Tarraleah Redevelopment Project
Development Application

Appendix B

Traffic Impact Assessment

Hydro Tasmania

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Abbreviations

Table 1: Abbreviations

Abbreviation	Description
AGRD Part 3	Austroads Guide to Road Design Part 3: Geometric Design (2021)
AGRD Part 4A	Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2021)
AS 2890.1	AS/NZS 2890.1:2004 Off-street car parking
AS 2890.2	AS 2890.2:2018 Off-street commercial vehicle facilities
AS 2890.3	AS 2890.3:2015 Parking facilities: Bicycle parking
AS 2890.6	AS/NZS 2890.6:2022 Parking facilities: Off-street parking for people with disabilities
ASD	Approach sight distance
AUL	Auxiliary left turn facility
AUR	Auxiliary right turn facility
Austroads Guide to Traffic Management Part 6	Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (2020)
Austroads Guide to Traffic Management Part 12	Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (2020)
AV	Articulated vehicle
BAR	Basic right turn facility
BAL	Basic left turn facility
CHL	Channelised left turn facility (full length)
CHL(s)	Channelised left turn facility (short)
CHR	Channelised right turn facility (full length)
CHR(S)	Channelised right turn facility (short)
Council	Central Highlands Council
DA	Development Application
EIS	Environmental Impact Statement
GML	General Mass Limits
HML	Higher Mass Limits
HVNL	Heavy Vehicle National Law
Hydro	Hydro Tasmania
LGAT	Local Government Association of Tasmania
LOS	Level of Service
NHVR	National Heavy Vehicle Regulator
NTC Guidelines	National Transport Commission Guidelines (2007)
RAV	Restricted Access Vehicle
SISD	Safe intersection sight distance
SPV	Special purpose vehicle
State Growth	Department of State Growth

Abbreviation	Description
The Project	Major Projects Program Tarraleah Redevelopment
TIA	Traffic Impact Assessment

Reference document listing

Table 2 below provides a list of the documents referred to in this report and documents/ data issued as background to the findings discussed in this report.

Table 2: Reference documents

Document name	Document version	Document source / location
ARRB Unsealed Roads Best Practice Guide 2	2020	ARRB
AS/NZS 2890.1:2004 Off-street car parking	2004	i2i
AS 2890.2:2018 Off-street commercial vehicle facilities	2018	i2i
AS 2890.3: Parking facilities: Bicycle parking	2015	i2i
AS/NZS 2890.6 Parking facilities: Off-street parking for people with disabilities	2022	i2i
Austroads Guide to Pavement Technology Part 6	2018	Austroads
Austroads Guide to Road Design Part 3: Geometric Design	2021	Austroads
Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections	2023	Austroads
Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management	2020	Austroads
Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments	2020	Austroads
Crash History Data	2024 (viewed)	Tasmanian Government Spatial Data Selector
Local Government Association of Tasmania Standard Drawings	2020	LGAT
Performance-Based Standards Scheme – Network Classification Guidelines	2007	National Transport Commission
Department of State Growth T3 – Road Design Standards	2020	Transport Tasmania

Executive Summary

Introduction

Hydro Tasmania, as part of its Major Projects Program, is redeveloping the Tarraleah Hydropower Scheme. The Project proposed to connect the Lake King William intake to a pipeline and headrace tunnel, and furthermore to a power tunnel and a new Tarraleah Power Station. A surge shaft, rising from the power tunnel, will connect to a 70m high surge tower. A new 220 kV transmission line will connect to the new power station – two route options are currently being considered. Redundant assets will be decommissioned and made safe. To facilitate construction, the Project will also involve construction of; a construction camp at Tarraleah Village (including workshop and laydown area); various access tracks; and batch concrete plants.

An assessment of the traffic impacts associated primarily with the construction of the Tarraleah Hydropower Scheme Project has been prepared with reference to the Department of State Growth's Publication *Traffic Impact Assessments (TIA) Guidelines* and the *Tasmanian Planning Scheme.*

Summary of investigations

The scope of the Traffic Impact Assessment (TIA) includes assessment of the public roads that provide access to the Project area plus assessment of Butlers Gorge Road, the Project area site layout and the previously endorsed Tarraleah intersection/ access upgrade design drawings. The assessment included: approach, safe intersection and stopping sight distance, and sight distance for commercial vehicle traffic entering a public roadway from an access driveway; traffic operation at intersections both for existing and construction peak period operation; crash history, road condition, road width and capacity, and road safety; turn treatments at intersections; and the *Logistics and Transport Study: Tarraleah Hydro Redevelopment Project* written by Blue Water Shipping for the largest OSOM combination transporting GRP pipes.

Existing conditions

The Project area is accessed via the Lyell Highway, a two-way sealed Department of State Growth (State Growth) owned main access road subject to the Tasmanian rural default speed limit of 100km/h. Horizontal and vertical geometry and the provision of numerous speed advisory signs and other warning signage generally slows the approximately 800 vehicles per day that utilise the Lyell Highway significantly. The Lyell Highway is the main route between Hobart and Tasmania's West Coast.

Other roads utilised as part of the Project include Oldina Drive (south) (sealed road), Fourteen Mile Road (unsealed), Butlers Gorge Road (unsealed) and Victoria Valley Road (unsealed).

Table 3: Road widths

Road	Road width	Shoulder width
Lyell Highway	5.6 – 7.4m	0.0 – 0.5m
Butlers Gorge Road	3.3 – 4.8m	0.3 – 1.2m
Fourteen Mile Road	4.6m	1.0 – 1.5m
Oldina Drive (south)	6.0m	0.4m
Victoria Valley Road	4.0 – 4.8m	0.5m

Table 4: Road condition

Road	Road condition
Lyell Highway	Generally in good condition, with minimal defects noted
Butlers Gorge Road	Generally in fair condition. Minor potholing, minor corrugations and minor longitudinal scouring is present at various locations along the road. It is noted that course material has been used where the surface has recently been upgraded. There is potential that a coarser aggregate will ravel and become loose quickly.
Fourteen Mile Road	Generally in fair condition. Many small potholes along the road, particularly in the vicinity of the narrow bridge at (-42.3012, 146.4218). Minor corrugations also present for short periods.
Oldina Drive (south)	Excellent condition. Has recently undergone resealing
Victoria Valley Road	Generally in good condition. Corrugations noted in multiple locations, typically minor.

Key existing intersections/ accesses include Lyell Highway/ Fourteen Mile Road, Lyell Highway/ Oldina Drive (south), Lyell Highway/ Butlers Gorge Road Access, Lyell Highway/ Oldina Drive (north) Access, Lyell Highway/ Paddy's Quarry Access, Lyell Highway/ Tarraleah Power Station Access and Oldina Drive/ Palana Crescent Access. A number of other intersections/ accesses are also associated with the proposed transmission line route options. The assessment of these has not been included in the executive summary as the preferred alignment has not yet been confirmed.

Table 5: Approach sight distance

Intersection	Operating speed (Minor road)	ASD	Required ASD	ASD Limitation	Potential ASD
Lyell Highway/ Fourteen Mile Road	80km/h	145m	189m	Vegetation	>190m
Lyell Highway/ Oldina Drive (south)	60km/h	245m	91m	-	-

Table 6: Safe Intersection Sight Distance

Intersection	Operating speed	SISD right	Required SISD right	SISD Limitation right	Potential SISD right	SISD left	Required SISD left	SISD Limitation left	Potential SISD left
Lyell Highway/ Fourteen Mile Road	50km/h	230m	147m	-	-	220m	111m	-	-
Lyell Highway/ Oldina Drive (south)	60km/h	100m	193m	Vegetation and crest	~110m	180m	141m	Vegetation	>230m
Lyell Highway/ Butlers Gorge Road	80km/h	110m	188m	Vegetation, hillside	~150m*	160m	188m	Trees	-
Lyell Highway/ Oldina Drive (north)	75km/h – left 95km/h right	120m	333m	Vegetation, hillside	-	90m	191m	Vegetation, hillside	-
Lyell Highway/ Paddy's Quarry Access	95km/h left 75km/h right	100m	191m	Vegetation	-	155m	333m	Vegetation, hillside	-
Lyell Highway/ Tarraleah Power Station Access	40km/h	>100m	88m	-	-	170m	219m	Vegetation, hillside	-
Oldina Drive/ Palana Crescent Access	60km/h	>200m	151m	-	-	>200m	141m	-	-

Based on the existing traffic volumes on roads throughout the Project area, it was discerned that all intersections/ accesses currently operate with very limited queueing and delays.

The crash history for the most recent 10-year period showed that crash clusters were observed at tight corners, most of which were type 180 – 189 – on curve crashes.

Generalised safety issues throughout the Project area were discerned as follows:

Table 7: Road safety issues

Road	Comments
Lyell Highway	• 100km/h speed limit is excessive for the area, despite the provision of advisory speed signs • Various tight corners with limited stopping sight distance • Existing non-compliant road safety barrier and end terminals; and • Provision of road safety barrier may be warranted in multiple locations.
Butlers Gorge Road	• Single lane section west of intersection with switchyard track • Existing non-compliant road safety barrier and end terminals; and • Dirty temporary traffic management signs and a taper was not provided to the Road Closed sign.
Fourteen Mile Road	• Lack of bridge safety barrier at (-42.3011, 146.4219) • Incorrect order of signage on approach to bridge at (-42.3011, 146.4219) • Tight corners with limited stopping sight distance • Crests with limited stopping sight distance; and • Dirty temporary traffic management signs
Oldina Drive (south)	• Lack of pavement marking (at time of site visit) • Unprotected culvert headwall at (-42.3057, 146.4331); and • Gravel and other litter in kerb
Victoria Valley Road	• Loose gravel shoulders • Various tight corners with limited stopping sight distance; and • Existing non-compliant bridge safety barrier and end terminals (-42.2790, 146.5938)

Assessment of impacts

The TIA assesses the various intersections during the AM and PM construction peak hours (7:00am to 8:00am and 3:30pm to 4:30pm based on information received from Hydro Tasmania). The construction peak hours were assessed as a far greater number of vehicles are expected to be generated during construction that during operation. The traffic generation included delivery trucks travelling to and from the Project area (typically from ports or quarries), trucks and other construction vehicles travelling between locations in the Project area, and employees travelling between Tarraleah Village and locations within the Project area.

Based on the completion of a SIDRA Intersection model, it was found that the intersections with the greatest estimated traffic volumes, the Lyell Highway/ Oldina Drive (south) intersection and the Lyell Highway/ Tarraleah Power Station intersection, operated with minimal queues and delays during construction.

Assessment of turn treatments at intersections/ accesses off the Lyell Highway determined that a rural basic left turn (BAL) facility and rural channelised short lane right turn (CHR(S)) facility is recommended at the Lyell Highway/ Oldina Drive (south) intersection and the Lyell Highway/ Paddy's Quarry Access. A BAL treatment is recommended at the Lyell Highway/ Oldina Drive (north) Access intersection. A CHR(S) treatment is recommended at the Lyell Highway/ Butlers Gorge Road Access intersection. Based on this, it is recommended that a BAL is added to the previously endorsed Tarraleah intersection/ access upgrade design drawings at the Lyell Highway/ Oldina Drive (south) intersection and at the Lyell Highway/ Paddy's Quarry Access. It is also recommended that the turning paths of the largest design vehicle are checked at each of the intersections, although minor encroachment into opposing lanes by NHVR Class vehicles on ingress and egress, given their low volumes, is likely acceptable. Alternatively, traffic management may be implemented during construction to safely and efficiently manage vehicle movements into intersections and accesses.

Recommendations

Based on the assessments undertaken as part of the TIA, the following is recommended:

Recommendation	Actions
Lyell Highway intersections/ accesses	Intersections/ accesses off the Lyell Highway should be modified to enable navigation of the largest design vehicle expected to utilise them. The modification should enable vehicles to not enter the opposing lane of the Lyell Highway whilst egressing the intersection/ access. Modifications include turn treatments or traffic management as outlined in Section 5.2.1 of this report. This does not include high-risk OSOM combinations that will definitely be managed using temporary traffic management. Project representatives should commit to liaise with the relevant authorities (Department of State Growth, Central Highlands Council) regarding modifications to intersections/ accesses.
Other accesses	Intersections/ accesses off other public roads within the Project area should be modified, as necessary, to enable navigation of the largest design vehicle expected to utilise them. The modification should enable vehicles to safely enter/ exit the accesses. This does not include high-risk OSOM combinations that will definitely be managed using temporary traffic management. Project representatives should commit to liaise with the relevant authority (Central Highlands Council) regarding upgrades to accesses.
Improve road safety on the surrounding road network	Project representatives should commit to liaise with the relevant authorities (Department of State Growth, Central Highlands Council) as appropriate to maintain road safety. Safety improvements may include: • Improving sight distance at intersections and accesses by clearing and maintaining vegetation. Where sight distance improvements are not considered viable, provide warning signage, visual cues etc. • Improving sight distance along roads by clearing and maintaining vegetation • Providing pull over bays (or appropriate temporary traffic management) on narrow roads within the Project area • Install road warning signage on approach to tight curves and other hazards (where not already erected); and • Regularly maintain road signage (including temporary traffic management signage) to ensure it is clearly visible.

Recommendation	Actions
Develop a Construction Traffic Management Plan	A Construction Traffic Management Plan (CTMP) should be developed for the Project to manage vehicle movements throughout the Project area. In particular, it is important to discern how traffic is managed along the Switchyard Track (western end of Butlers Gorge Road), as this is a one-way section with no space for vehicles to pull over at the eastern end.
Complete a visual condition assessment	It is recommended that a visual road condition assessment be undertaken prior to, and post construction. The change in road condition may be discussed with the road authority. Intermediate inspections and relevant road maintenance should also be carried out to ensure that an acceptable road condition is maintained during construction.
Lift low powerlines	Low powerlines near the proposed stockpile yards on Butlers Gorge Road should be lifted in accordance with TasNetworks requirements.
Upgrade safety barrier as necessary along Butlers Gorge Road	Existing road safety barrier along Butlers Gorge Road is non-compliant and may not sufficiently protect vehicles from roadside hazards, particularly in the vicinity of the Switchyard Track. Road safety barrier should be assessed, and upgraded as required for construction vehicles, to reduce the severity of potential run-off-road crashes. Alternatively, other controls such as lowering of the speed limit may be implemented.

1. Introduction

1.1 Background

Hydro Tasmania is proposing to redevelop the Tarraleah Hydropower Scheme to replace end of life assets and provide a more flexible and efficient scheme to ensure a reliable and safe renewable energy source into the future. The key permanent components of the Tarraleah Redevelopment Project are outlined below:

- An approximately 4.2 km **headrace pipeline** and associated service roads connecting the Lake King William tunnel (under construction) to the headrace tunnel
- An approximately 9.8 km low pressure **headrace tunnel**
- An approximately 2.3 km long high pressure **power tunnel** that splits into two short penstocks before entering the power station
- A partially underground **power station** with an installed capacity of approximately 180 MW and rated flow of 60 m3/s located adjacent to the existing Tarraleah Power Station
- A **surge facility** consisting of a 70 m high (above ground level) surge tower and associated underground approximately 140 m high surge shaft to control water pressure in the headrace and power tunnels
- An approximately 6 m3/s **pumping station** and approximately 0.8 km **rising main** to transfer water from the existing No. 2 Pond to the power and headrace tunnels via the surge tower
- A **transformer yard** and **switchyard** located close to the power station connecting the power station to the proposed transmission line
- A new 22 kV **power supply** from the existing 22 kV network to the western, mid access and Paddy's Quarry portals, pump station, surge tower and power station will provide power during construction and operation
- A new 220 kV **transmission line**. There are currently two transmission line options being considered:
    - A 14 km double circuit line from the existing Tungatinah Switchyard to the existing Dee Lagoon substation (northern option), or
    - A 15 km double circuit line from the proposed Tarraleah Switchyard to the existing Liapootah substation (southern option); and
- **Access tunnels, tunnel portals and access roads** to provide access to the headrace and power tunnels. Excess spoil from tunnel, power station and portal excavations will be stored in one of three **permanent spoil emplacement areas** located at the western portal, mid tunnel access portal and Paddy's Quarry portals.

Construction of the Tarraleah Redevelopment Project underground works will be completed using drill and blast techniques and may be supported by a tunnel boring machine. Above ground works will be completed by conventional earth moving and mechanical excavation. To support construction the following key temporary infrastructure is proposed:

- A **construction compound** at Tarraleah Village supported by smaller construction compounds located at each of the tunnel portals and the power station. Construction compounds will include site administration facilities and workshops, handle and store materials and equipment imported to site and concrete batching and crushing and screening plant
- Explosives for excavation work are required to be stored in a dedicated facility. Two **explosive magazines** will be located off Butlers Gorge Road
- To facilitate construction of the power station a **temporary bridge** will built over the Nive River; and
- A workforce accommodation village will be constructed at Tarraleah.

Upon the completion of works, all temporary construction sites will be rehabilitated.

A Traffic Impact Assessment (TIA) is required to be submitted as part of the Development Application for the proposed works.

1.2 Traffic Impact Assessment scope

Entura has engaged pitt&sherry to undertake a Traffic Impact Assessment (TIA) for the proposed development.

This report has been prepared with reference to the Department of State Growth's (State Growth's) Publication *Traffic Impact Assessments (TIA) Guidelines* and the *Tasmanian Planning Scheme* (the Planning Scheme), with reference to the *Central Highlands Local Provision Schedule*.

This report evaluates the immediate road network in accordance with the Guidelines and the Planning Scheme. It also includes assessment of Butlers Gorge Road and proposed intersection/ junction upgrades along the Lyell Highway in the vicinity of the site. However, it does not encompass an evaluation of transport routes for heavy vehicles or oversized/ over mass vehicles between relevant ports and the site.

1.3 Document structure

This report body has been set out as follows from Section 2 onwards:

- 2. Existing Conditions: Defines the project area location and describes the current operation of the road network surrounding the site. This includes outlining road width and road condition, sight distance at intersections and driveways, traffic operation and crash history; and safety issues associated with infrastructure and environment
- 3. Tarraleah Hydropower Scheme Project: Describes the Project, and provides an overview of operation and proposed design as it pertains to traffic engineering
- 4. Project construction: Provides an overview of construction activities associated with the Project as it pertains to traffic engineering
- 5. Operational phase traffic assessment: Assesses the proposed impact of the design on the surrounding road network and assesses the proposed design against relevant standards, schemes and guidelines
- 6. Construction phase traffic assessment: Assesses the proposed impact of Project construction on the surrounding road network and assesses the proposed design against relevant standards, schemes and guidelines; and
- 7. Planning Scheme assessment: Assesses the proposed development against the Acceptable Solution or Performance Criteria of the Planning Scheme.

1.4 Team experience

This report has been prepared by suitably qualified persons in accordance with the *Austroads Guide to Traffic Management – Part 12 (2016).* The relevant experience of the project team is detailed below.

1.4.1 Nicholas Ashlin

Nicholas is a Roads and Traffic Engineer with five years' experience in both traffic analysis and road safety assessments. He has been involved in a wide variety of transport infrastructure and renewable energy projects from small scale developments through to nationally recognised infrastructure projects, including both CopperString 2032 and North West Transmission Developments. Nicholas is a qualified road safety auditor and is proficient in the use of GIS which he utilises effectively to communicate technical analysis outputs in a form suitable for stakeholders.

1.4.2 Ross Mannering

Ross has over 23 years' experience in transport infrastructure design, project management, road safety, traffic engineering and stakeholder engagement which has been acquired through his involvement in a wide variety of transport infrastructure and traffic engineering projects. This experience, combined with his extensive technical knowledge, enables Ross to optimise the design of traffic and transport infrastructure projects and to undertake comprehensive assessments of development proposals. Ross' services are also frequently sought to provide expert witness advice on traffic engineering matters associated with planning appeals. He also holds Road Safety Auditor accreditation with Department of Transport and Planning Victoria.

2. Existing Conditions

2.1 Project area location

The Tarraleah Hydropower Scheme Project area is shown below in Figure 1.

