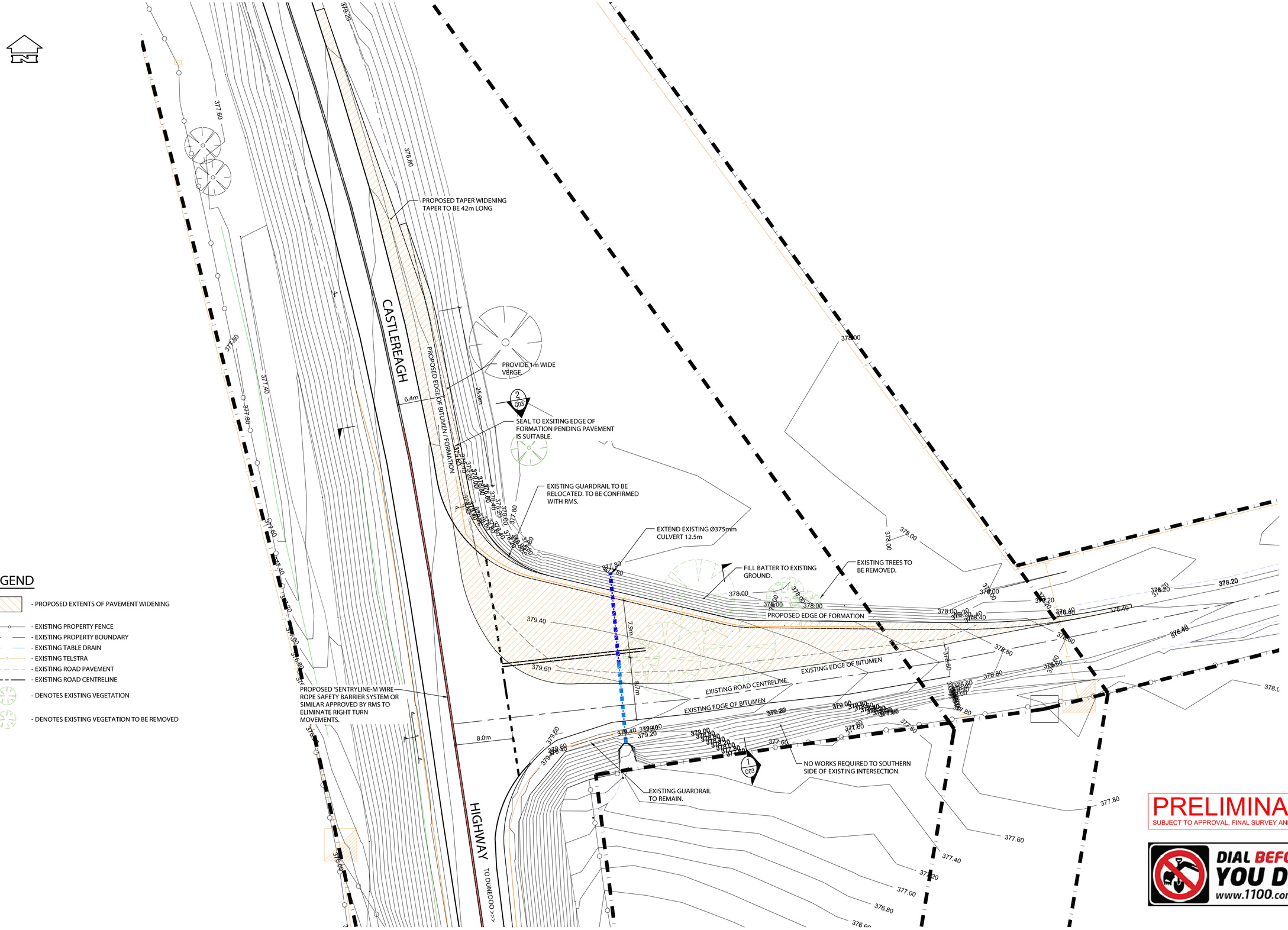
ATTACHMENT B
MEDIAN ISLAND ALONG CASTLEREAGH HIGHWAY CONCEPT DESIGN BY LG CIVIL

A1 SHEET



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

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C	AMENDED INTERSECTION - FOR DISCUSSION	17/12/20	MG				
B	ISSUED FOR APPROVAL.	04/03/20	MG				
A	PRELIMINARY ISSUE.	24/02/20	MG				