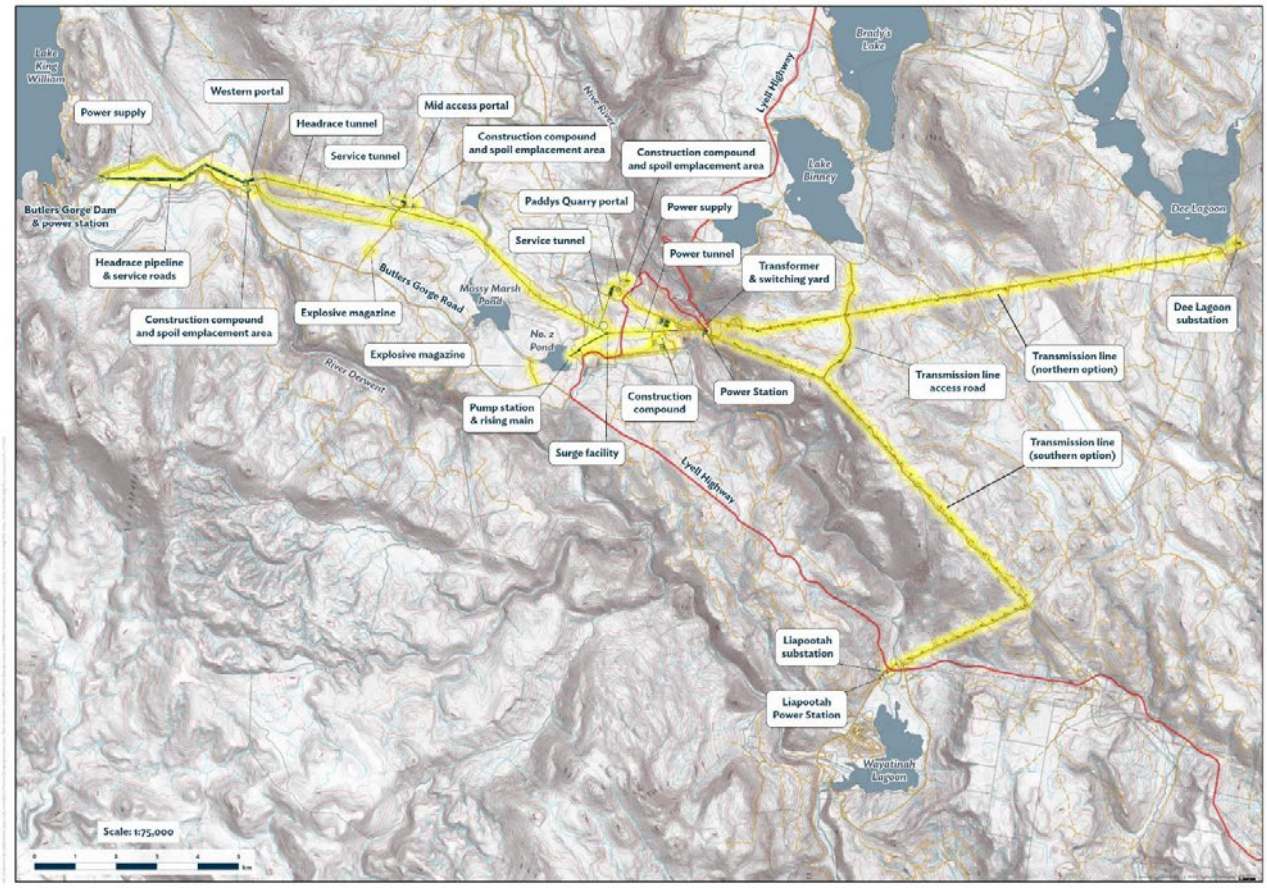


Figure 1: Preliminary project area

As shown, the Tarraleah Hydropower Scheme Project (the Project) area includes a significant portion of the greater Tarraleah area and is thus subject to various land classifications as outlined in the Planning Scheme.

The Project area has land use classifications as follows:

- Village (12) – in the vicinity of Tarraleah Estate
- Rural (20) – primary use of the Project area
- Environmental Management (23) – east of Fourteen Mile Road and surrounding the eastern end of Butlers Gorge Road
- Utilities (26) – some surrounding roads and hydropower infrastructure; and
- Recreation (28) – west of Tarraleah Estate.

The land use classification of Tarraleah and surrounds is shown below in Figure 2. Note that the project area does not include the potential transmission tower routes.

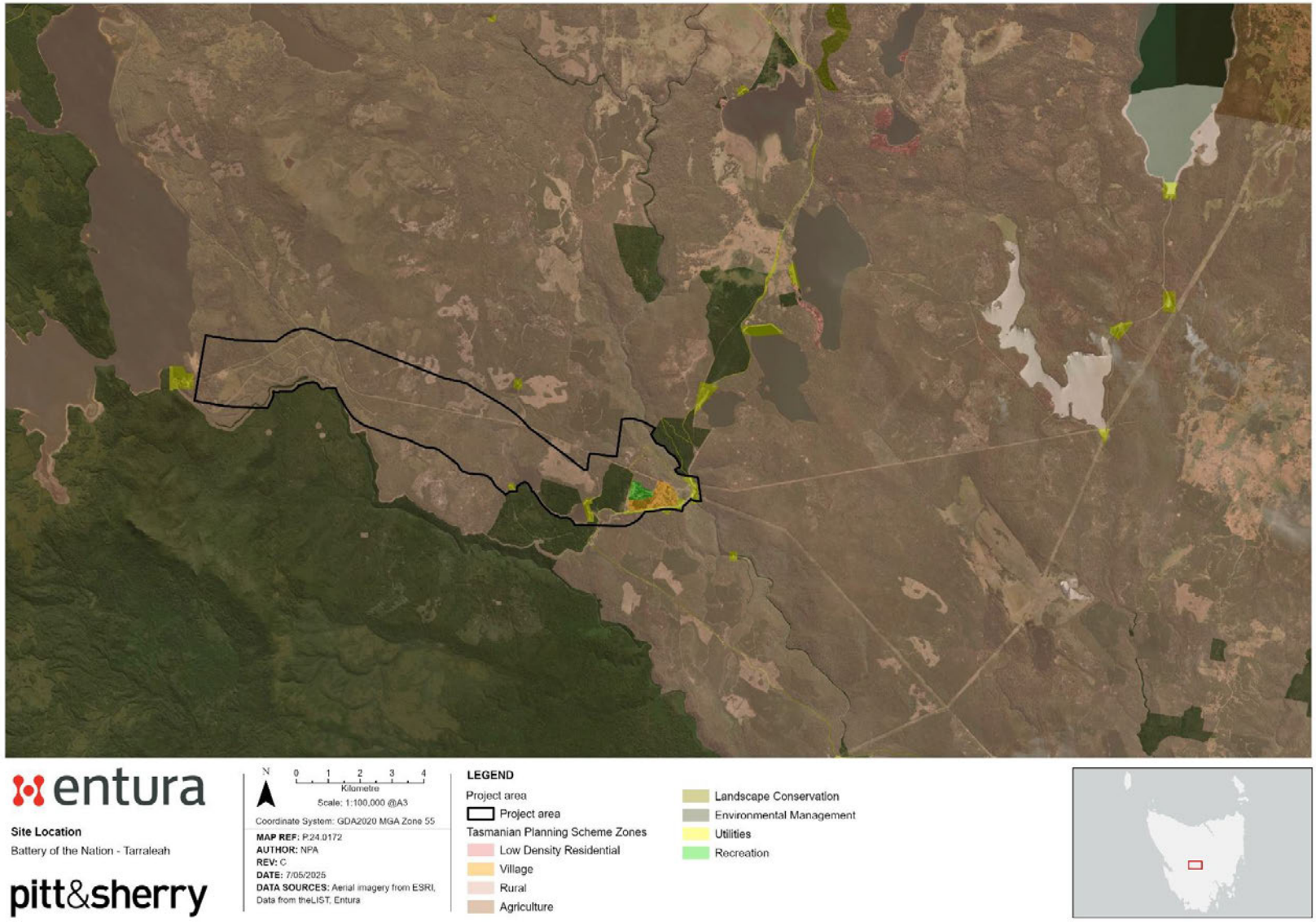


Figure 2: Site location

2.2 Project area accesses

An access, in this report, is defined as the junction between a public road and a privately owned road, including driveways.

Existing accesses related to the Project, and their location, are as follows:

- Lyell Highway/ Butlers Gorge Road Access (-42.3140, 146.4175)
- Lyell Highway/ Oldina Drive (north) Access (-42.2923, 146.4343)
- Lyell Highway/ Paddy's Quarry Access (-42.2925, 146.4340)
- Lyell Highway/ Tarraleah Power Station Access (-42.2997, 146.4578); and
- Oldina Drive/ Palana Crescent Access (-42.3041, 146.4486).

In addition to the above, accesses are proposed for use for the northern transmission line option as follows:

- Access Point 1 (Lyell Highway) (-42.2905, 146.4443)
- Access Point 2 (Lyell Highway/ Tungatinah Power Station Car Park Access) (-42.2982, 146.4581)
- Access Point 3 (Lyell Highway) (-42.2981, 146.4582)
- Access Point 4 (Lyell Highway/ Tungatinah Drive Access) (-42.2794, 146.4550)
- Lyell Highway/ Portal Road Access (-42.2116, 146.5035)
- Victoria Valley Road/ Portal Road Access (-42.2461, 146.5618)
- Access Point 5 (Victoria Valley Road) (-42.2824, 146.6087)
- Access Point 6 (Victoria Valley Road/ Lake Echo Road) (-42.2835, 146.6151); and
- Access Point 7 (Victoria Valley Road/ Lake Echo Road) (-42.2828, 146.6159).

Accesses are proposed for use for the southern transmission line option as follows:

- Access Point A (Lyell Highway/ Black Bobs Road Access) (-42.3782, 146.5700)
- Access Point B (Lyell Highway) (-42.3735, 146.5270)
- Access Point C (Lyell Highway) (-42.3752, 146.5161)
- Access Point D (Lyell Highway) (-42.3753, 146.5143)
- Liapootah Power Station Access (-42.3752, 146.5112)
- Access Point F (Lyell Highway) (-42.2991, 146.4588); and
- Access Point G (Lyell Highway/ Tungatinah Drive Access) (-42.2794, 146.4550).

Publicly accessible State or Council-owned intersections have been assessed in Section 2.4 of this report.

The location of the Project area accesses are shown below in Figure 3.

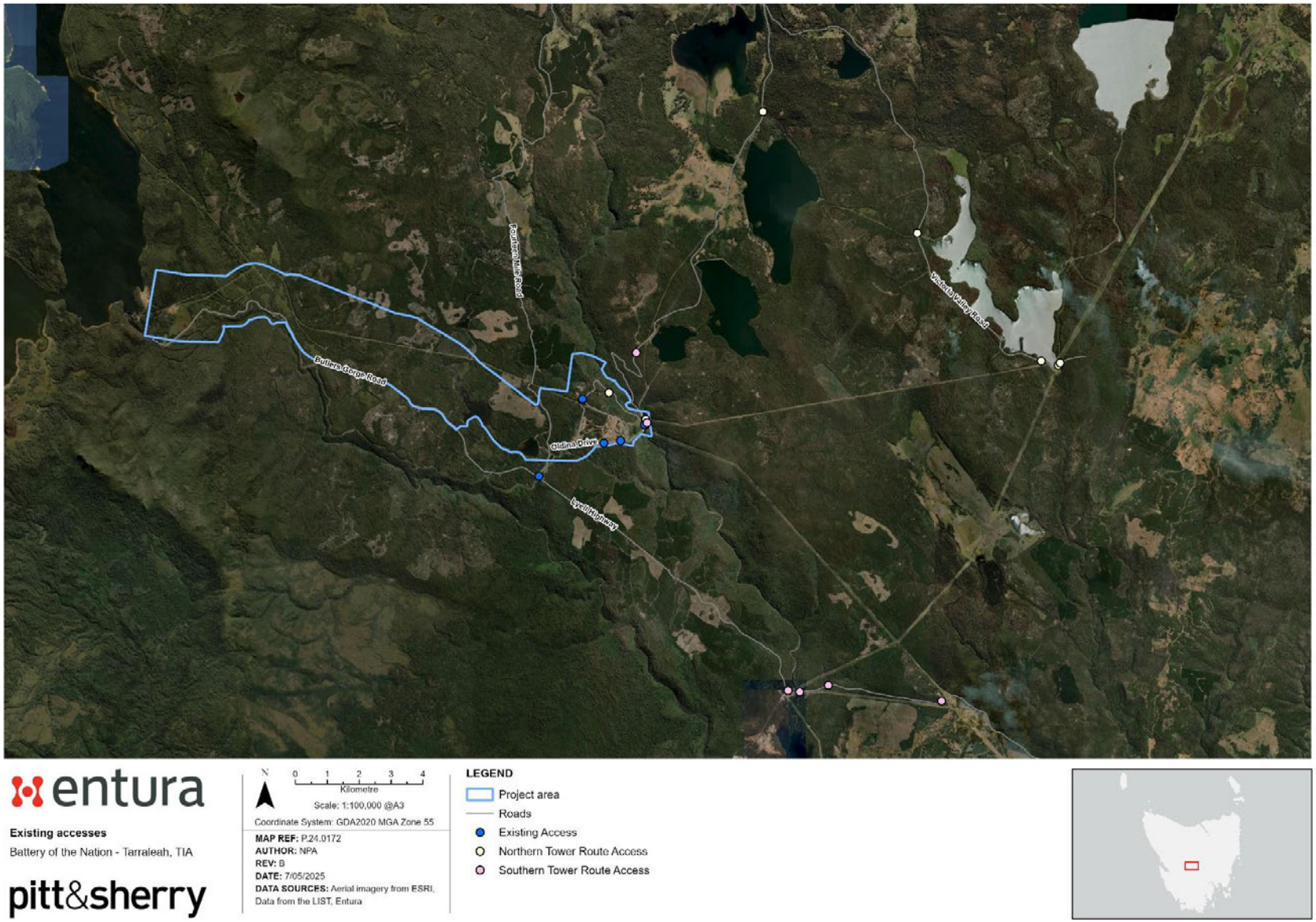


Figure 3: Site accesses

2.3 Road network

2.3.1 Project area

The Tasmanian Road Hierarchy comprises the following road classifications:

Table 8: Tasmanian road hierarchy

Owner	Hierarchy/ Class	Definition
Department of State Growth	1	Primary freight and passenger roads
	2	Major regional roads
	3	Main access roads
	4	Tourist and industry specific roads
	5	Remainder of state roads
Council	Arterial	Major connecting roads (generally between towns/ suburbs)
	Sub-arterial	Connecting roads, generally with lower traffic volumes
	Collector	Connect local roads to arterial roads
	Local	Minor roads with low traffic volumes
Private	Roads not owned by the Department of State Growth or Council. Generally, these roads are not accessible to the general public	

The road network within the Project area includes the following roads:

- Lyell Highway – Two-lane two-way (2L2W) sealed Department of State Growth (State Growth) owned Category 3 main access road under the Tasmanian State Road Hierarchy, subject to a 100km/h speed limit, although horizontal and vertical geometry, and the provision of numerous speed advisory signs and other warning signage generally slows vehicles significantly
- Butlers Gorge Road – 2L2W unsealed Hydro Tasmania owned local road[1] subject to the Tasmanian gravel road default speed limit of 80km/h
- Fourteen Mile Road – 2L2W unsealed Central Highlands Council (Council) owned collector road[1] subject to the Tasmanian gravel road default speed limit of 80km/h
- Oldina Drive (south) – 2L2W sealed Council owned local road[1] subject to a posted speed limit of 60km/h, slowing to a posted speed limit of 25km/h approaching Tarraleah Estate where it becomes a 2L2W sealed privately owned access road (eastern northbound-southbound extent to Tagama Street)
- Oldina Drive (north) – 2L2W sealed Sustainable Timber Tasmania (STT) owned access road (northern eastbound-westbound extent to Lyell Highway), currently gated

[1] Based on theLIST road centrelines transportation layer

- Palana Crescent – 2L2W sealed privately owned access road
- Probula Avenue – 2L2W sealed Hydro Tasmania owned access road
- Black Bobs Road – 2L2W unsealed STT owned access road
- Portal Road – 2L2W unsealed Hydro Tasmania owned local road
- Victoria Valley Road – 2L2W unsealed Council owned collector road[1] subject to the Tasmanian gravel road default speed limit of 80km/h, other than at Dee where is slows to 40km/h
- Lake Echo Road – 2L2W unsealed Hydro Tasmania (Hydro) owned local road[1] subject to the Tasmanian gravel road default speed limit of 80km/h; and
- Various other unnamed access roads typically privately owner or authorised by either STT or Hydro Tasmania.

Lyell Highway

The Lyell Highway acts as the primary route between Hobart and Tasmania's west coast, and provides integral connection to mining, fish and hydro-electric industry, as well as tourism. Through Tarraleah, the Lyell Highway has a seal width generally ranging between 5.6m and 7.4m wide.

State Growth's traffic count website outlines that the Lyell Highway carried approximately 774 vehicles per weekday in 2023 approximately 0.3km east of the Lyell Highway/ Butlers Gorge Road intersection (Station A0197270). Of those vehicles, 83.6% were light vehicles, 11.5% were a two-axle rigid truck or bus, and the remaining 4.9% were heavy vehicles with three or more axles. The Lyell Highway, at Station A0197270, has a mid-day peak hour between 12:00pm and 1:00pm, where it carries, on average, 101 vehicles, split roughly 50/50 by direction (48% northbound, 52% southbound). Typically, a greater number of vehicles travel northbound during the morning and a greater number of vehicles travel southbound during the afternoon.

Road widths

Road widths of State Growth or Council owned roads (and along Butlers Gorge Road) within the Project area are given in Table 9, which were measured during a site visit on 27 March 2024. Note that on unsealed/ gravel roads, shoulder width has been defined as the width of available road between the typical edge of wheel path and the verge.

Table 9: Road widths

Road	Road width	Shoulder width
Lyell Highway	5.6 – 7.4m	0.0 – 0.5m
Butlers Gorge Road	3.3 – 4.8m	0.3 – 1.2m
Fourteen Mile Road	4.6m	1.0 – 1.5m
Oldina Drive (south)	6.0m	0.4m
Victoria Valley Road	4.0 – 4.8m	0.5m

Road condition

The existing road condition was assessed during the site visit. General comments on the condition of roads within the Project area that are expected to be utilised as part of the Project are provided in Table 10. Note that Butlers Gorge Road is Hydro-owned.

Table 10: Road condition

Road	Road condition
Lyell Highway	Generally in good condition, with minimal defects noted
Butlers Gorge Road	Generally in fair condition. Minor potholing, minor corrugations and minor longitudinal scouring is present at various locations along the road. It is noted that course material has been used where the surface has recently been upgraded. There is potential that a coarser aggregate will ravel and become loose quickly.
Fourteen Mile Road	Generally in fair condition. Many small potholes along the road, particularly in the vicinity of the narrow bridge at (-42.3012, 146.4218). Minor corrugations also present for short periods.
Oldina Drive (south)	Excellent condition. Has recently undergone resealing
Victoria Valley Road	Generally in good condition. Corrugations noted in multiple locations, typically minor.

Images of standard defects evidenced on Butlers Gorge Road, Fourteen Mile Road and Victoria Valley Road are shown below.

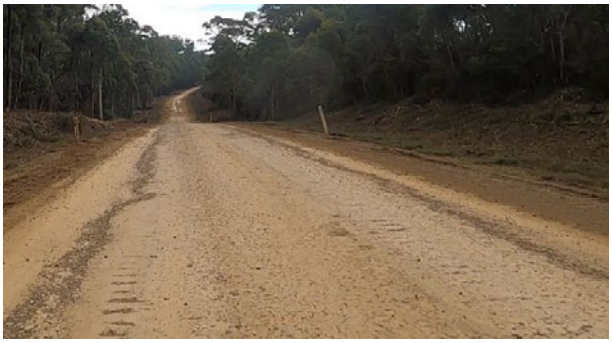


Figure 4: Butlers Gorge Road - evidence of longitudinal scouring (-42.282, 146.400)

Figure 5: Butlers Gorge Road - evidence of minor potholes (-42.267, 146.316)

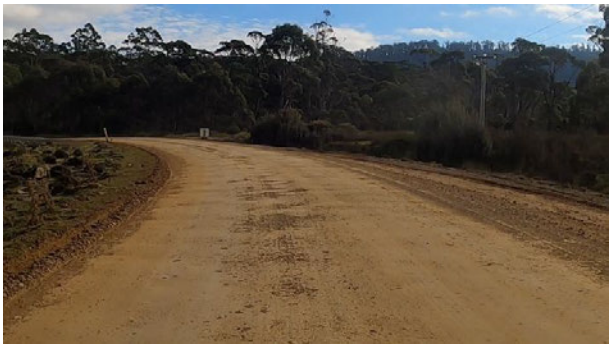


Figure 6: Butlers Gorge Road - evidence of minor corrugations (-42.266, 146.291)

Figure 7: Butlers Gorge Road - evidence of coarse aggregate surface (-42.276, 146.326)

Figure 8: Butlers Gorge Road - road safety barrier (-42.273, 146.269)

Figure 9: Butlers Gorge Road - dirty signs and missing taper (-42.297, 146.382)

Figure 10: Fourteen Mile Road - evidence of minor potholes (-42.301, 146.422)

Figure 11: Fourteen Mile Road - evidence of minor corrugations (-42.304, 146.421)

Figure 12: Victoria Valley Road - evidence of minor corrugations (-42.188, 146.511)

2.4 Key intersections

An intersection, in this report, is defined as the junction between two or more public roads.

Intersections within and providing access to the Project area include:

- Lyell Highway/ Fourteen Mile Road – unsignalised T-intersection (no turn treatments provided); and
- Lyell Highway/ Oldina Drive (south) – unsignalised T-intersection (no turn treatments provided).

Additionally, the Lyell Highway/ Wayatinah Road intersection (Access point E) will be utilised as part of the southern transmission line option, should that be the preferred option. The Lyell Highway/ Wayatinah Road intersection is an unsignalised T-intersection and does not provide turn treatments.

2.4.1 Sight distance

The existing available Approach Sight Distance (ASD) and Safe Intersection Sight Distance (SISD) at the above intersections was determined during a site visit undertaken on 27 March 2024.

SISD was also measured or estimated at the following accesses that either, currently act more like intersections than accesses, or, will be subject to substantial traffic volumes during construction:

- Lyell Highway/ Butlers Gorge Road Access (-42.3140, 146.4175)
- Lyell Highway/ Oldina Drive (northern access) (-42.292334, 146.434296)
- Lyell Highway/ Paddy's Quarry Access (-42.2925, 146.4340)
- Lyell Highway/ Tarraleah Power Station Access (-42.2997, 146.4578)
- Oldina Drive/ Palana Crescent Access (-42.3041, 146.4486)
- Lyell Highway/ Portal Road Access (-42.2116, 146.5035)
- Victoria Valley Road/ Lake Echo Road (-42.2835, 146.6151); and
- Victoria Valley Road/ Lake Echo Road (-42.2828, 146.6159).

ASD was not assessed at the above accesses as they will primarily, or solely, be utilised by the construction workforce, who will be familiar with the location of the upcoming major road.

At the Lyell Highway/ Wayatinah Road intersection, ASD and SISD have been estimated.