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PROPOSED INTERSECTION CASTEREAGH HIGHWAY DUNEDOO NSW

LGCIVIL

PROPOSED INTERSECTION LAYOUT PLAN

Scale
Horizontal:
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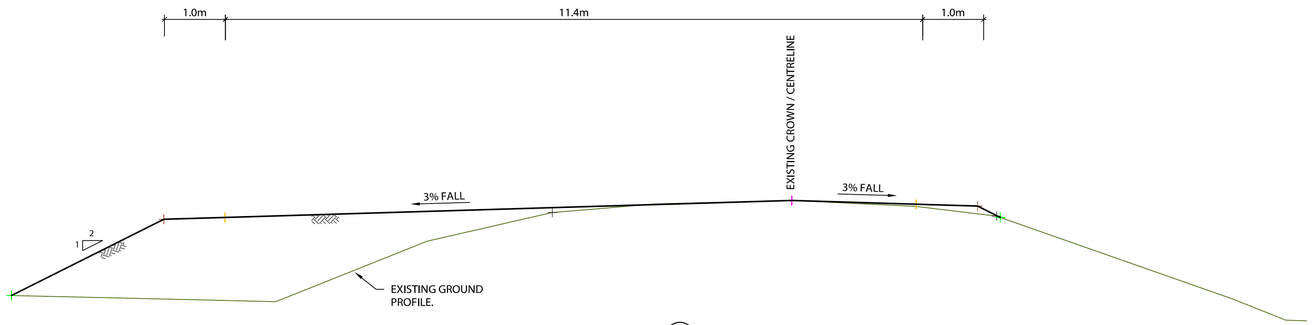
SCALE 1:250 (A1)

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	C

A1 SHEET



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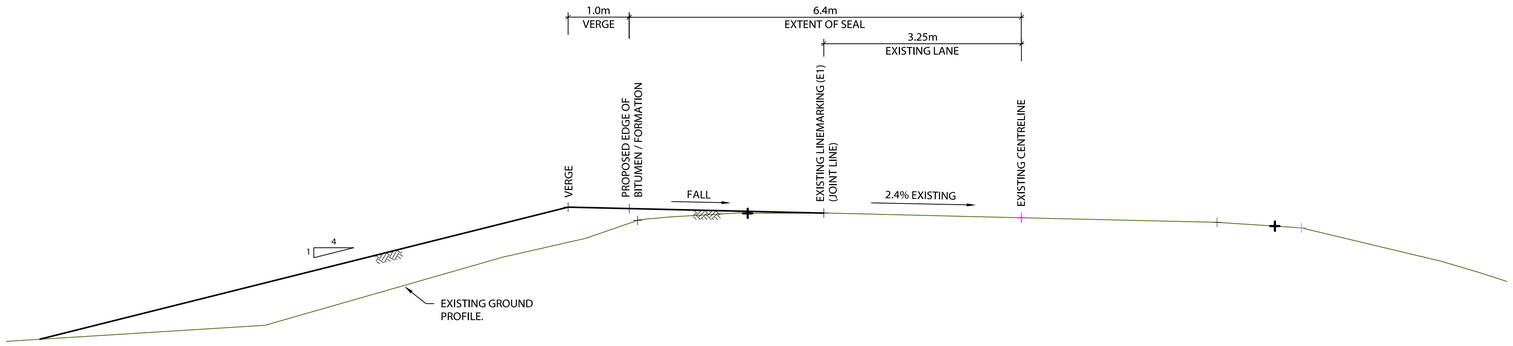

SECTION 2
SCALE 1:50 C01

CASTLEREAGH HIGHWAY

PRELIMINARY
SUBJECT TO APPROVAL, FINAL SURVEY AND DESIGN

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A	AMENDED INTERSECTION - FOR DISCUSSION	17/12/20	MG				

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PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

CROSS SECTIONS

Scale
Horizontal:
0 2.5 5 7.5 10 12.5
SCALE 1:250 (A1)