ASD is the minimum sight distance which a motorist should have along the minor road to an intersection hold line or other sign or device indicating an upcoming intersection. ASD allows sufficient recognition of an upcoming intersection. SISD is the minimum sight distance which should be provided between a vehicle travelling on a major road and a vehicle on a minor road attempting to turn into or travel through the major road. SISD allows enough time for a vehicle on the minor road to complete a necessary manoeuvre onto or through a major road without a collision.

The Australian Road Research Board Unsealed Roads Best Practice Guide Edition 2 (ARRB Unsealed Roads Guide) makes minor amendments to the values in the AGRD Part 4A for unsealed roads based on reduced friction with the road surface, increasing the time it takes vehicles to accelerate and slow down.

Approach Sight Distance

The ASD was taken from a point on the minor road to the hold line in accordance with the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD Part 4A) as shown in Figure 13. ASD was generally measured from a height of 1.1m, noting that this would generally produce a lower ASD, however, was also considered at a height of 2.4m for trucks. The Austroads ASD requirements are defined by the equation shown in Figure 14.

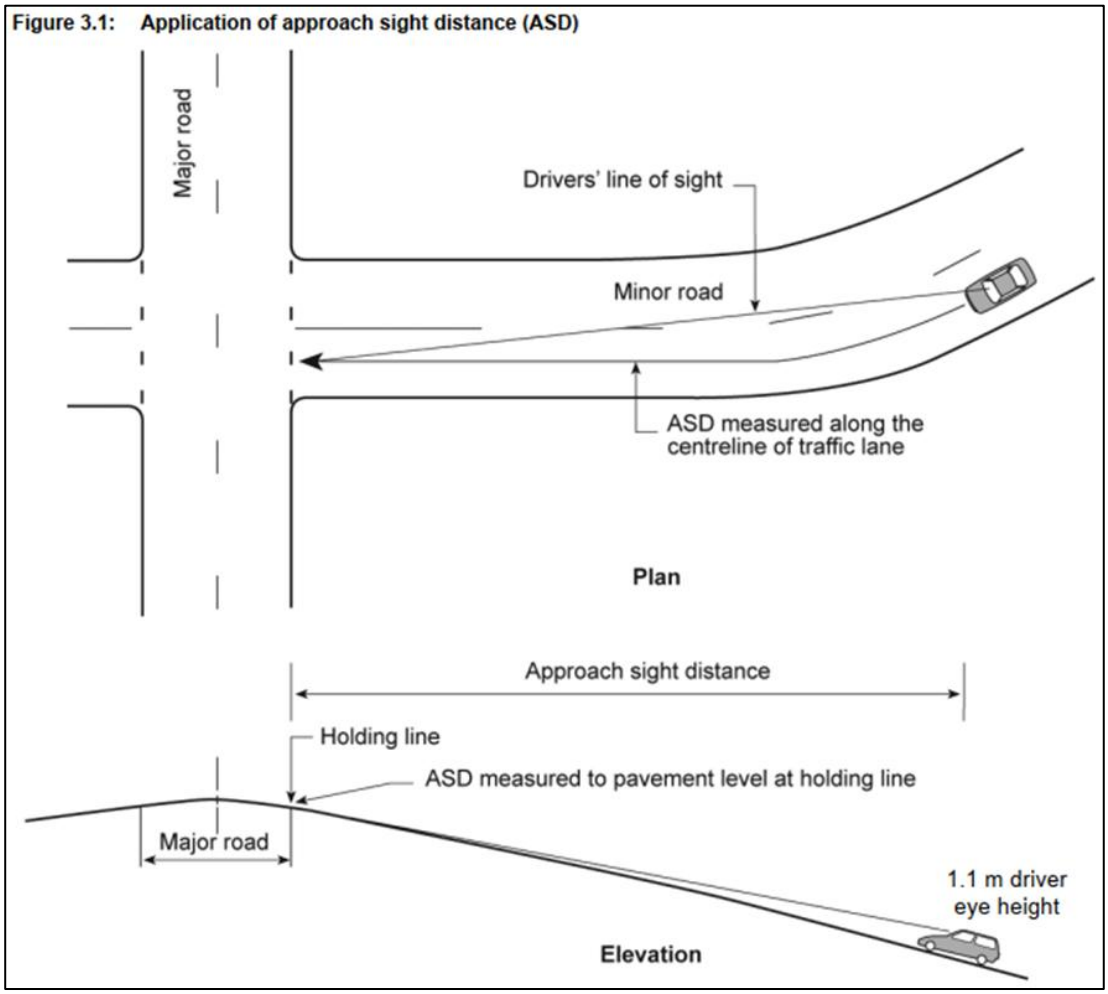


Figure 13: Austroads Guide to Road Design Part 4A: unsignalised and signalised intersections application of ASD

$$ASD = \frac{R_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

where

ASD	=	approach sight distance (m)
R_T	=	reaction time (sec), refer to *AGRD Part 3* (Austroads 2016b) for guidance on values
V	=	operating (85th percentile) speed (km/h)
d	=	coefficient of deceleration, refer to Table 3.3 and *AGRD Part 3* for values
a	=	a longitudinal grade in % (in direction of travel: positive for uphill grade, negative for downhill grade)

Figure 14: Austroads ASD equation

Using the above ASD equation, the following parameters were assumed for the largest general vehicle proposed to be utilised during construction, a National Heavy Vehicle Register (NHVR) Class 1 vehicle.

Table 11: AGRD Part 4A sight distance parameters

Reaction time (R_T)	2.5 – Desirable reaction time for trucks around horizontal curves
Operating speed (V)	Road speed limit, unless otherwise discerned based on the site visit
Coefficient of deceleration (d)	0.24 – provided by Austroads for trucks
Longitudinal grade in percentage (a)	Varies based on intersection

The deceleration factor for trucks on unsealed roads has been estimated to be 0.20 for an 80km/h operating speed based on information provided in the ARRB Unsealed Roads Guide.

The Austroads ASD requirements for trucks on flat longitudinal grades for the varying road speed limits were calculated as shown below in Table 12.

Table 12: Austroads ASD requirements for trucks on flat longitudinal grades

Travel speed	Austroads ASD minimum requirement
40km/h	54m
50km/h	76m
60km/h	101m
80km/h	161m
100km/h	233m
110km/h	275m

Estimated longitudinal grades of the major and minor roads at each intersection listed in Section 2.4 of this report are outlined below in Table 13. Please note that these are approximate based on 10m contours as shown on theLIST and photos taken on site. They are thus conservative estimates only to inform ASD and SISD requirements, noting that the greater the downgrade, the greater the ASD and SISD requirement.

Table 13: Road grades at intersections

Intersection	Major Road Grade – left	Major Road Grade – right	Minor Road Grade
Lyell Highway/ Fourteen Mile Road	<+5%	>-10%	>-5%
Lyell Highway/ Oldina Drive (south)	<+5%	>-10%	<+5%
Lyell Highway/ Wayatinah Road	>-20%	<+10%	0%
Lyell Highway/ Butlers Gorge Road	0%	0%	0%
Lyell Highway/ Oldina Drive (northern access)	<+5%	>-5%	>-10%
Lyell Highway/ Paddy's Quarry Access	>-5%	<+5%	0%
Lyell Highway/ Tarraleah Power Station Access	>-20%	0%	<+5%
Oldina Drive/ Palana Crescent Access	<+5%	0%	>-10%
Lyell Highway/ Portal Access Road	>-5%	0%	>-5%
Victoria Valley Road/ Lake Echo Road (-42.2835, 146.6151)	>-10%	0%	>-5%
Victoria Valley Road/ Lake Echo Road (-42.2828, 146.6159)	>-15%	0%	<+10%

The observed ASD and the ASD requirements (based on conservative estimated grade) for trucks at the intersections is shown in Table 14. Note that the operating speeds have been estimated based on observations made on site and the geometry of the road. Please also note that the sight distance at the Lyell Highway/ Wayatinah Road intersection has been estimated utilising available imagery.

Table 14: Approach sight distance

Intersection	Operating speed (Minor road)	ASD	Required ASD	ASD Limitation	Potential ASD
Lyell Highway/ Fourteen Mile Road	80km/h	145m	189m	Vegetation	>190m
Lyell Highway/ Oldina Drive (south)	60km/h	245m	91m	-	-
Lyell Highway/ Wayatinah Road	100km/h	>240m	234m	-	-

Based on the above, the Lyell Highway/ Oldina Drive (south) and Lyell Highway/ Wayatinah Road intersections currently meet ASD requirements.

Recommendations to mitigate insufficient sight distance are proposed in Section 5.2.4 of this report.

Safe Intersection Sight Distance

The SISD was measured in accordance with AGRD Part 4A as shown in Figure 15. SISD was generally measured from a height of 1.1m, noting that this would generally produce a lower SISD, however, was also considered at a height of 2.4m for trucks.

Figure 3.2: Safe intersection sight distance (SISD)

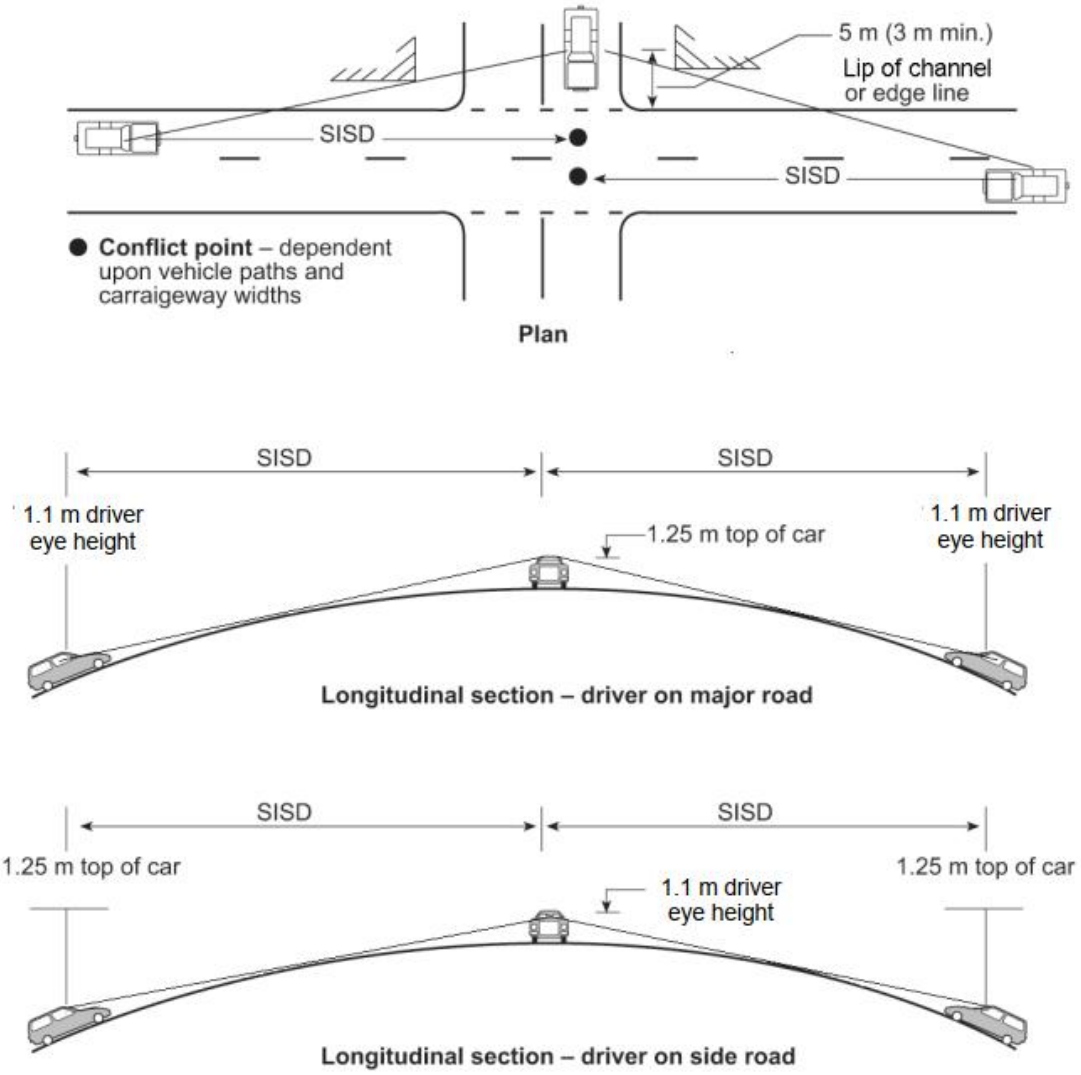


Figure 15: Austroads Guide to Road Design Part 4A: unsignalised and signalised intersections application of SISD

The Austroads SISD requirements are defined by the equation shown in Figure 16.

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

where

SISD	=	safe intersection sight distance (m)
D_T	=	decision time (sec) = observation time (3 sec) + reaction time (sec) – refer to *AGRD Part 3* (Austroads 2016b) for a guide to values
V	=	operating (85th percentile) speed (km/h)
d	=	coefficient of deceleration – refer to Table 3.3 and *AGRD Part 3* for a guide to values
a	=	longitudinal grade in % (in direction of travel: positive for uphill grade, negative for downhill grade)

Figure 16: Austroads SISD equation

The parameters defined in Table 11 were used to determine the Austroads SISD requirements for trucks on flat longitudinal grades for varying road speed limits and are shown below in Table 15.

Table 15: Austroads SISD requirements for trucks on flat longitudinal grades

Travel speed	Austroads SISD minimum requirement
40km/h	87m
50km/h	117m
60km/h	151m
80km/h	227m
100km/h	317m
110km/h	367m

The observed SISD and the SISD requirements (based on conservative estimated grade in Table 13) for trucks at the intersections is shown in Table 16. Note that the operating speeds have been estimated based on observations made on site and the geometry of the road.

Table 16: Safe Intersection Sight Distance

Intersection	Operating speed	SISD right	Required SISD right	SISD Limitation right	Potential SISD right	SISD left	Required SISD left	SISD Limitation left	Potential SISD left
Lyell Highway/ Fourteen Mile Road	50km/h	230m	147m	-	-	220m	111m	-	-
Lyell Highway/ Oldina Drive (south)	60km/h	100m	193m	Vegetation and crest	~110m	180m	141m	Vegetation	>230m
Lyell Highway/ Wayatinah Road	95km/h	195m	268m	Vegetation, signage	~275m	165m	1,034m	Vegetation	~195m
Lyell Highway/ Butlers Gorge Road	80km/h	110m	188m	Vegetation, hillside	~150m*	160m	188m	Trees	-
Lyell Highway/ Oldina Drive (north)	75km/h – left 95km/h right	120m	333m	Vegetation, hillside	-	90m	191m	Vegetation, hillside	-
Lyell Highway/ Paddy's Quarry Access	95km/h left 75km/h right	100m	191m	Vegetation	-	155m	333m	Vegetation, hillside	-
Lyell Highway/ Tarraleah Power Station Access	40km/h	>100m	88m	-	-	170m	219m	Vegetation, hillside	-
Oldina Drive/ Palana Crescent Access	60km/h	>200m	151m	-	-	>200m	141m	-	-
Lyell Highway/ Portal Road Access	100km/h	230m	317m	Vegetation	280m*	175m	360m	Vegetation	240m*
Victoria Valley Road/ Lake Echo Road (-42.2835, 146.6151)	80km/h	180m	249m	Vegetation	~230m	135m	375m	Vegetation, hillside	~140m
Victoria Valley Road/ Lake Echo Road (-42.2828, 146.6159)	80km/h	225m	249m	Vegetation	~275m	315m	627m	Vegetation, hillside	-

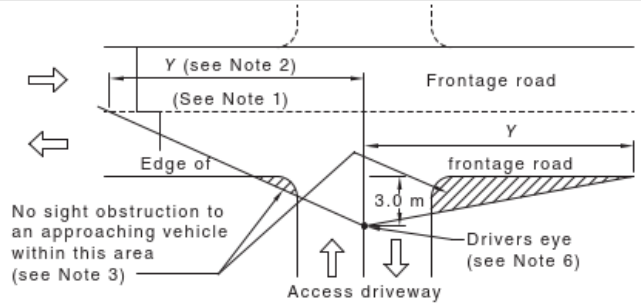
*Before substantial vegetation removal

Based on the above, only the Lyell Highway/ Fourteen Mile Road intersection and Oldina Drive/ Palana Crescent Access currently meet SISD requirements in both directions.

Recommendations to mitigate insufficient sight distance are proposed in Section 5.2.4 of this report.

2.4.2 Sight distance for commercial vehicle traffic entering a public roadway from an access driveway

The sight distance for commercial vehicle traffic entering a public roadway from an access driveway was estimated in accordance with *AS 2890.2:2018 Off-street commercial vehicle facilities* (AS 2890.2) as shown in Figure 17 below. The required sight distances for both a 5 second and 8 second gap are also shown below in Figure 17.



Frontage road speed (see Note 4) km/h	Distance (*Y*) along frontage road (see Note 5) m	
	5 s gap	8 s gap
40	55	89
50	69	111
60	83	133
70	97	156
80	111	178
90	125	200
100	139	222
110	153	244

NOTE 1 Centre-line or centre of roadway (undivided road), or right-hand edge of right-hand through lane (divided road).

NOTE 2 A check to the left is not required at a divided road where the median is wide enough to shelter a vehicle leaving the driveway.

NOTE 3 Parking on this side of the frontage road may need to be restricted on either side of the driveway so that the sight distance required by the above table to an approaching vehicle is not obstructed.

NOTE 4 This is the posted or general speed limit unless the 85th percentile speed is significantly higher.

NOTE 5 These distances are equivalent to minimum gap sight distance (MGSD) for an exiting vehicle. The minimum requirement is a 5 s gap. A right turn exit into a six lane road may require up to an 8 s gap, unless the median is wide enough to shelter a vehicle leaving the driveway.

NOTE 6 When checking sight distance the height of the object (approaching vehicle) is to be taken as 1.15 m above the road surface. The driver's eye height is to be taken as any height in the range 1.15 m to 2.5 m, to cater for both car and commercial vehicle drivers.

Figure 17: AS 2890.2 sight distance requirements

Sight distance was assessed against the requirements for a 5s gap, as all roads are 2L2W. The observed sight distance and the 'sight distance for commercial vehicle traffic entering a public roadway from an access driveway' requirements for trucks at the driveway accesses, for accesses on potential transmission line routes, is shown in Table 17.

Table 17: Sight distance for commercial vehicle traffic entering a public roadway from an access driveway

Driveway	Speed limit	SD right	Required SD right	SD Limitation right	Potential SD right	SD left	Required SD left	SD Limitation left	Potential SD left
Access Point 1 (Lyell Highway) (-42.2905, 146.4443)	100km/h	>150m	139m	-	-	>150m	139m	-	-
Access Point 2 (Lyell Highway/ Tungatinah Power Station Car Park Access) (-42.2982, 146.4581)	100km/h	115m	139m	Building	-	10m (fence), 100m	139m	Fence, embankment	-
Access Point 3 (Lyell Highway) (-42.2981, 146.4582)	100km/h	95m	139m	Embankment	-	120m	139m	Building	-
Access Point 4, G (Lyell Highway/ Tungatinah Drive Access) (-42.2794, 146.4550)	100km/h	>150m	139m	-	-	>150m	139m	-	-
Access Point 5 (Victoria Valley Road) (-42.2824, 146.6087)	80km/h	>120m	111m	-	-	>120m	111m	-	-
Access Point A (Lyell Highway/ Black Bobs Road Access) (-42.3782, 146.5700)	100km/h	110m	139m	Vegetation, hillside	-	~140m	139m	Crest	-
Access Point B (Lyell Highway) (-42.3735, 146.5270)	100km/h	>150m	139m	-	-	>150m	139m	-	-
Access Point C (Lyell Highway) (-42.3752, 146.5161)	100km/h	>150m	139m			>150m	139m		
Access Point D (Lyell Highway) (-42.3753, 146.5143)	100km/h	95m	139m	Signage, vegetation	~110m	>150m	139m	-	-
Liapootah Power Station Access (-42.3752, 146.5112)	100km/h	70m*	139m	Intersection	-	>140m	139m	-	-
Access Point F (Lyell Highway) (-42.2991, 146.4588)	100km/h	~140m	139m	Fence	-	120m	139m	Vegetation	>140m

*Limited by the nearby Lyell Highway/ Wayatinah Road intersection, which will substantially reduce vehicle speeds below the assessed speed limit.

Based on the above, many of the sight distances at accesses do not meet the requirements of AS 2890.2.

Recommendations to mitigate insufficient sight distance are proposed in Section 5.2.4 of this report.

2.5 Existing traffic operation

When roads carry high traffic volumes relative to their capacity, congestion is the result. To ensure safe and efficient traffic flow on roads it is necessary to manage congestion levels.

The conditions for the different levels of performance of two-lane highways are described in the following terms:

- At LOS A, drivers should be able to maintain operating speeds close or equal to the Free Flow Speed (FFS) of the highway (i.e. drivers able to travel at their desired speed either at or below the speed limit)
- At LOS B, it becomes difficult to maintain FFS operation, but the speed reduction is still relatively small
- At LOS C, most vehicles are travelling in platoons. Speeds are noticeably curtailed
- At LOS D, the fall-off from FFS is now significant
- At LOS E, speed is less than two-thirds the FFS. The lower limit of this LOS represents capacity; and
- LOS F exists whenever arrival flow in one or both directions exceed the capacity of the segment. Operating conditions are unstable, and heavy congestion exists.

The consequence of traffic congestion on the operation of the road network has been defined as shown in Table 18.

Table 18: Consequence of congestion

Severity	Description	Performance
Catastrophic	Significant risk to operation of multiple roads	LOS F
Serious	Considerable traffic delays expected	LOS D or E
Minor	Some acceptable delays expected	LOS C
Limited	Minor or no delays expected	LOS A or B

The levels of performance above have informed the assessment in Section 5.1, which assesses the LOS that is expected on each of the project route roads as a result of the project's construction traffic.

Based on the traffic volumes and types of vehicles that utilise the Lyell Highway, as well as observations made on site, the Lyell Highway, and surrounding intersections, currently operate at LOS A. Assessment against the proposed construction traffic volumes is presented in Section 5.1.3 of this report.

2.6 Road safety

2.6.1 Crash history

Crash data for the most recent 10-year period (2015 – 2025) has been downloaded from the Department of State Growth's Spatial Data Selector. The data has been mapped to the road network using GIS.

The location, number and severity of the crashes within or on roads directly providing access to the Project area, including the northern and southern transmission line options, are detailed in Table 19.

Table 19: Crash history – 2015 to 2025

Road	Count	Severity	Frequent crash types	Crash patterns observed
Lyell Highway	84	Serious – 17 Minor – 14 First aid – 9 Property damage only – 44	• 46 type 180 – 189 – on curve crashes, of which 24 were type 189 – other curve crashes • 7 120 – Wrong side/ other head on (not overtaking)	• Seven crashes occurred on the horizontal curve at the Lyell Highway/ Fourteen Mile Road intersection (none resulted in serious injury) • Five crashes occurred on the horizontal curve at the Tarraleah Power Station and three crashes occurred on the horizontal curve opposite Tarraleah Hydro Park (one at each location resulted in serious injury) • Six crashes occurred on the horizontal curve at -42.2794, 146.4456 (one resulted in serious injury) • Six crashes occurred on the horizontal curve at -42.2861, 146.4568 (one resulted in serious injury)
Fourteen Mile Road	6	Minor – 2 First aid – 1 Property damage only – 6	-	-
Victoria Valley Road	1	Minor – 1	-	-
Access Point 4 (Lyell Highway/ Tungatinah Drive Access)	1	Unknown – 1	-	-

Based on the above, crash patterns were often observed on sharp horizontal curves along the Lyell Highway. Due to the topography of the surrounding landscape, improvements to the road geometry are likely not viable, however, curve widening, advisory speed signage, upgraded road safety barrier and other safety improvements can be made to reduce the risk and severity of crashes.

A map of crashes within the Project area is shown below in Figure 18.

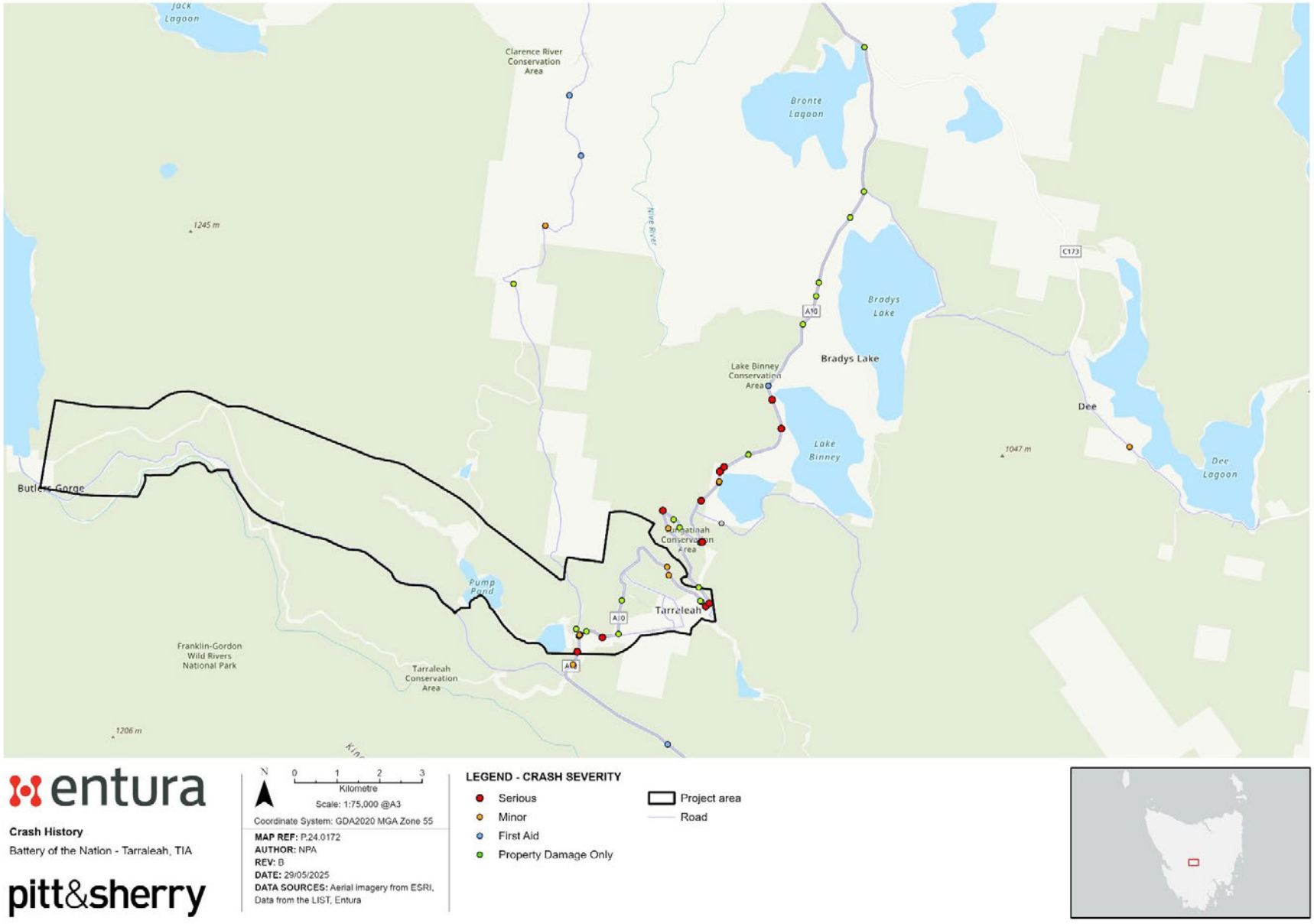


Figure 18: Crash history

2.6.2 Infrastructure and environment

In addition to the safety implications associated with traffic volumes, road width, road condition and sight distance, various other elements contribute to the overall road safety. These include, but are not limited to:

- Speed limit
- Horizontal and vertical alignment
- Road safety barrier
- Roadside environment
- Provision of overtaking opportunities
- Wildlife
- Road signage
- Overhead clearance; and
- Lighting.

Generalised safety issues were noted along public roads (and Butlers Gorge Road) during the site visit undertaken on 27 March 2024. These are outlined in Table 20 below.

Table 20: Road safety issues

Road	Comments
Lyell Highway	• 100km/h speed limit is excessive for the area, despite the provision of advisory speed signs • Various tight corners with limited stopping sight distance • Existing non-compliant road safety barrier and end terminals; and • Provision of road safety barrier may be warranted in multiple locations.
Butlers Gorge Road	• Single lane section west of intersection with switchyard track • Existing non-compliant road safety barrier and end terminals; and • Dirty temporary traffic management signs and a taper was not provided to the Road Closed sign.
Fourteen Mile Road	• Lack of bridge safety barrier at (-42.3011, 146.4219) • Incorrect order of signage on approach to bridge at (-42.3011, 146.4219) • Tight corners with limited stopping sight distance • Crests with limited stopping sight distance; and • Dirty temporary traffic management signs
Oldina Drive (south)	• Lack of pavement marking (at time of site visit) • Unprotected culvert headwall at (-42.3057, 146.4331); and • Gravel and other litter in kerb

3. Tarraleah Hydropower Scheme Project

3.1 Overview

An overview of the Tarraleah Hydropower Scheme Project is provided in Section 1.1 of this report.

3.2 Staff and operation

Post development, the number of staff employed at Tarraleah is expected to be similar to the number of staff currently employed.

Employee shift times are expected to not change from current shift times.

The operation workforce is expected to be significantly smaller than the construction workforce, outlined in Section 3.8.3 of this report.

3.3 Site accesses

The following site accesses[2] are proposed to be used for the Project during operation:

- Lyell Highway/ Butlers Gorge Road Access (-42.3140, 146.4175)
- Lyell Highway/ Oldina Drive (north) Access (-42.2923, 146.4343)
- Lyell Highway/ Paddy's Quarry Access (-42.2925, 146.4340)
- Lyell Highway/ Tarraleah Power Station Access (-42.2997, 146.4578)
- Oldina Drive/ Palana Crescent Access (-42.3041, 146.4486) – upgrade proposed
- Fourteen Mile Road/ Access to surge tower pipeline (east) (-42.3045, 146.4208); and
- Fourteen Mile Road/ Access to No. 2 Pump Station (-42.3045, 146.4207).

The above do not include the accesses for the transmission line options, described in Section 2.2 of this report.

Sight distance for commercial vehicle traffic entering a public roadway from an access driveway

Sight distance has been estimated at the location of the proposed accesses (those not yet existing) and assessed against the requirements for a 5s gap. The observed sight distance and the 'sight distance for commercial vehicle traffic entering a public roadway from an access driveway' requirements for trucks at the proposed accesses is shown below in Table 21.

[2] Note that a site access, in this report, is the junction between a State or Council-owned road, and a private road or access.

Table 21: Sight distance for commercial vehicle traffic entering a public roadway from an access driveway

Intersection	Operating speed	SD right	Required SD right	SD Limitation right	Potential SD right	SD left	Required SD left	SD Limitation left	Potential SD left
Fourteen Mile Road/ Access to surge tower pipeline (east)	80km/h	120m	111m	-	-	125m	111m	-	-
Fourteen Mile Road/ Access to No. 2 Pump Station	80km/h	120m	111m	-	-	80m	111m	Vegetation	>120m

Based on the above, the sight distance at the Fourteen Mile Road/ Access to No. 2 Pump Station to the north does not meet the requirements of AS 2890.2:

Recommendations to mitigate insufficient sight distance are proposed in Section 5.2.4 of this report.

3.4 Site plans

General arrangement plans have been developed for the Tarraleah Redevelopment Power Station Site and the No. 2 Pump Station. The plans are shown below in Figure 19 and Figure 20.

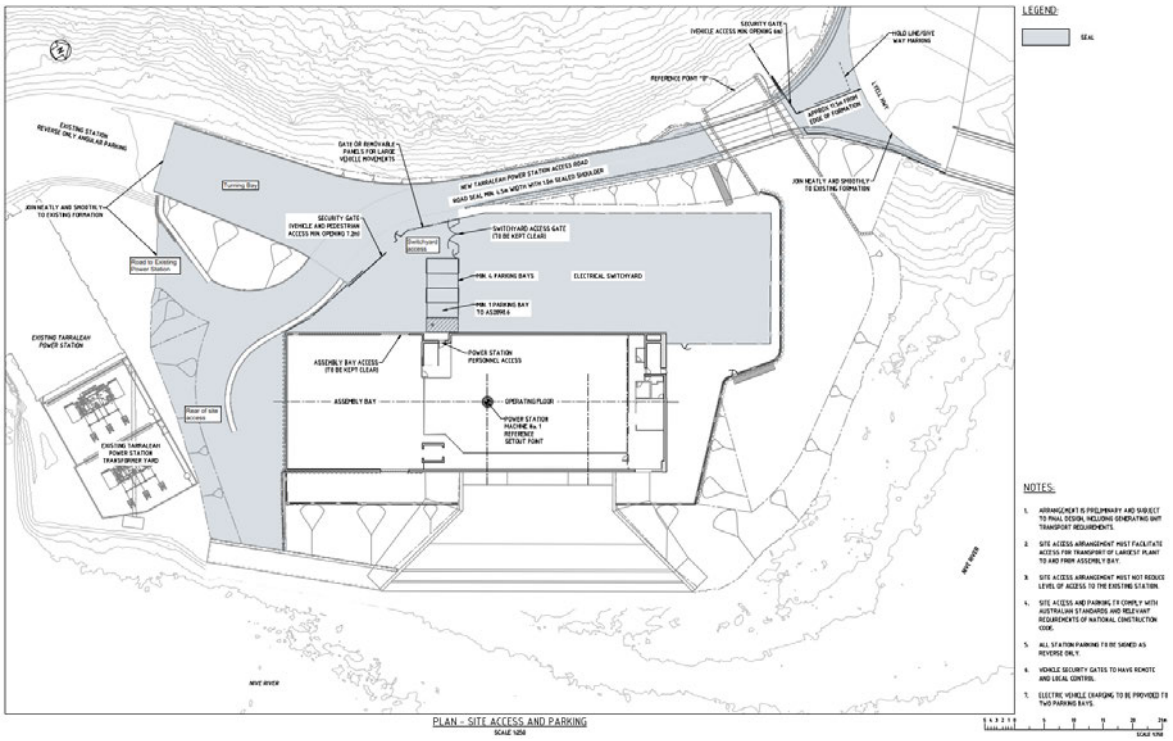


Figure 19: Tarraleah Redevelopment Power Station Site

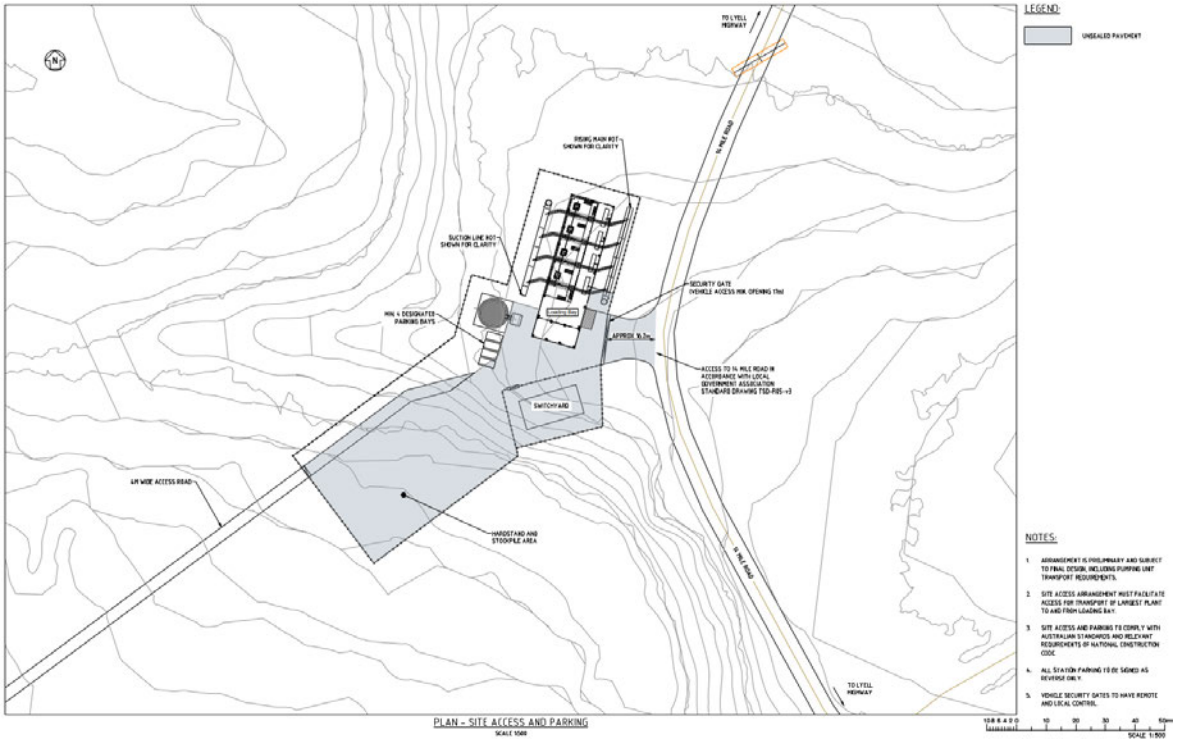


Figure 20: Tarraleah Redevelopment No. 2 Pump Station

3.4.1 Power Station Site

Access

The Power Station Site will be accessed by light vehicles and heavy vehicles up to the size of a 19m semi-trailer.

As evidenced in Figure 19, a new access road will be developed at the site. The access road will be sealed, 4.5m wide with 1.0m wide sealed shoulders. A 6m wide security gate will be located 11.5m back from the edge of the Lyell Highway. Site access will be managed such that vehicles are not entering and exiting concurrently. As such, the access will operate under a two-way shuttle flow arrangement, managed onsite. Light vehicles will be able to pass one another at the access.

Circulation

Circulation roads are provided throughout the site. It is noted that the Power Station site, post construction, will be subject to limited traffic volumes. Circulation roads and their approximate widths are as follows:

Table 22: Circulation road dimensions

Circulation road location	Width
Turning Bay (and access to Existing Power Station)	~11.9m min.
Road to Existing Power Station	~5.9m min. on straight, ~6.5m min. on curve
Rear of site access	~4.8m min.
Switchyard access	~5.9m min.

A secondary security gate is provided outside the Power Station Site parking area, and a switchyard access gate provided outside the switchyard. The former provides a minimum opening width of 7.2m, however, will be able to be modified to enable the entry of larger vehicles such as semi-trailers. The switchyard access gate will be 3.6m wide.

Heavy vehicles will not utilise the rear of site access.

Car parking

Four formalised car parking spaces are provided at the Power Station Site, including one DDA accessible car parking space. Parking space dimensions are shown below in Table 23.

Table 23: Parking space dimensions

Parking space	Feature	Width
90-degree parking spaces	Parking space width	2.5m
	Parking space length	5.4m
	Parking aisle width	6.8m min.

DDA accessible parking space	Parking space width	2.5m
	Parking space length	5.4m
	Shared area width (side)	2.5m
	Shared area length (side)	5.4m
	Shared area width (rear)	2.5m
	Shared area length (rear)	>2.5m

Informal reverse 60-degree parking may also be utilised along the western side of the Existing Power Station access road if required. These parking spaces will be located south of the turning bay.

Loading

Heavy vehicles up to the size of a 19m semi-trailer may reverse into the assembly bay.

3.4.2 No. 2 Pump Station Site

Evidenced in Figure 20, a new 13.2m wide access will be provided to the No. 2 Pump Station site. The access road will be sealed. A 17m wide security gate will be located 16.2m back from the edge of 14 Mile Road.

Circulation

A min. 7.5m wide circulation road is provided to the hardstand and stockpile area.

Car parking

Four formalised car parking spaces are provided at the No. 2 Pump Station Site. Parking space dimensions are shown below in Table 24.

Table 24: Parking space dimensions

Parking space	Feature	Width
90-degree parking spaces	Parking space width	2.5m
	Parking space length	5.4m
	Parking aisle width	>10m

Loading

Heavy vehicles up to the size of a 19m semi-trailer may reverse into the loading bay from Fourteen Mile Road. Heavy vehicles dropping equipment at the hardstand and stockpile area will turn around and leave the site in a forward direction.

3.5 Project Site circulation

During operation, vehicles are expected to primarily operate between:

- Tarraleah Village
- Butlers Gorge Road
- Paddy's Quarry
- The Tarraleah Power Station; and
- the No.2 Pump Station and pipeline to surge tower of Fourteen Mile Road, as shown in Figure 1.

As such, vehicles are expected to operate along the following State or Council-owned roads:

- Lyell Highway
- Oldina Drive (south); and
- Fourteen Mile Road.

A section of Victoria Valley Road between Portal Road and Lake Echo Road will also be utilised should the northern transmission line option be preferred. Wayatinah Road, between the Lyell Highway intersection and the Wayatinah Power Station, would be utilised for the southern transmission line option.

Vehicles are expected to operate along the following privately-owned roads:

- Butlers Gorge Road
- Oldina Drive (north)
- Circulation roads surrounding Tarraleah Village, such as Palana Crescent; and
- Any constructed circulation roads within Paddy's Quarry and surrounding infrastructure accesses off Butlers Gorge Road and Fourteen Mile Road.

The road widths of existing roads, described in Section 2.3.1 of this report, are generally not anticipated to change from the existing.

Palana Crescent, and any constructed circulation roads, will be designed to enable two-way operation of the design vehicle, or, in constrained locations, provide regular vehicular passing bays.

During construction of the transmission towers, the following privately-owned roads would be utilised for the northern option:

- Access Road (-42.2982, 146.4581)
- Access Road (-42.2794, 146.4549)
- Portal Road
- Access Road (-42.2824, 146.6086); and
- Lake Echo Road.

During construction of the transmission towers, the following privately-owned roads would be utilised for the southern option:

- Black Bobs Road
- Access Road (-42.3763, 146.5678)
- Access Road (-42.3735, 146.5270); and
- Access Road (-42.2991, 146.4587).

3.6 Project car parking and laydown

Car parking will be provided at multiple locations within the Project area, including at Tarraleah Village and the Village laydown area, the new Tarraleah Power Station (as shown) and in the vicinity of all other major infrastructure such as the No. 2 Pump Station.

Car parking will be designed to accommodate all vehicles expected to access the site post development, including both light vehicles and heavy vehicles. DDA accessible parking spaces will be provided as deemed necessary to suit the operation workforce.

3.7 Project loading, deliveries and waste collection

Loading and deliveries, post development, will occur to and from various laydown locations within the Project area, as required. Sufficient area for laydown will be provided to account for all vehicles expected to concurrently access the Project area.

General waste will be trucked from site to waste collection facilities by the Tarraleah hydropower scheme operator, or private collection. The design of accesses, circulation roads and parking areas will be suitable to accommodate waste collection vehicles.

3.8 Project construction

3.8.1 Construction timeline

Works associated with the intake and portal began in 2023. Works associated with the tunnel are currently ongoing. Construction works generating construction related vehicles are proposed to occur from 2025 to 2030. Station commissioning may extend into 2031. It is understood that the exact timeline may shift, and thus construction timelines in the report are described as follows:

- Year 1 (January 2025 to December 2025)
- Year 2 (January 2026 to December 2026)
- Year 3 (January 2027 to December 2027)
- Year 4 (January 2028 to December 2028)
- Year 5 (January 2029 to December 2029)
- Year 6 (January 2030 to December 2030); and
- Year 7 (January 2031 to December 2031).