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	- C03	A

Stantec

Memo

ATTACHMENT C
AUL CONCEPT DESIGN BY LG CIVIL

A1 SHEET

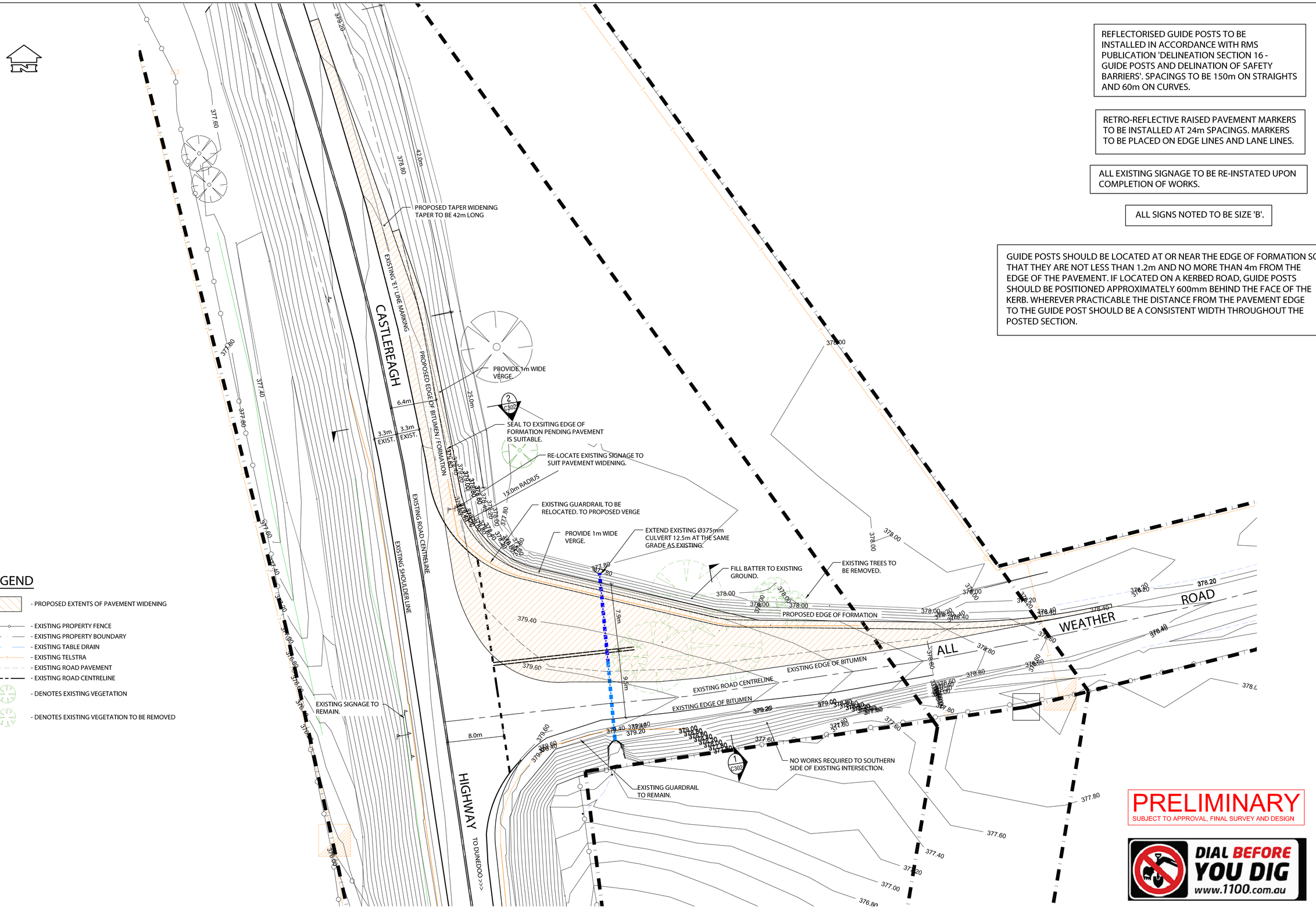
REFLECTORISED GUIDE POSTS TO BE INSTALLED IN ACCORDANCE WITH RMS PUBLICATION 'DELINEATION SECTION 16 - GUIDE POSTS AND DELINATION OF SAFETY BARRIERS'. SPACINGS TO BE 150m ON STRAIGHTS AND 60m ON CURVES.

RETRO-REFLECTIVE RAISED PAVEMENT MARKERS TO BE INSTALLED AT 24m SPACINGS. MARKERS TO BE PLACED ON EDGE LINES AND LANE LINES.

ALL EXISTING SIGNAGE TO BE RE-INSTATED UPON COMPLETION OF WORKS.

ALL SIGNS NOTED TO BE SIZE 'B'.