An approximate construction timeline is shown below in Figure 21.

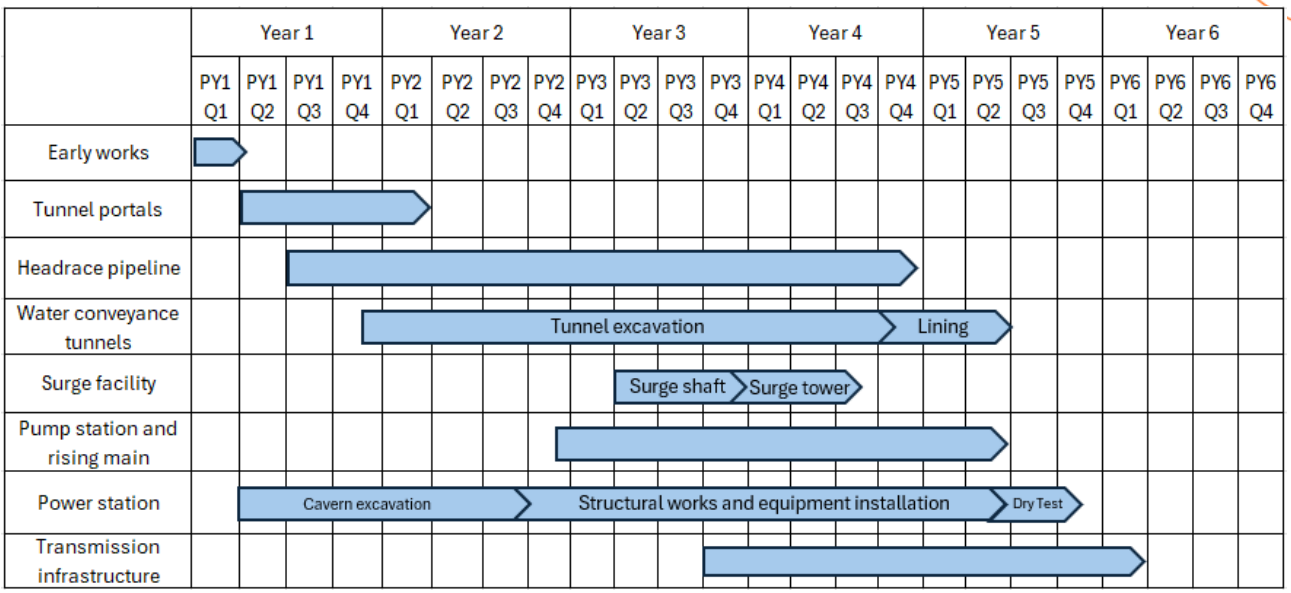


Figure 21: Construction timeline

Transmission line construction

Transmission line construction is not shown in Figure 21. Transmission line staging, for both the northern and southern transmission line options, is shown below in Figure 22 and Figure 23. It is noted that the timelines do not include provision for holidays and wet weather, and thus will likely be extended by roughly 10% - 20%. Transmission line construction will be completed during the wet testing phase of commissioning. As such, the northern route is expected to begin construction roughly at the beginning of Q4 in Year 5. The southern route is expected to begin in Q3 of Year 4.

Northern Route Construction Timeline (10 months)																																						
Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Tracks	P1																					P34																	
Vegetation	P1																							P34														
Hardstands	P1																							P34														
Foundations				T1																				P34														
Assemble Towers							T1																					T28											
String New Circuit																	T1												T28									
String TL527																														TL 527 T 35 to T 56								
Pole Foundations																				Tarraleah & Dee Lagoon																		
Assemble Poles																																							
Augment Tarra & Dee																																							

Figure 22: Northern route construction timeline

Southern Route Construction Timeline (21 months)																																							
Weeks	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89
Tracks	P1												P46																																
Vegetation	P1																P46																													
Hardstands			P1														P46																													
Foundations			P1												P15									P27												P42		P46							
Stand poles																														P1			P14			P27		P42	P46						
Stringing																																	P1 to P10			P10 to P23			P23 to P33				P33 to P46		

Figure 23: Southern route construction timeline

3.8.2 Construction hours

Construction hours are expected to be as follows:

- Surface works (including underground civil works and transmission line) employees: 10-12 hour shift, 6-day week; and
- Underground works employees: 11-hour shift, 24/7 operation 2 weeks on, 1 week off.

Shift times are expected to be as follows:

- Surface works employees: 7:00am to 5:00pm weekdays (6:00am to 6:00pm during periods of extended daylight), 8:00am to 1:00pm Saturday; and
- Underground works employees: 7:00am to 6:00pm and 7:00pm to 6:00am.

3.8.3 Construction workforce

The construction workforce is expected to largely vary across the phases of construction with peak workforce numbers for each year expected to be as follows:

- Year 1 – 70 full-time employees (50 EPC early works, 12 professionals, 8 supporting staff)
- Year 2 – 246 full-time employees (97 civil works, 24 underground works, 63 professionals, 62 supporting staff)
- Year 3 – 233 full-time employees (35 civil works, 72 underground works, 63 professionals, 63 supporting staff)
- Year 4 – 237 full-time employees (36 civil works, 69 underground works, 3 equipment and maintenance, 67 professionals, 62 supporting staff)
- Year 5 – 390 full-time employees (113 civil works, 27 underground works, 6 building works, 111 equipment and maintenance, 73 professionals, 60 supporting staff); and
- Year 6 – 104 full-time employees (73 civil works, 10 underground works, 64 equipment and maintenance, 73 professionals, 60 supporting staff).

Transmission line construction

The above does not account for the workforce associated with the construction of transmission towers. Peak workforce numbers for each year for the two route options are as follows:

- Northern transmission line option:
  - Year 5 – 64 full-time employees
  - Year 6 – 106 full-time employees
- Southern transmission line option:
  - Year 4 – 34 full-time employees
  - Year 5 – 54 full-time employees; and
  - Year 6 – 54 full-time employees.

3.8.4 Construction accommodation

The construction workforce will reside at Tarraleah Village. As per Figure 1, an accommodation facility is proposed between Probula Avenue and Palana Crescent to be accessed via Palana Crescent. A vehicle laydown area will also be located along Palana Crescent, near the junction with Oldina Drive (north).

3.8.5 Circulation roads

Circulation roads, other than those discussed in Sections 3.4.1 and 3.4.2, will be designed to accommodate the largest construction vehicles proposed to utilise them.

3.8.6 Construction vehicles

A range of vehicles are expected to be utilised during construction. These include:

- Light vehicles, primarily utilised by employees travelling around the site
- General access heavy vehicles, primarily utilised to transport materials to and from the site and around the site. Shuttle buses will also be utilised to transport workers between accommodation and construction sites; and
- Class 1, 2 and 3 heavy vehicles, per the *National Heavy Vehicle Regulator* (NHVR) Classes of Heavy Vehicles in the Heavy Vehicle National Law, transporting materials to and from the site, including glass reinforced plastic (GRP) pipes and transformers.

A table of the types of heavy vehicles (including general access vehicles) expected to be used during construction is shown below in Table 25.

Table 25: Construction heavy vehicles

Vehicle type	Vehicle Type
General access vehicles	2-axle Truck
	3-axle Truck
	3-axle Truck (12-tonne)
	5-axle Articulated Vehicle (AV)
	7-axle AV
	4-axle Truck with 4-axle Pig
	5-axle Concrete Truck
	5-axle Flat Bed Tray Truck
	3-axle Rigid Bus
	4-axle Truck
NHVR Class 1	Prime Mover and Low Loader with Dolly (Gooseneck)
	6x4 Low Loader
	Prime Mover and Steerable Platform Trailer with Push Block Truck*
	Special purpose vehicles (SPV) – Cranes, truck mounted drill rigs, graders etc.
NHVR Class 3	Prime Mover and Semitrailer towing Converter Dolly

*Vehicle type used for the delivery of transformers is yet to be confirmed. It is anticipated that such a vehicle will be required due to the mass of the transformers.

The largest vehicle travelling to the site will be the vehicle combination delivering the three 100MVA transformers, which weigh approximately 100 tonnes each. All Class 1 and 3 vehicles will require a permit from the NHVR.

3.8.7 Vehicle routes – to/from site

The below does not include the routes to and from site of vehicles associated with the construction of transmission towers.

Employee route

Employee vehicles are proposed to travel between the Tarraleah Village and sites outlined in Section 3.5 of this report.

General access vehicle routes

General access heavy vehicles will travel to site via several routes. Origins and destinations of general access vehicles are described below in Table 26.

Table 26: General access vehicle origin and destination

Origin	Destination
Hobart	Butlers Gorge Road
	Paddy's Quarry
	Tarraleah Village
	Oldina Drive
	Tarraleah Power Station
	Northern and southern transmission line options
Port of Burnie	Paddy's Quarry
	Northern and southern transmission line options
Launceston	Northern and southern transmission line options
Railton	Paddy's Quarry

General access vehicles can drive on all Tasmanian roads without the need for a permit or specific approval.

NHVR Class 1 and 3 vehicle routes

NHVR Class 1 and 3 vehicles may travel via several routes, subject to permit and, in some cases, specific route assessment. Generally, Class 1 and 3 vehicles coming from southern Tasmania travel via Brooker Avenue, Brooker Highway and the Lyell Highway to Tarraleah and are able to travel as far north as the Lyell Highway/ Oldina Drive (south) intersection. NHVR Class 1 and 3 vehicles travelling from northern Tasmania generally travel via the Bass Highway, Meander Valley Road, Highland Lakes Road, Marlborough Road, Lyell Highway and Fourteen Mile Road.

Further information on the route from Hobart is provided in the *Logistics and Transport Study: Tarraleah Hydro Redevelopment Project* written by Blue Water Shipping.

It is anticipated that the vehicles transporting both the 65MVA and 100MVA transformers will travel from either Port of Bell Bay or Burnie Port.

Origins and destinations of the NHVR Class 1 and 3 heavy vehicles are described below in Table 27.

Table 27: NHVR Class 1, 2 and 3 heavy vehicles origin and destination

Origin	Destination	Routes
Port of Bell Bay	Butlers Gorge Road	Subject to permit, (likely via) East Tamar Highway – Midland Highway – Bass Highway – Meander Valley Road – East Parade – Highland Lakes Road – Marlborough Road – Lyell Highway – Fourteen Mile Road
Hobart	Tarraleah Village	Brooker Highway – Lyell Highway
	Northern and southern transmission line options	
Port of Burnie	Butlers Gorge Road	Subject to permit, (likely via) Bass Highway – Meander Valley Road – East Parade – Highland Lakes Road – Marlborough Road – Lyell Highway – Fourteen Mile Road
	Tarraleah Village	
	Pumpstation	
	Tarraleah Power Station	
Launceston	Butlers Gorge Road	Subject to permit, (likely via) Midland Highway – Illawarra Road – Marlborough Street – Cressy Road – Poatina Road – Highland Lakes Road – Marlborough Road – Lyell Highway – Fourteen Mile Road
	Tarraleah Power Station	
	Northern and southern transmission line options	
Ulverstone	Tarraleah Power Station	Subject to permit, (likely via) Bass Highway – Meander Valley Road – East Parade – Highland Lakes Road – Marlborough Road – Lyell Highway – Fourteen Mile Road
Wynyard	Butlers Gorge Road	

School bus routes

School buses, as per the *Tasmanian Government School Bus Routes App*, do not operate in the vicinity of the Project area, finishing at Ouse in Tasmania's south and Queenstown in Tasmania's west. Class 1 and 3 Project vehicle routes will be subject to the conditions of respective permits which, where necessary, are expected to limit timing of movements.

3.8.8 Vehicle routes – to/from accommodation

As discussed, the construction workforce is expected to be accommodated, primarily, within the proposed Tarraleah Village. It is anticipated that other workers will be accommodated in the existing Tarraleah Village accommodation.

Workers are expected to travel to the site from all over Tasmania (Hobart, Launceston and north-west coast), via both light vehicle and shuttle bus (for those travelling from interstate). Workers are expected to generally travel to/from accommodation outside of peak times, and at varied times, and thus are not expected to have a significant impact on the operation of the surrounding road network.

4. Operational phase traffic assessment

4.1 Traffic impact assessment

Post development, the number of staff stationed at Tarraleah (across the Tarraleah Hydropower Scheme Project) is expected to be similar to the number of staff currently employed. As such, during operation, the Project will generate significantly less traffic than it will during construction.

Assessment of the impact of the Project on the surrounding road network has thus been undertaken for the peak period during construction.

4.2 Site access and circulation

It is anticipated that site accesses and circulation roads utilised for construction of the Project will continue to be utilised during operation, including for maintenance as required.

As defined in Section 4.3.3 of this report, parking areas (including site accesses and circulation roads), must be designed to meet the requirements of *AS/NZS 2890.1 Parking facilities: Off-street car parking* (AS 2890.1), AS 2890.2, *AS 2890.3 Parking facilities: Bicycle parking* (AS 2890.3) and *AS/NZS 2890.6 Parking facilities: Off-street parking for people with disabilities* (AS 2890.6). Site accesses and circulation roads should also be designed in accordance with the *ARRB Unsealed Roads Best Practice Guide 2* and the *Austroads Guide to Pavement Technology Part 6*.

In accordance with AS 2890.2, site accesses and circulation roads should be designed to cater for the largest vehicle proposed to access and egress the Project area.

4.2.1 Power Station Site

Site Access

As discussed, the Power Station access will operate under a managed, two-way shuttle flow; vehicles will not enter and exit the site concurrently. In accordance with AS 2890.2, access width should be suitable for the largest vehicle entering the site. Turning paths, shown below in Figure 24, demonstrate that a 19m semi-trailer can access and egress the site in a forward direction whilst encroaching onto the opposing lane. This can be managed using traffic management.

The access is suitable for the passing of light vehicles north of the proposed security gate.

It is noted that due to the position of the security gate, the gate must be opened prior to the entry of vehicles larger than an 8.8m MRV such that the body of those vehicles is not sticking out onto the Lyell Highway whilst waiting for the gate to open. Alternatively, the security gate may be relocated further south in detailed design.

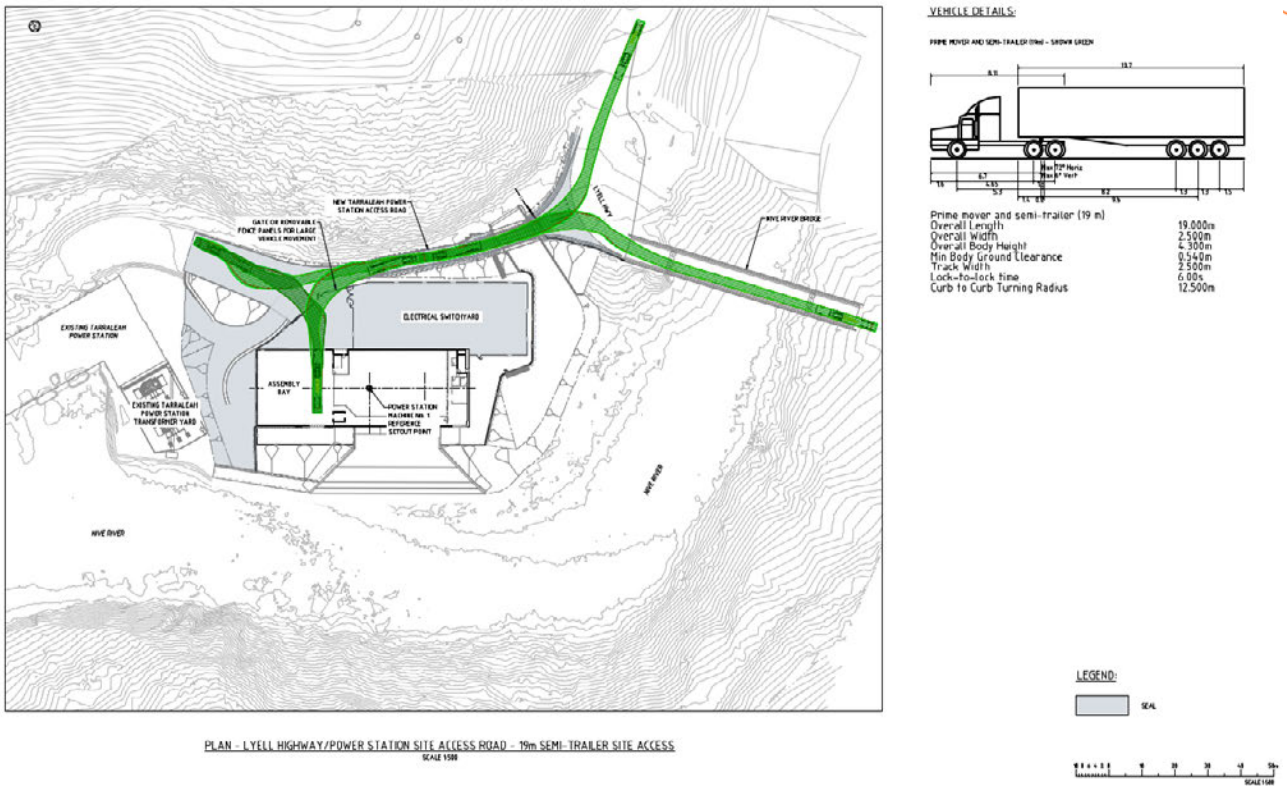


Figure 24: Power Station Site swept path - 19m semi-trailer into assembly bay

Site Circulation

In accordance with AS 2890.2, circulation roads should be designed for the swept paths of the largest vehicle expected to operate throughout the site. The swept paths confirm that minor widening will be required in detailed design to accommodate the right turn out of the secondary security gate. A 0.6m offset to the vehicle is required on the outside of the turn path, and a 0.3m offset required on the inside. As such, a 7m wide circulation road should be provided directly west of the electrical switchyard.

The access road or secondary security gate should be slightly modified in detailed design to ensure that an egressing 19m semi-trailer has sufficient space.

The width of the circulation roads has been further assessed against the requirements of AS 2890.1 in Table 28 below.

Table 28: Circulation road width assessment

Circulation road location	Width	Required width (AS2890.1)	Meets requirements?
Turning Bay (and access to Existing Power Station)	~11.9m min.	Two-way: 5.5m	Yes
Road to Existing Power Station	~5.9m min. on straight ~6.5m min. on curve	Two-way on straight: 5.8m (with obstruction on one side) Two-way on curve (r=17m): 7.0m	Yes, on straight No, on curve
Rear of site access	~4.8m min.	One-way on curve (r=32m, with obstruction on one side): 3.5m	Yes
Switchyard access	~5.9m min.	Two-way (with obstruction on one side): 5.8m	Yes

Based on the above, minor widening is required on the curve to the existing power station for two-way operation. All other circulation roads meet minimum width requirements for expected operation.

Consideration is to be given regarding sight distance at the rear of site access, noting the level difference. Any fencing or railing on the retaining wall should not completely block the view of a vehicle on one side of the retaining wall to a vehicle on the other, such that safe passing can occur.

Based on the topography of the existing site, circulation road grades are expected to meet the requirements of AS 2890.1 and AS 2890.2.

4.2.2 No. 2 Pump Station Site

Site Access

Swept paths, shown below in Figure 25, confirm that as currently designed, a 19m semi-trailer cannot reverse into the loading bay without widening of the site access. As such, the access will need to be widened in detailed design.

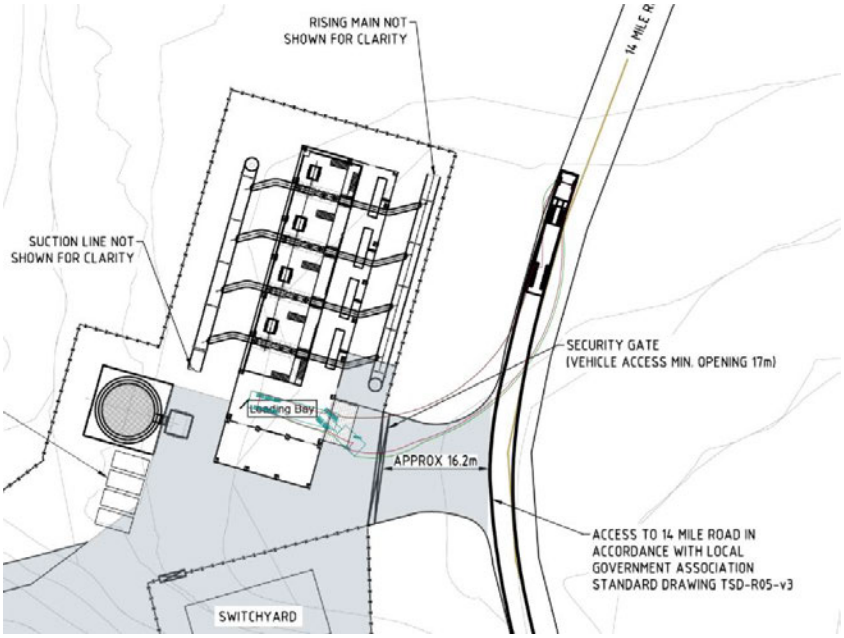


Figure 25: No. 2 Pump Station Site swept path - 19m semi-trailer into loading bay

It is noted that due to the position of the security gate, the gate must be opened prior to the entry of vehicles larger than a 12.5m HRV such that the body of those vehicles is not sticking out onto the Lyell Highway whilst waiting for the gate to open.

The access is sufficiently designed for the two-way operation of vehicles travelling to/ from the switchyard or hardstand area.