GUIDE POSTS SHOULD BE LOCATED AT OR NEAR THE EDGE OF FORMATION SO THAT THEY ARE NOT LESS THAN 1.2m AND NO MORE THAN 4m FROM THE EDGE OF THE PAVEMENT. IF LOCATED ON A KERBED ROAD, GUIDE POSTS SHOULD BE POSITIONED APPROXIMATELY 600mm BEHIND THE FACE OF THE KERB. WHEREVER PRACTICABLE THE DISTANCE FROM THE PAVEMENT EDGE TO THE GUIDE POST SHOULD BE A CONSISTENT WIDTH THROUGHOUT THE POSTED SECTION.



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

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PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

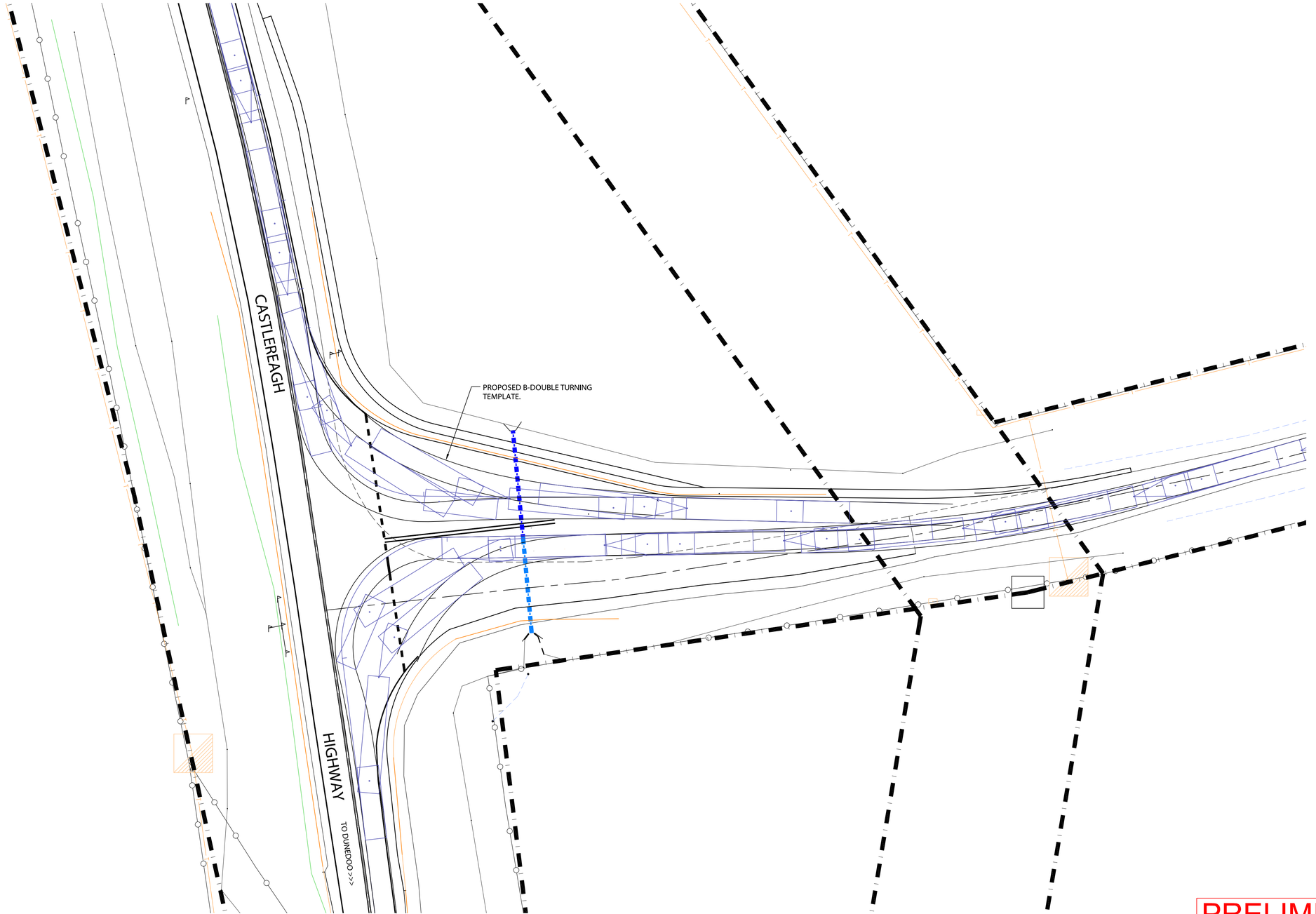
PROPOSED INTERSECTION
LAYOUT PLAN

Scale
Horizontal:
0 2.5 5 7.5 10 12.5
SCALE 1:250 (A1)