Site Circulation

The minimum 7.5m wide circulation road is sufficient for heavy vehicles and light vehicles, meeting AS 2890.2 and AS 2890.1, respectively. Based on the topography of the land, circulation road grades are expected to meet the requirements of AS 2890.1 and AS 2890.2.

4.3 Parking

4.3.1 Car parking provision

As outlined in Clause C2.5.1 Car parking numbers of the Planning Scheme, the Project should provide parking spaces in accordance with Table C2.1 of the Planning Scheme.

In accordance with Table C2.1 of the Planning Scheme, there is no requirement for car parking.

As the Project will provide sufficient car parking and/or laydown area to meet the needs of workers during both construction and operation, it will exceed the requirements of C2.1 of the Planning Scheme.

4.3.2 Heavy vehicle parking provision

As outlined in Clause C2.5.4 of the Planning Scheme, the Project should provide one loading bay for uses with a floor area of more than 1000m^2 in a single occupancy, if the occupancy is zoned as Bulky Goods Sales, General Retail and Hire, Manufacturing and Processing; or Storage. As such, loading bays are not required for the development.

Therefore, the Project will comply with C2.5.4 of the Planning Scheme.

4.3.3 Parking layout

To meet Planning Scheme Acceptable Solutions:

Clause C2.6.1 of the Planning Scheme, parking area pavements must be constructed with a durable all-weather seal and be drained to the public stormwater system or contained on site. Furthermore, any constructed parking areas in the Village or Utilities Zone must be surfaced with a spray seal, asphalt, concrete, pavers or equivalent material.

Clause C2.6.2 of the Planning Scheme, parking spaces must either comply with the Planning Scheme or with *Australian Standards AS 2890 Parking facilities, Parts 1-6.*

Clause C2.6.3 of the Planning Scheme, the number of accesses provided for each frontage must be no greater than 1 or no greater than the existing number of accesses.

Clause C2.6.6 of the Planning Scheme, loading bays must be designed in accordance with AS 2890.2 and enable vehicles to enter and exit the site in a forward direction.

Clause C2.6.8 of the Planning Scheme, siting of parking and turning areas within the Village Zone must be located behind the building line, unless a parking area is already provided in front of the building line.

Power Station Site

Clause C2.6.1 – Parking spaces will be constructed with a spray seal or approved equivalent material.

Clause C2.6.2 – The car parking space dimensions meet the requirements of AS 2890.1 and AS 2890.6. Relevant pavement marking is to be shown for the DDA accessible space in accordance with AS 2890.6. Circulation roads require minor modification, as discussed.

Clause C2.6.3 – Only one access is planned for the site.

Clause C2.6.6 – The assembly bay meets the requirements of AS 2890.2.

No. 2 Pump Station Site

Clause C2.6.1 – Parking spaces will be constructed with a durable all-weather seal.

Clause C2.6.2 – The car parking space dimensions meet the requirements of AS 2890.1. Minor modifications are required to the site access.

Clause C2.6.3 – Only one access is planned for the site.

Clause C2.6.6 – The loading bay meets AS 2890.2, however, heavy vehicles will reverse into the loading bay from Fourteen Mile Road.

Other Locations

Any other locations in which parking is provided should be designed in accordance with the above clauses.

5. Construction phase traffic assessment

Section 5.1 assesses traffic travelling to, from and around the site during the anticipated construction peak period, during the AM and PM peak hour. It does not account for travel between workforce accommodation and residences which will occur outside of the peak AM and PM peak hours from several different locations.

Travel between workforce accommodation and residences will occur at varied times from several different locations and thus is expected to have a lesser impact on the operation of the surrounding road network as compared to travel between site and workforce accommodation. It has therefore not been assessed.

5.1 Traffic Impact Assessment

The TIA has been completed for the year and month coinciding with the Project's peak traffic generation. During construction, the AM and PM peak hours will be as follows, as per information received from Hydro Tasmania:

- AM peak hour 7:00am to 8:00am; and
- PM peak hour 3:30pm to 4:30pm.

Due to the nature of the vehicle movements throughout the Project site during construction, the construction peak hour will be the new peak hour on the surrounding road network. The northern transmission line route option's construction traffic volumes have been included in this assessment as they generate a greater number of peak vehicle volumes as compared to the southern transmission line route option.

5.1.1 Traffic generation

Traffic generation for the Project has been provided and includes the following:

- Trucks delivering materials to the site, including return trips
- Trucks and other construction vehicles, such as cranes, travelling around the site, including return trips; and
- Employees travelling around the site, generally from Tarraleah Village during the AM peak hour, and from Tarraleah Village during the PM peak hour both via light vehicles and shuttle buses.

The following clarifications/ assumptions have been made regarding the traffic generation of general access heavy vehicles and NHVR class 1, 2 and 3 heavy vehicles associated with delivery and/ or movement of infrastructure or materials:

- The number of trips, where necessary, has been rounded up to the nearest whole integer
- It has been conservatively assumed that 25% of vehicles movements that will occur consistently throughout the day (i.e. deliveries) will be generated during the AM and PM peak hours
- The number of trips to and from a site during the AM and PM peak hours has been split evenly (i.e. the same number of vehicles that travel to the Project area will leave the Project area during the same hour)
- Vehicles travelling to Oldina Drive/ the Tarraleah Village from the Tarraleah Power Station or other locations north of Oldina Drive (north) were assumed to turn left into the Oldina Drive (north) intersection
- Where NHVR Class 1 or 3 heavy vehicles were proposed to come from the north to Tarraleah via the Lyell Highway, they were assumed to travel south via Fourteen Mile Road; and
- All vehicles travelling to Oldina Drive/ Tarraleah Village would travel to the proposed Tarraleah Village off Palana Crescent rather than travel to existing structures within Tarraleah.

The following clarifications/ assumptions have been made regarding the traffic generation of light vehicles and 3-axle trucks and buses utilised as employee vehicles:

- The number of trips, where necessary, has been rounded up to the nearest whole integer
- All vehicles will travel from Tarraleah Village to various locations during the AM peak hour, and travel from various locations back to Tarraleah Village during the PM peak hour
- All vehicles travelling to Oldina Drive/ the Tarraleah Village from the Tarraleah Power Station were assumed to turn left into the Oldina Drive (north) intersection; and
- All vehicles travelling to Oldina Drive/ Tarraleah Village would travel to the proposed Tarraleah Village off Palana Crescent rather than existing Tarraleah Village infrastructure.

The following clarifications/ assumptions have been made regarding the existing vehicles that currently travel on the Lyell Highway through Tarraleah:

- The existing traffic volumes on the Lyell Highway during the AM and PM peak hour were grown based on the historical growth rate to the year coinciding with the Project's peak construction traffic generation
- The existing traffic volumes turning to and from Butlers Gorge Road and Fourteen Mile Road are conservatively assumed to be 25% of traffic on the Lyell Highway. The ingress/ egress movements from both roads are expected to roughly be a 50/50 split. This is expected to be conservative; and
- The traffic volumes to Oldina Drive (and into the existing Tarraleah Village) during construction were estimated based on access being provided to the café and to the viewing platform. Rough traffic generation rates were provided for the café. Rough traffic generation rates of the viewing platform were discerned based on the number of available car parking spaces.

It is noted that some of the existing traffic volumes on the Lyell Highway would be associated with the existing Tarraleah Development upgrade works. As such, the above assumptions are considered particularly conservative.

5.1.2 Traffic volumes

The estimated traffic volumes during the peak construction period for the AM and PM peak hours are shown below in Figure 26 and Figure 27. Please note that the number within the light grey squares represents the number of light vehicles completing that movement during the peak hour, and the number within the dark grey squares represents the number of heavy vehicles completing that movement during the peak hour. Please also note that it is understood that the Lyell Highway/ Oldina Drive (north) Access will operate as a one-way, left-in only road for vehicles travelling southbound on the Lyell Highway.

The below does not show all transmission line accesses. Transmission line accesses are subject to fewer peak vehicle volumes than Oldina Drive (south) and the Tarraleah Power Station.

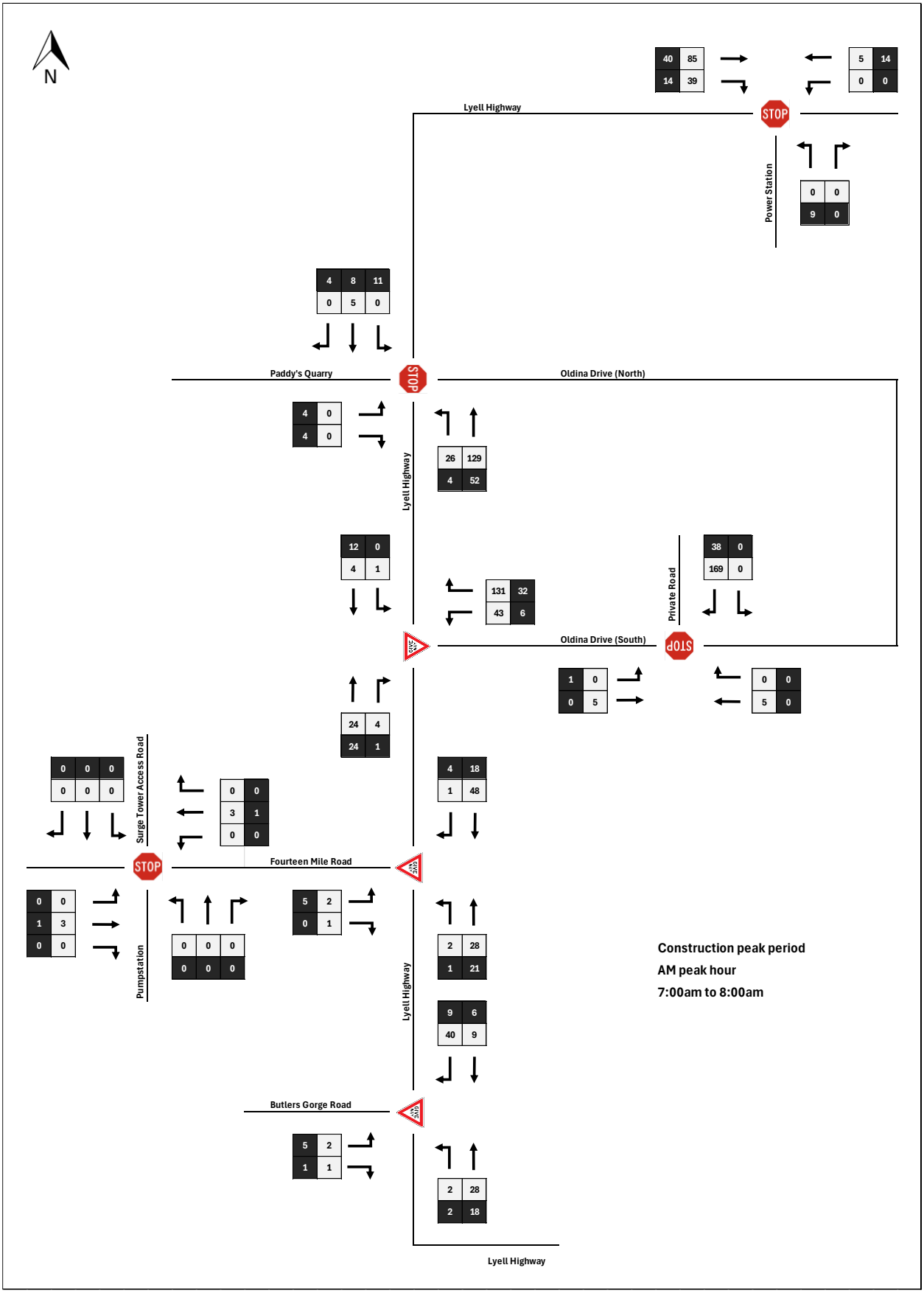


Figure 26: Construction traffic volumes – AM peak hour

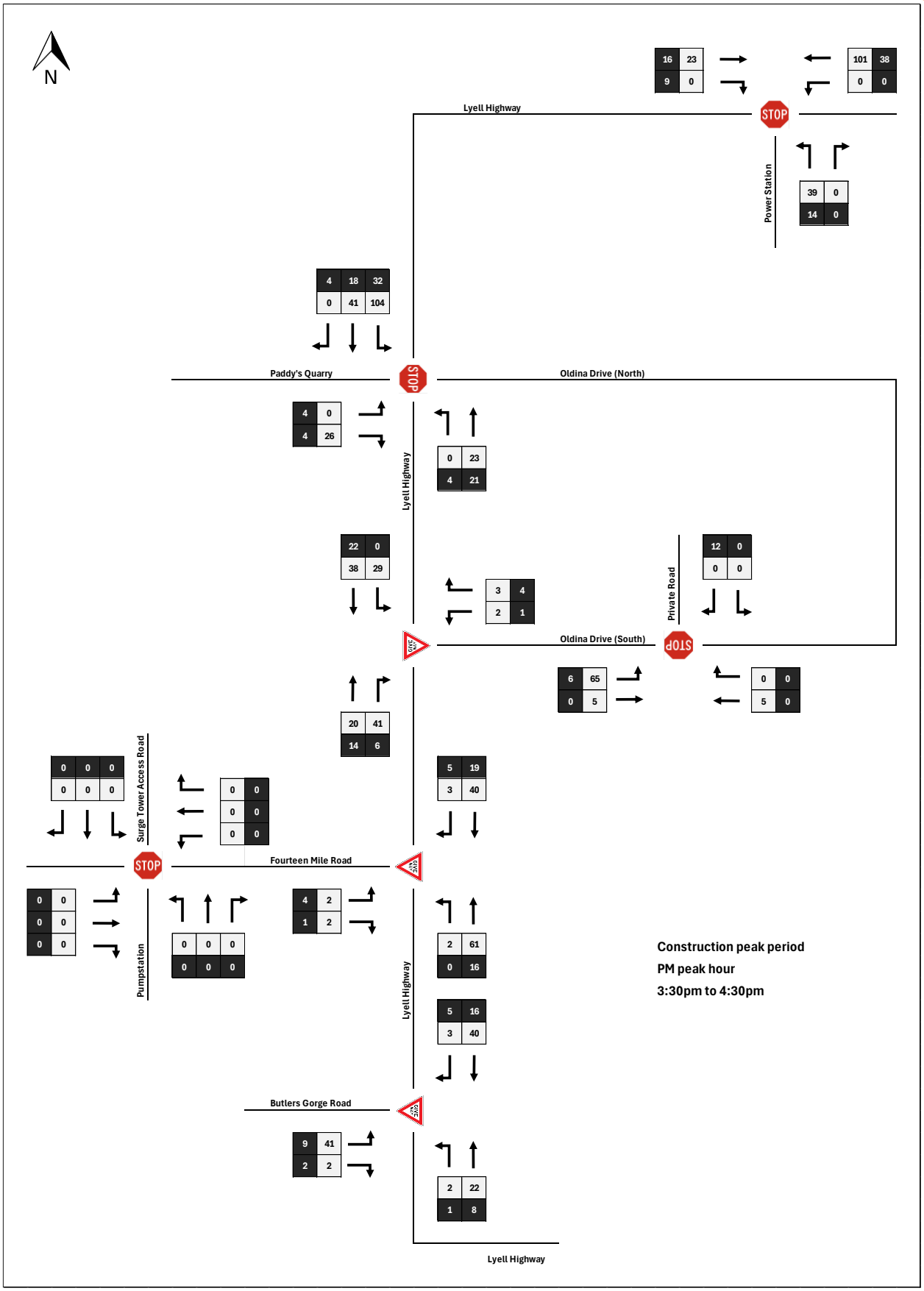


Figure 27: Construction traffic volumes – PM peak hour

5.1.3 Traffic operation

Traffic modelling has been completed for the intersections with the greatest number of opposing traffic movements during the AM and PM peak hour, the Lyell Highway/ Oldina Drive (south) intersection and the Lyell Highway/ Tarraleah Power Station intersection, respectively. These intersections represent the worst-case on the network during the peak hours.

Traffic modelling software

The operation of the intersections has been modelled using SIDRA Intersection 9.1 traffic modelling software. SIDRA Intersection rates the performance of the intersections based on the vehicle delay and the corresponding Level of Service (LOS). Table 29 shows the criteria that SIDRA Intersection adopts in assessing the LOS. It is generally accepted that LOS D or better is an acceptable level of operation.

Table 29: SIDRA intersection level of service (data source: SIDRA, 2022)

LOS	Delay per Vehicle (secs)		
	Signals	**Roundabout**	**Sign Control**
A	10 or less	10 or less	10 or less
B	10 to 20	10 to 20	10 to 15
C	20 to 35	20 to 35	15 to 25
D	35 to 55	35 to 50	25 to 35
E	55 to 80	50 to 70	35 to 50
F	Greater than 80	Greater than 70	Greater than 50

Intersection layout

The geometry of the Lyell Highway/ Oldina Drive (south) intersection and the Lyell Highway/ Tarraleah Power Station intersection for the SIDRA traffic model has been developed based on their existing alignment. It is noted that the intersections may be subject to traffic management during construction.

The geometry of the Lyell Highway/ Oldina Drive (south) intersection is shown below in Figure 28.

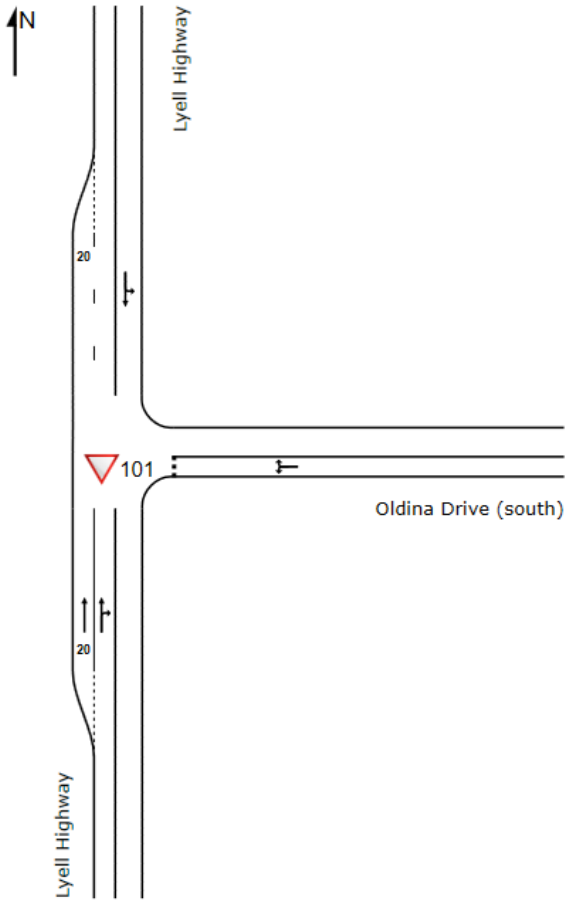


Figure 28: Geometric layout – Lyell Highway/ Oldina Drive (south) intersection

The geometry of the Lyell Highway/ Tarraleah Power Station intersection is shown below in Figure 29.

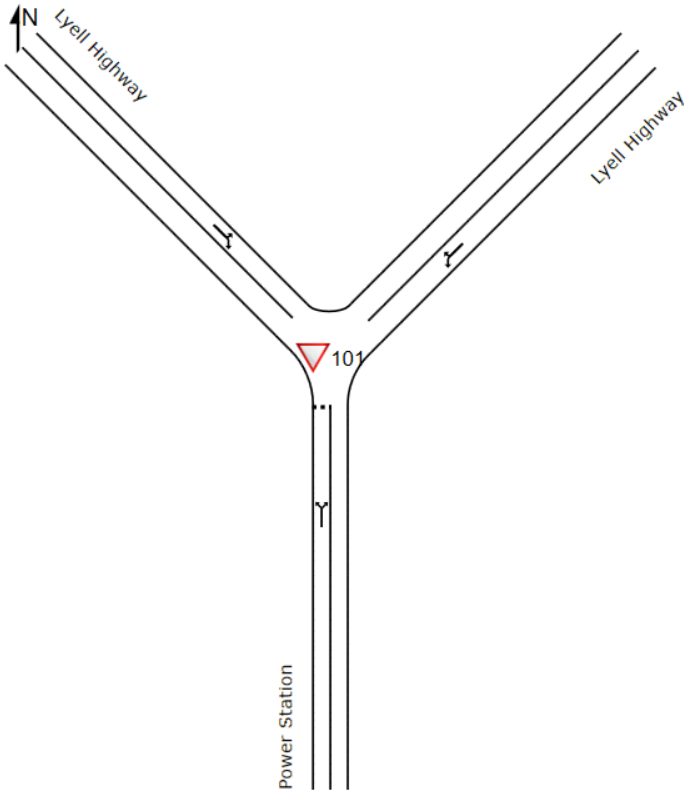


Figure 29: Geometric layout – Lyell Highway/ Tarraleah Power Station intersection

Traffic modelling results

Table 30 presents a summary of the SIDRA Intersection results during the construction AM and PM peak hours at the intersections. Detailed results are presented in Appendix B.

Table 30: Estimated construction peak SIDRA results

Intersection	Peak Hour	Approach	Degree of Saturation	Average Delay (secs)	95th Percentile Queue (m)	LOS
Lyell Highway/ Oldina Drive (south) intersection	AM	South: Lyell Highway	0.017	1.0	0.2	A
		East: Oldina Drive (south)	0.200	6.0	7.4	A
		North: Lyell Highway	0.004	0.9	0.0	A
		All	**0.200**	**5.2**	**7.4**	**A**
Lyell Highway/ Tarraleah Power Station intersection	PM	South: Tarraleah Power Station	0.047	1.3	1.6	A
		North-east: Lyell Highway	0.094	5.8	4.0	A

Intersection	Peak Hour	Approach	Degree of Saturation	Average Delay (secs)	95th Percentile Queue (m)	LOS
		North-west: Lyell Highway	0.037	8.6	0.8	A
		All	**0.094**	**5.4**	**4.0**	**A**

Based on the above, the Lyell Highway/ Oldina Drive (south) intersection is expected to operate at LOS A with minimal queues and delays during the AM peak construction period, and the Lyell Highway/ Tarraleah Power Station intersection is expected to operate at LOS A with minimal queues and delays during the PM peak construction period. Should vehicles travel to/ from sites in a more condensed period, slightly larger queues and delays can be expected, however, these will still be minimal. A sensitivity analysis, increasing vehicle volumes at intersections by a factor of 2 (i.e. as if all vehicles travelled within a 30-minute period), confirms that intersections will still operate at LOS A.

5.2 Intersections

5.2.1 Lyell Highway intersection turn treatments

The *Austroads Guide to Traffic Management Part 6: Interchanges and Crossings Management (2020)* (Austroads Guide to Traffic Management Part 6) specifies warrants for providing left and right turn treatments at unsignalised intersections. Treatments include rural basic right and left turn facilities (BAR/ BAL), rural channelised right turn and short lane right turn facilities (CHR/ CHR(S)), rural auxiliary left turn and short lane left turn facilities (AUL/ AUL(s)) and rural channelised left turn facilities (CHL). Further information on the design of each of these facilities in Tasmania can be found within the *Standard Drawings for Intersections and Interchanges*, here: https://www.transport.tas.gov.au/roadworks/contractor_and_industry_information/standard_drawings.

Figure 30 and Figure 31 are excerpts from the Austroads Guide to Traffic Management Part 6. They show the volumes of traffic at an intersection subject to a speed limit of ≤70km/h, or 70km/h to 100km/h, which would warrant turn treatments. Note that, due to existing geometric constraints which limit the operating speed of vehicles on the Lyell Highway, the warrants for providing left and right turn treatments at unsignalised intersections has been assessed against estimated operating speeds at each of the intersections/ accesses.

The assessment has been completed for the following intersections/ accesses:

- Lyell Highway/ Oldina Drive (south) intersection – 60km/h operating speed
- Lyell Highway/ Fourteen Mile Road intersection – 50km/h operating speed
- Lyell Highway/ Paddy's Quarry Access – 95km/h operating speed (southbound)
- Lyell Highway/ Oldina Drive (north) Access – 95km/h operating speed (southbound); and
- Lyell Highway/ Butlers Gorge Road Access – 80km/h operating speed.

Turning treatments are not expected to be required, due to low traffic volumes, or alternatively cannot be feasibly constructed at other intersections/ accesses within the Project area. This includes transmission line accesses, which will only be utilised for a short period of time.

The assessment has been completed using the peak hour traffic volumes shown in Figure 26 and Figure 27.

Note that Curve 1 (red) and Curve 2 (blue) represent the boundary between the treatment types.

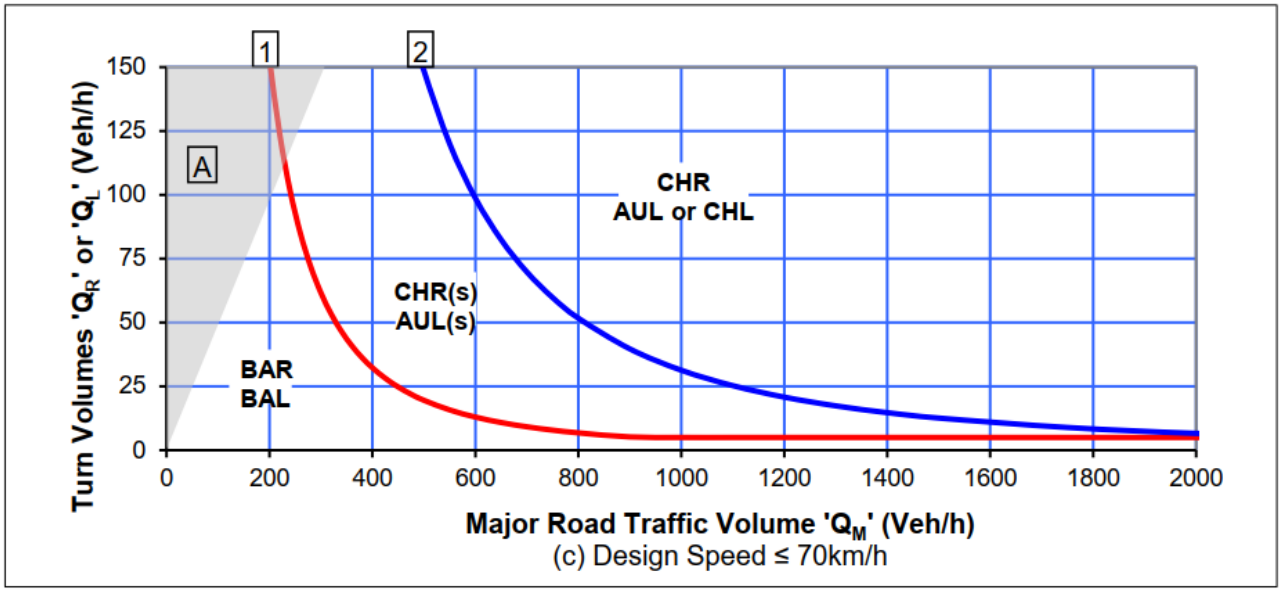


Figure 30: Warrants for turn treatments at unsignalised intersections - ≤ 70km/h (Source: Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (2020))

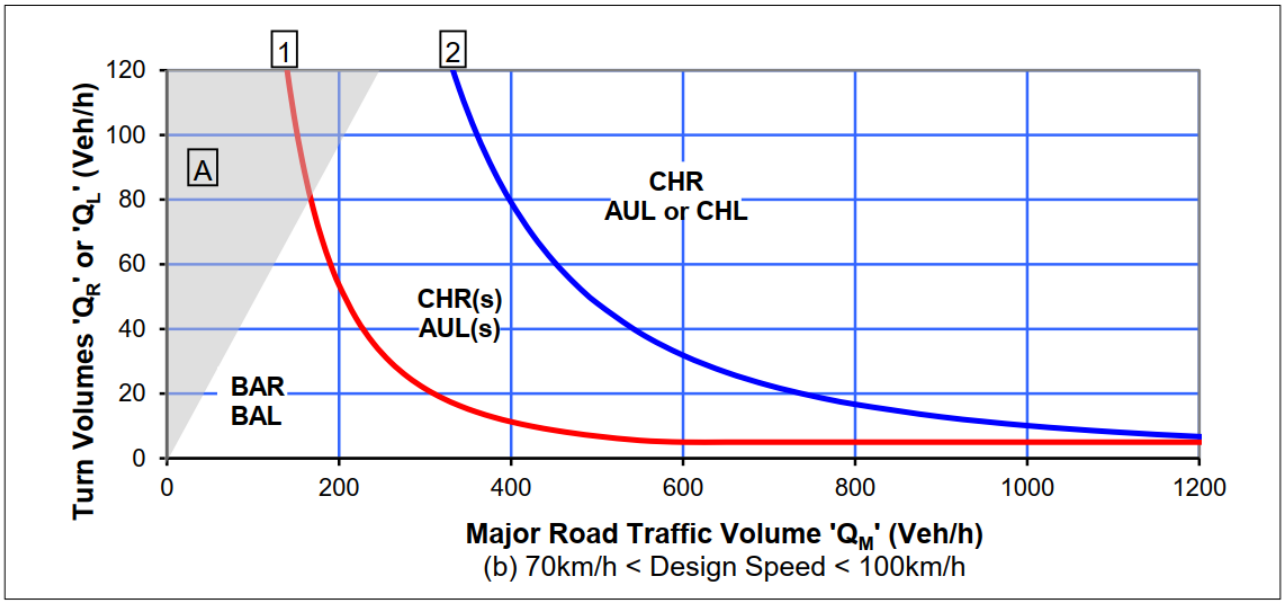
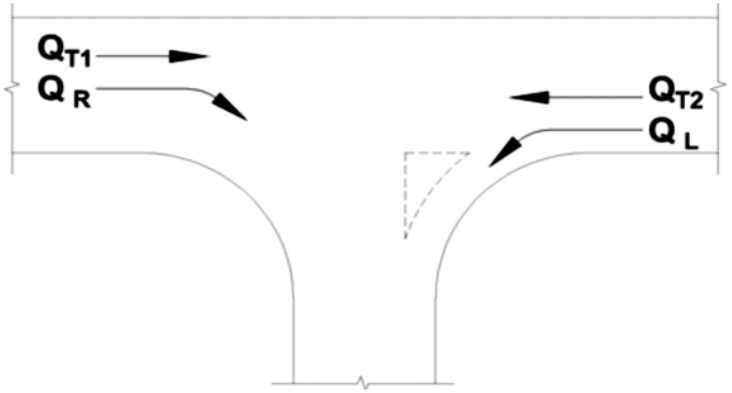


Figure 31: Warrants for turn treatments at unsignalised intersections – 70km/h to 100km/h (Source: Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (2020))

The calculation of Q_M is shown below in Figure 32.



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	= $Q_{T1} + Q_{T2} + Q_L$
		Yes	= $Q_{T1} + Q_{T2}$
	Left	Yes or no	= Q_{T2}
Four-lane two-way	Right	No	= 50% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 50% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 50% x Q_{T2}
Six-lane two-way	Right	No	= 33% x $Q_{T1} + Q_{T2} + Q_L$
		Yes	= 33% x $Q_{T1} + Q_{T2}$
	Left	Yes or no	= 33% x Q_{T2}

Figure 32: Calculation of Q_M

For all intersections during both the AM and PM peak hour, a rural BAL and BAR are recommended according to the Austroads Guide to Traffic Management Part 6, at minimum, at each intersection/ access.

Due to the low turning volumes at the Lyell Highway/ Fourteen Mile Road intersection, and the requirement of vehicles to slow down significantly to navigate the corner, provision of turning lanes is not considered necessary. Furthermore, a BAL is not considered necessary for the Lyell Highway/ Butlers Gorge Road Access due to the very low left turning vehicle volumes during both the AM and PM peak hours. Finally, due to the geometry of the intersections/ accesses and thus preference to not require through vehicles to shift laterally, a rural (CHR(S)) is recommended instead of a BAR at the intersections.

The design vehicle for each of the turning lanes during construction is described below in Table 31, based on information provided by Hydro and the assumption that NHVR Class 1, 2 and 3 vehicles travelling from the north of the State would utilise Fourteen Mile Road.

Table 31: Turning lane design vehicles

Intersection/ Access	Design vehicle – left turn (BAL)	Design vehicle – right turn (CHR(S))
Lyell Highway/ Oldina Drive (south) intersection	Light vehicle*	NHVR Class vehicle – Prime Mover and Semitrailer towing Converter Dolly
Lyell Highway/ Paddy's Quarry Access	4 Axle Truck + 4 Axle Pig	4 Axle Truck + 4 Axle Pig

Intersection/ Access	Design vehicle – left turn (BAL)	Design vehicle – right turn (CHR(S))
Lyell Highway/ Oldina Drive (north) Access	NHVR Class vehicle – Prime Mover and Semitrailer towing Converter Dolly	-
Lyell Highway/ Butlers Gorge Road Access	-	NHVR Class vehicle – Prime Mover and Semitrailer towing Converter Dolly

*It is recommended that the turn lane be designed, at minimum, for a semi-trailer should such movements be required during Project operation.

Rural channelised short lane right turn facilities and rural basic left turn facilities should be designed in accordance with the Department of State Growth's *Tasmanian Standard Drawings*, shown in Figure 33 and Figure 34, respectively.

Rural channelised short lane right turn facilities

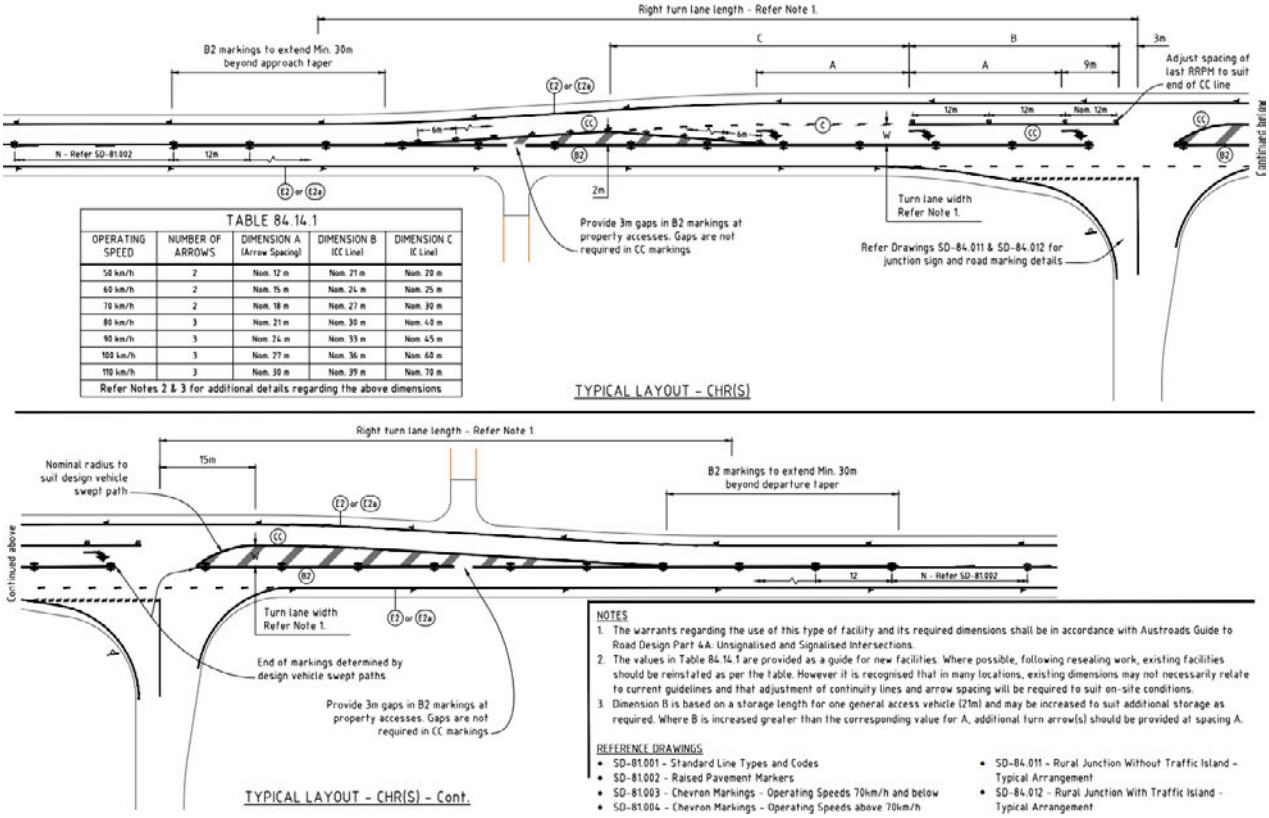


Figure 33: Typical layout – CHR(S) (Standard Drawings for Intersections and Interchanges)

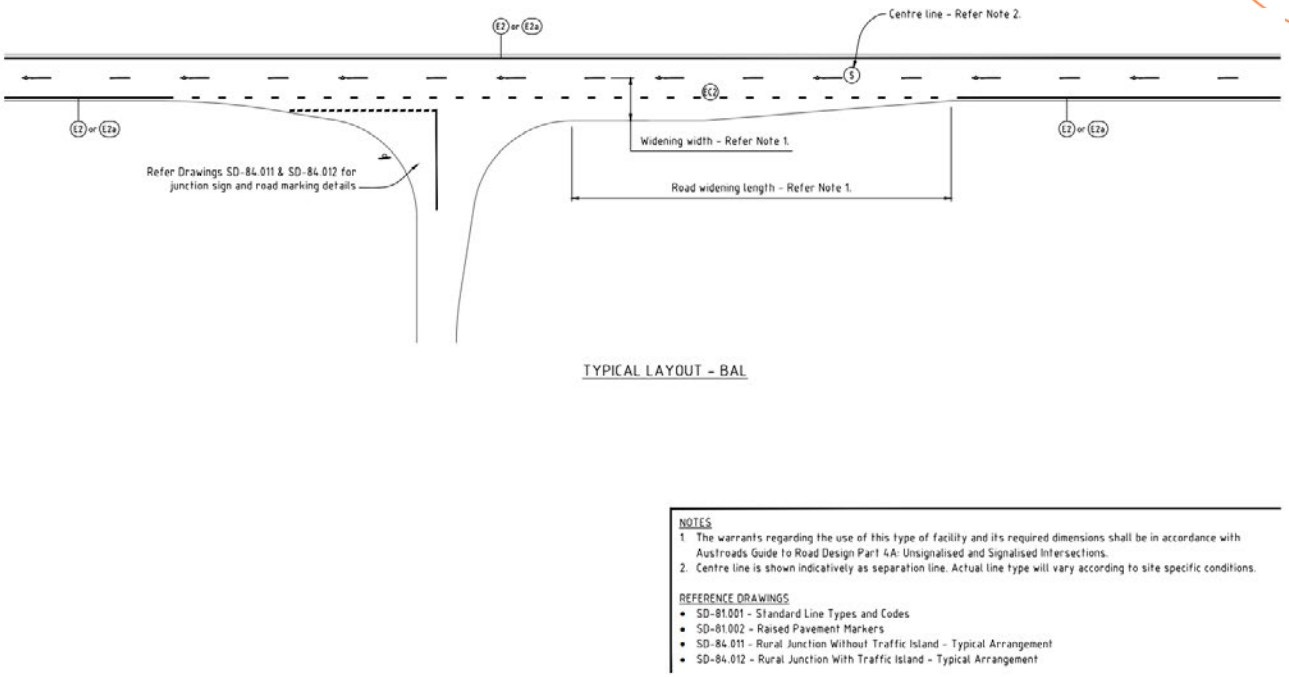


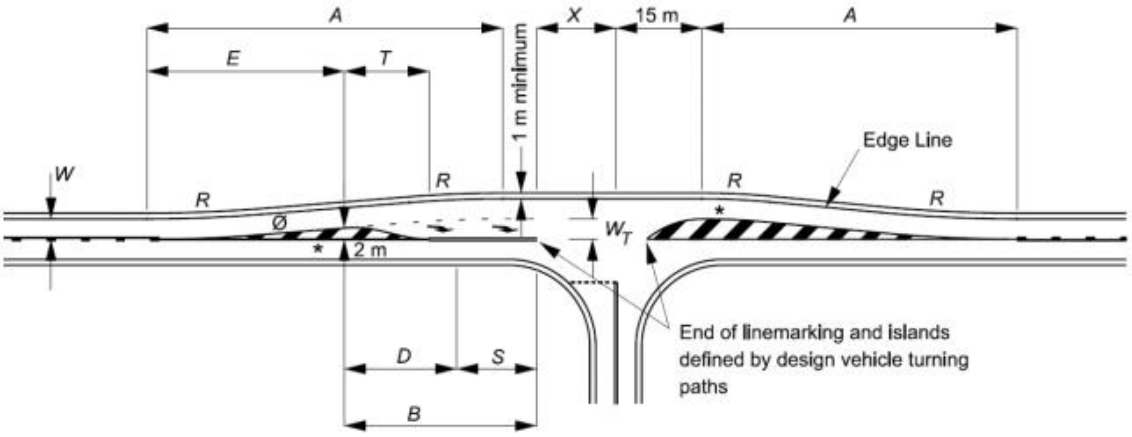
Figure 34: Typical Layout – BAL (Standard Drawings for Intersections and Interchanges)

Based on Figure 33, a CHR(S) should be designed in accordance with the requirements of Figure 35 and Figure 36, taken from the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (AGRD Part 4A).