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	A

A1 SHEET



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SUBJECT TO APPROVAL, FINAL SURVEY AND DESIGN

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A	ISSUED FOR APPROVAL.	08/02/21	MG				

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PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

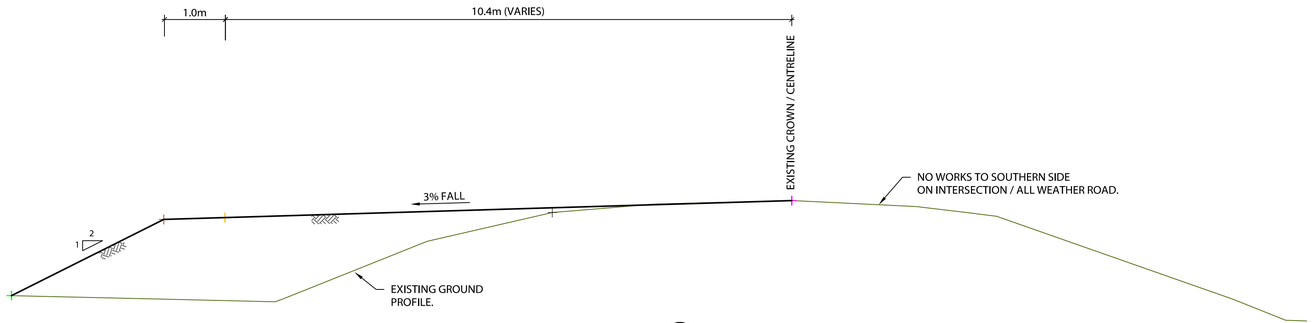
TURNING TEMPLATE
DIAGRAM
LEFT OUT / LEFT IN

Scale
Horizontal:
0 2.5 5 7.5 10 12.5
SCALE 1:250 (A1)

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	A

A1 SHEET



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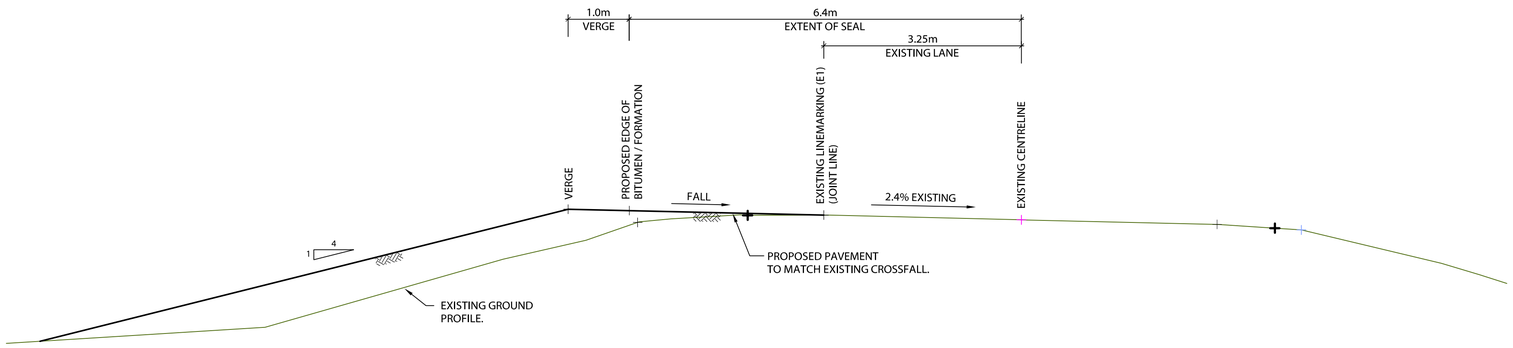

SECTION 2
SCALE 1:50 C300

CASTLEREAGH HIGHWAY

PRELIMINARY
SUBJECT TO APPROVAL, FINAL SURVEY AND DESIGN

REV	DESCRIPTION	DATE	BY	REV	DESCRIPTION	DATE	BY
A	ISSUED FOR APPROVAL.	08/02/21	MG				

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PROPOSED INTERSECTION
CASTEREAGH HIGHWAY
DUNEDOO NSW

LGCIVIL

TYPICAL CROSS SECTIONS

Scale
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SCALE 1:250 (A1)

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	- C03	A