Design speed of major road approach (km/h)	Lateral movement length *A* (m)[1]	Diverge/deceleration length *D* (m)[2]	Desirable radius *R* (m)	Taper length *T* (m)[3]
50	40[4]	15	110	15
60	50[4]	25	175	15
70	60	35	240	20
80	65	45	280	20
90	75	55	350	25
100	85	70	425	30
110	95	85	500	30
120	100	100	600	35

1 *Based on a diverge rate of 1 m/sec and a turn lane width of 3.0 m. Increase lateral movement length if the turn lane width > 3 m. If the through road is on a tight horizontal curve (e.g. one with a side friction demand greater than the maximum desirable), the lateral movement length should be increased so that a minimal decrease in speed is required for the through movement.*
2 *Based on a 20% reduction in through road speed at the start of the taper to a stopped condition using a value of deceleration of 3.5 m/s^2 (Table 5.2). Adjust for grade using the 'correction to grade' factor in Table 5.3.*
3 *Based on a turn lane width of 3.0 m.*
4 *Where Type 2 road trains are required, minimum A = 60 m.*

Figure 35: Dimensions of CHR(S) treatment for various design speeds (Source: AGRD Part 4A)



Notes:
Ø – double barrier line not to be used this side of the island.
** – Islands are to comprise linemarking only, i.e. no raised or depressed medians. Diagonal rows of RRPMs within the painted islands should be used to improve the delineation of diagonal pavement marking.*
The holding line is typically placed in prolongation of the kerb line or edge line, however, it may be set back if there is a problem with the design vehicle over-running the holding line, or if it is desired to hold vehicles back some distance from the intersecting roadway (AS 1742.2 - 2009). The setback needs to be balanced such that sight distance is not negatively impacted to create a safety issue and the needs of pedestrians is met.
The dimensions of the treatment are defined below and values of A, D, R and T are shown in Table 7.1:

- W = *Nominal through lane width (m) (including widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy*
- W_T = *Nominal width of turn lane (m), including widening for curves based on the design turning vehicle = 3.0 m minimum*
- A = *Length of lateral movement (Table 7.1)*
- B = *Total length of auxiliary lane including taper, diverge/deceleration and storage (m)*
- E = *Distance from start of taper to 2.0 m width (m) and is given by:*
  $E = 2\left(\frac{A}{W_T}\right)$
- T = *Taper length (m) and is given by:*
  $T = \frac{0.33VW_T}{3.6}$
- S = *Storage length to cater for one design turning vehicle (m)*
- V = *Design speed of major road approach (km/h)*
- X = *Distance based on design vehicle turning path, typically 10–15 m*

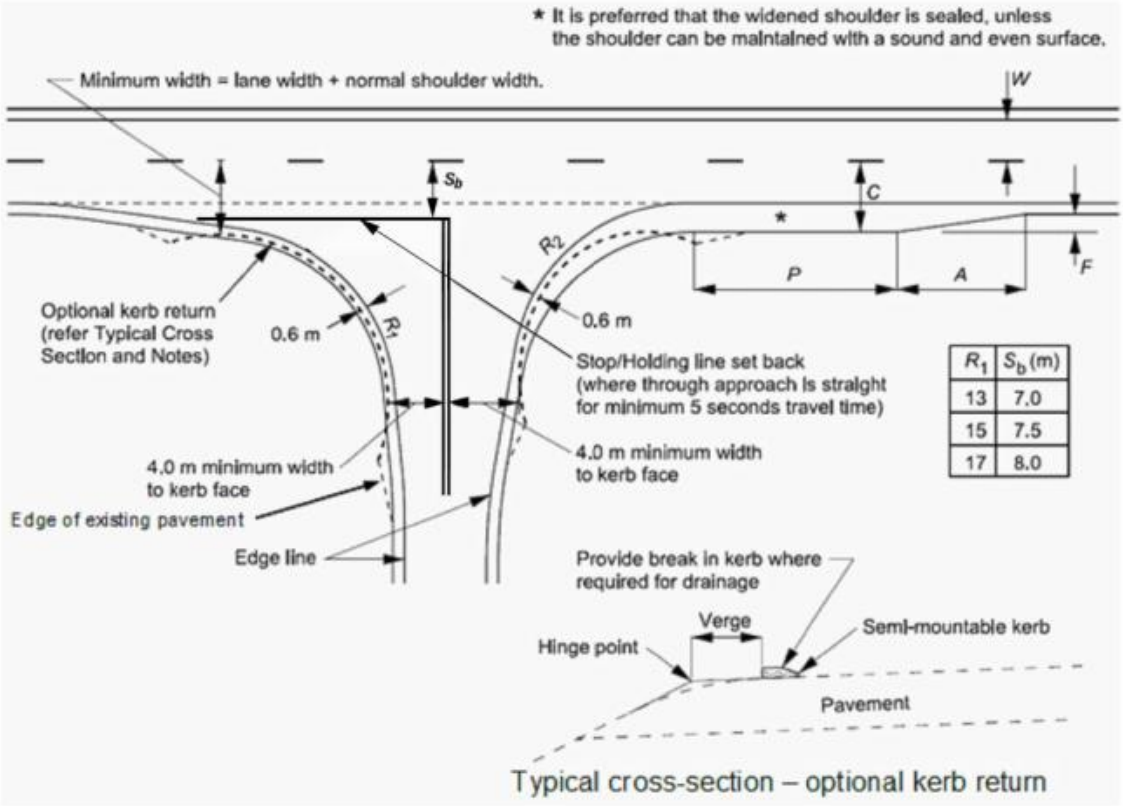
Figure 36: CHR(S) – two lane rural road (Source: AGRD Part 4A)

CHR(S)' should be designed based on the above, taking into account the design vehicles as outlined in Table 31. It is noted that the radius at the Lyell Highway/ Oldina Drive (south) intersection and the Lyell Highway/ Butlers Gorge Road Access will not be able to meet the desirable radius.

Rural basic left turn facilities

Based on Figure 34, a rural BAL should be designed as per Figure 37, taken from AGRD Part 4A.

Figure 8.2: Rural basic left-turn treatment (BAL)



R_1	S_b (m)
13	7.0
15	7.5
17	8.0

Notes:

- *R_1 and R_2 are determined by the swept path of the design vehicle.*
- *The dimensions of the treatment are defined thus:*

W = *Nominal through lane width (m) (including widening for curves).*

C = *On straights – 6.0 m minimum.*
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

$A = \frac{0.5VF}{3.6}$

V = *Design speed of major road approach (km/h).*

F = *Formation/carriageway widening (m).*

P = *Minimum length of parallel widened shoulder (Table 8.1).*

S_b = *Setback distance between the centre of the major road and the give way or stop line in the minor road.*

Figure 37: Rural BAL (Source: AGRD Part 4A)

BALs should be designed based on the above, taking into account the design vehicles as outlined in Table 31. It is noted that locating a BAL at the Lyell Highway/ Paddy's Quarry Access would likely require removal of large trees located in the vicinity of the access.

Generally, all Project intersections/ accesses off the Lyell Highway, whether they do or do not require turn lanes, should be designed to accommodate the turning paths of the largest design vehicle expected to access. Preferentially, vehicles should be able to exit onto the Lyell Highway without entering the opposing lane. Noting that NHVR Class vehicle movements are very low at the above intersections and junctions, and that space is generally very constrained at the intersections/ accesses, it may be acceptable to allow these vehicles to momentarily enter the opposing lane.

Any upgrades to intersections should also consider improvements to sight distance for the use of trucks where relevant sight distance requirements are not already met. It is recommended that sight distance for trucks is provided based on the operating speed of the Lyell Highway at each of the intersections, where possible.

Alternatively, rather than providing turning lanes, temporary traffic management may be implemented during Project construction.

5.2.2 Oldina Drive (south)/ Palana Crescent access

The Oldina Drive (south)/ Palana Crescent access should be modified to accommodate the turning paths of the largest design vehicle anticipated to use the access. This is expected to be a Prime Mover and Semitrailer towing a Converter Dolly. Low loaders will also access Palana Crescent from Oldina Drive (south). Subject to the requirements of the relevant NHVR permit, these vehicles could enter the Palana Crescent from the east or west. In doing so, the access will comply with the requirements of C2.6.6 of the Planning Scheme, should it be designed to AS 2890.2.

Due to the low volumes of through traffic on Oldina Drive (south) during construction, it is anticipated that such vehicles would likely be able to use both sides of Oldina Drive (south), momentarily, during ingress and egress movements.

5.2.3 Other accesses

Other accesses to be utilised during the Project should also be modified to accommodate the turning paths of the largest design vehicle anticipated to use them. In doing so, the access will comply with the requirements of C2.6.6 of the Planning Scheme, should it be designed to AS 2890.2.

Due to the anticipated low volumes of through traffic on Fourteen Mile during construction, it is expected that such vehicles would likely be able to use both sides of Fourteen Mile Road during ingress and egress movements. This is also the case for transmission line access roads off the Lyell Highway, such as Black Bobs Road, Portal Road and Victoria Valley Road.

The largest design vehicle anticipated to utilise the accesses described in Sections 2.2 and 3.3 of this report are outlined below in Table 32.

Table 32: Design vehicles – other accesses

Access	Design vehicle
Fourteen Mile Road/ Access tunnel Access (east)	Unknown*
Fourteen Mile Road/ Access tunnel Access (west)	Unknown*
Fourteen Mile Road/ Access to surge tower pipeline (east)	NHVR Class vehicle – Prime Mover and Semitrailer towing a Converter Dolly
Fourteen Mile Road/ Access to No. 2 Pump Station (pump station)	NHVR Class vehicle – Low Loader
Access Point 1 (Lyell Highway) (-42.2905, 146.4443)	Prime Mover with semi-trailer
Access Point 2 (Lyell Highway/ Tungatinah Power Station Car Park Access) (-42.2982, 146.4581)	Prime Mover with semi-trailer
Access Point 3 (Lyell Highway) (-42.2981, 146.4582)	Prime Mover with semi-trailer
Access Point 4 (Lyell Highway/ Tungatinah Drive Access) (-42.2794, 146.4550)	Prime Mover with semi-trailer
Lyell Highway/ Portal Road Access (-42.2116, 146.5035)	Prime Mover with semi-trailer

Access	Design vehicle
Victoria Valley Road/ Portal Road Access (-42.2461, 146.5618)	Prime Mover with semi-trailer
Access Point 5 (Victoria Valley Road) (-42.2824, 146.6087)	Prime Mover with semi-trailer
Access Point 6 (Victoria Valley Road/ Lake Echo Road) (-42.2835, 146.6151)	Prime Mover with semi-trailer
Access Point 7 (Victoria Valley Road/ Lake Echo Road) (-42.2828, 146.6159)	Prime Mover with semi-trailer
Access Point A (Lyell Highway/ Black Bobs Road Access) (-42.3782, 146.5700)	Prime Mover with semi-trailer
Access Point B (Lyell Highway) (-42.3735, 146.5270)	Prime Mover with semi-trailer
Access Point C (Lyell Highway) (-42.3752, 146.5161)	Prime Mover with semi-trailer
Access Point D (Lyell Highway) (-42.3753, 146.5143)	Prime Mover with semi-trailer
Liapootah Power Station Access (-42.3752, 146.5112)	Prime Mover with semi-trailer
Access Point F (Lyell Highway) (-42.2991, 146.4588)	Prime Mover with semi-trailer
Access Point G (Lyell Highway/ Tungatinah Drive Access) (-42.2794, 146.4550)	Prime Mover with semi-trailer

*It has not been specified by Hydro as to whether construction vehicles are required to utilise this access, however, an access road is expected to be constructed to provide improved access to the Project area during construction.

5.2.4 Summary of recommendations

As outlined above, the following turning treatments, at minimum, are recommended to accommodate the vehicle on the road network within or surrounding the Project area during construction. Alternatively, traffic management may be implemented during construction.

Table 33: Intersections/ accesses - summary of recommended turn treatments

Intersection/ Access	Appropriate turn treatment/s
Lyell Highway/ Oldina Drive (south) intersection	CHR(S)/ BAL
Lyell Highway/ Paddy's Quarry Access	CHR(S)/ BAL
Lyell Highway/ Oldina Drive (north) Access	BAL
Lyell Highway/ Butlers Gorge Road Access	CHR(S)

The following intersection upgrades/ modifications are recommended in addition to the above. These recommendations consider the various assessments completed within this report, the crash history and the additional risk associated with traffic generated by the Project.

Table 34: Intersection recommendations

Recommendation	Actions
Lyell Highway intersections/ accesses	Intersections/ accesses off the Lyell Highway should be modified to enable navigation of the largest design vehicle expected to utilise them. The modification should enable vehicles to not enter the opposing lane of the Lyell Highway whilst egressing the intersection/ access. Modifications include turn treatments or traffic management as outlined in Section 5.2.1 of this report. This does not include high-risk OSOM combinations that will definitely be managed using temporary traffic management. Project representatives should commit to liaise with the relevant authorities (Department of State Growth, Central Highlands Council) regarding modifications to intersections/ accesses.
Other accesses	Intersections/ accesses off other public roads within the Project area should be modified, as necessary, to enable navigation of the largest design vehicle expected to utilise them. The modification should enable vehicles to safely enter/ exit the accesses. This does not include high-risk OSOM combinations that will definitely be managed using temporary traffic management. Project representatives should commit to liaise with the relevant authority (Central Highlands Council) regarding upgrades to accesses.
Access Point 1 (Lyell Highway) (-42.2905, 146.4443)	If the northern transmission line option is preferred, no left turn in/ right turn out should be mandated at this access, unless substantial modifications are made to its alignment. Vehicles travelling southbound towards the access should instead turn around at Paddys Quarry and travel northbound before making a right turn into the access.
Access Point D (Lyell Highway) (-42.3753, 146.5143)	If the southern transmission line option is preferred, modifications to the access are likely required for the right turn in of heavy vehicles making deliveries from Hobart. Alternatively, such vehicles can turn around in the gravel rear access to the Liapootah Power Station located roughly 60m west of the access and travel eastbound before making a left turn into the access.
Improve sight distance, including ASD, SISD and SD for commercial vehicles at various intersections and accesses	Project representatives should commit to liaise with the relevant authorities (Department of State Growth, Central Highlands Council) as appropriate to discuss improving sight distance at intersections and accesses by clearing and maintaining vegetation. Where sight distance improvements are not considered viable, provide warning signage, visual cues etc. A temporary reduction in vehicle speeds in the vicinity of accesses may also be considered.

5.3 Roads

The below assessments do not include roads solely associated with the construction of transmission line options.

5.3.1 Road width and capacity

The width of a road is related to how much traffic it can carry without affecting the safety of vehicles. Roads do not necessarily need to be carrying high levels of traffic causing congestion for volumes to impact vehicle safety. This is generally crucial to roads with a one lane carriageway or roads where there are large numbers of parked vehicles that reduce the available carriageway width.

Department of State Growth roads

State Growth classify their roads separately to local government based on the State Road Hierarchy document. The classifications can be summarised as follows:

- Category 1 roads – are the primary freight and passenger roads connecting Tasmania. They facilitate inter-regional movement of passengers and freight and are crucial to the effective functioning of industry, commerce, and community in Tasmania
- Category 2 roads – are major regional roads facilitating inter-regional and sub-regional movement of passengers and freight. They also provide safe and efficient access to Tasmania's regions
- Category 3 roads – are the main access roads to Tasmania's regions and are of importance to regional and local communities. They facilitate access of regional bases to Category 1 and 2 roads
- Category 4 roads – allow safe travel between towns, major tourist destinations and industrial areas. They facilitate connection to Category 1 to 3 roads; and
- Category 5 roads – provide local access to properties and carry relatively low traffic volumes.

State Growth Category 1-4 roads would generally be considered to align with an Arterial classification. Category 5 roads could be a Collector, Link or Local Access Road.

The *Department of State Growth T3 – Road Design Standards* specify the following cross sections for rural roads:

Note that the width of the shoulders is to be sealed.

Table 35: Department of State Growth rural roads – cross section (Source: https://www.transport.tas.gov.au/__data/assets/pdf_file/0020/111449/T3_-_Roads_Design_Standards_-_Sep_2020_INTERIM_UPDATE.pdf)

Design				Cross Section Width (m) [7][8]			
Road Category	**AADT (vpd)**	**Carriageway**	**Vehicle**	**Seal**	**Lane**	**Shoulder**	**Median**
1	≥ 12,000	2 + 2 Divided	PBS-L3A	20.1	3.5	2.0	2.1 [13] (FSB)
	≥ 12,000 [1]	2 + 1 Divided	PBS-L3A	16.6	3.5	2.0 [10]	2.1 [14] (FSB)
	All	Ramps	Function dependant	7.0	4.0	2.0 (LHS) 1.0 (RHS)	Required where two opposing ramps
2	≥ 3,000	Single Undivided [2]	PBS-L2A	10.0	3.5	1.5	None [15]
	< 3,000 [1]	Single Undivided [3]	PBS-L2A	9.0	3.5	1.0 [11]	None [15]
3	≥ 5,000	Single Undivided [4]	PBS-L2A	9.0	3.5	1.0 [11]	None [15]
	< 5,000 [1]	Single Undivided [5]	PBS-L2A	8.2	3.1	1.0 [11]	None [15]
4 & 5 Typical	All	Single Undivided [6]	PBS-L2A	7.2	3.1	0.1 [11][12]	None
4 & 5 constrained alignments	All	Single Undivided [6]	GA	6.2	3.1	None [12]	None
4 & 5 unsealed	All	Single Undivided	GA	6.2 Pavement	N/A	None	None

1. Projected traffic volumes to be taken into account (i.e. if volumes are expected to exceed vpd limit within 20 years, a higher level of service should be considered).
2. Overtaking lanes may be required at regular selected locations. Divided multi-lane carriageways may be required where volumes are nearing or exceeding 12,000 vpd.
3. Overtaking lanes may be required at isolated selected locations.
4. Overtaking lanes may be required at regular selected locations. Divided multi-lane carriageways may be required where volumes are nearing or exceeding 12,000 vpd.
5. Overtaking lanes, slow vehicle turn outs or stopping bays may be required at isolated selected locations.
6. Slow vehicle turn outs and/or stopping bays may be required at isolated selected locations
7. Typical verge width of 0.5m to be applied.
8. Minimum width between safety barriers on two way single carriageway roads to be 8.0m.
9. Where kerb and channel is provided, the shoulder width may be reduced by the width between the lip line and line of kerb.
10. 2.5m where barrier required on single lane sections.
11. Wider shoulders may be considered on sections where there is a high volume of cyclist activity.
12. When determining the typical cross section on Category 4 and 5 Roads, the PBS Approval Status must be considered.
13. 2.1m minimum to facilitate FSB provision. 3.0m may be considered where AADT >15,000. Isolate sections of wider median may be required for stopping sight distance on curves.
14. 2.1m minimum to facilitate FSB provision. Isolated sections of wider median may be required for stopping sight distance on curves.
15. Median and FSB or Wide Centre Line Treatment may be considered on isolated sections where justified by crash history.

Local roads

The *Local Government Association of Tasmania (LGAT) Standard Drawings* specify the allowable daily traffic for different widths of rural sealed and unsealed roads. The allowable traffic for sealed roads is shown in Figure 38 and Figure 39.

The abbreviations in the figures are as follows:

- A.A.D.T Same as AADT (Annual Average Daily Traffic)
- (w) Width (mm)
- (S) Single lane; and
- (D) Dual lane.

TABLE 2		EXISTING INFRASTRUCTURE	NEW DEVELOPMENT				
CODE*	A.A.D.T.	(w) SEALED TRAFFIC WIDTH	(w) SEALED TRAFFIC WIDTH	SEALED SHOULDER	GRAVEL SHOULDER	VERGE	CARRIAGEWAY WIDTH
S1	< 30	4000 (S)	–	–	500	NO	5000
S2	30 – 100	4000 (S)	–	–	1000	NO	6000
S3	100 – 300	5500 (D)	5500 (D)	400 Refer Note 7.	500	500	6500
S4	300 – 2000	6000 (D)	6000 (D)	400 Refer Note 7.	500	500	7000
S5	> 2000	7000 (D)	7000 (D)	500	500	500	9000

Figure 38: Sealed rural road traffic capacity (Source: https://www.lgat.tas.gov.au/__data/assets/pdf_file/0046/679789/Tasmanian-Standard-Drawings-Release-Version-May-2020.pdf)[3]

CODE*	A.A.D.T.	(w) TRAFFIC WIDTH	GRAVEL SHOULDER	VERGE	PAVEMENT WIDTH
US1	<30	4000 (S)	500	NO	5
US2	30 – 100	4000 (S)	1000	NO	6
US3	100 – 300	5500 (D)	1000	NO	7.5
US4	> 300	6000 (D)	1000	NO	8

Figure 39: Unsealed rural road traffic capacity (https://www.lgat.tas.gov.au/__data/assets/pdf_file/0046/679789/Tasmanian-Standard-Drawings-Release-Version-May-2020.pdf)[4]

The guidance above for local roads has informed the road width assessment which identifies roads which are carrying traffic volumes higher than their intended capacity or expected to carry traffic higher than their intended capacity as a result of the project.

[3] Widths of shoulders and verges are in millimetres.

[4] Widths of shoulders and verges are in millimetres.

Road width and capacity assessment

A road width assessment, whilst the road is under construction traffic, has been undertaken for each of the roads (other than those part of transmission line route options) to determine whether upgrades should be considered. The assessment also considers whether the road is sufficiently dimensioned to cater for existing traffic volumes. For the purposes of this assessment, private roads have been assessed against the LGAT requirements.

The estimated maximum traffic volumes during construction includes traffic generated by the Project, plus the additional traffic expected to be on the road during the peak construction period, determined utilising the derived compounding yearly growth rate.

The maximum traffic volumes during construction have been conservatively estimated within a relevant range. Where yearly growth is discerned to be negative, a 1% per year growth rate has been applied to the existing traffic volumes. Where traffic volumes are not known along a road, they have conservatively been estimated to be 20% of the Lyell Highway AADT.

The assessment is shown below in Table 36.

Table 36: Road width assessment

Road	Road Owner	Category/ Function	HV approval	Lanes	Centreline	Edgeline	General lane width (m)	General shoulder width	Road surface type	Estimated maximum traffic volume during construction	Required combined road and shoulder width	Is road width sufficient
Lyell Highway	State Growth	3	26m B-double (south of Oldina Drive (south)) Higher Mass Limit (south of Oldina Drive (south)) PBS Level 2a (south of Oldina Drive (south)) PBS Level 1	2L2W	Yes	No	~3.0m	~0.3m	Sealed	<5,000	8.2m	No
Fourteen Mile Road	Council	Collector	PBS Level 1	2L2W	-	-	2.3m	~1.2m	Unsealed	100 – 300	7.5m	No
Oldina Drive (south)	Council	Local	-	2L2W	No	No	6.0m	0.4m	Sealed	<2,000	6.8m	Yes
Butlers Gorge Road	Hydro	Private - local	-	2L2W	-	-	~2.0m	~0.8m	Unsealed	>300	8.0m	No
Palana Crescent	Private	Private - local	-	2L2W	-	-	~2.1m	-	Unsealed	>300	8.0m	No

Based on the above, only Oldina Drive (south) currently has a sufficient road width to meet relevant requirements during construction.

5.3.2 Stopping sight distance

The general stopping sight distance (SSD) was assessed along all public roads within the Project area (other than those part of transmission line route options), as well as along Butlers Gorge Road. The SSD was approximated along the extent of the routes in accordance with the *Austroads Guide to Road Design Part 3: Geometric Design* (AGRD Part 3). SSD was generally estimated at a height of 1.1m, noting that this would generally produce a lower SISD, however, was also considered at a height of 2.4m for trucks.

Car and truck stopping sight distance diagrams, based on AGRD Part 3, are shown below in Figure 40 and Figure 41.

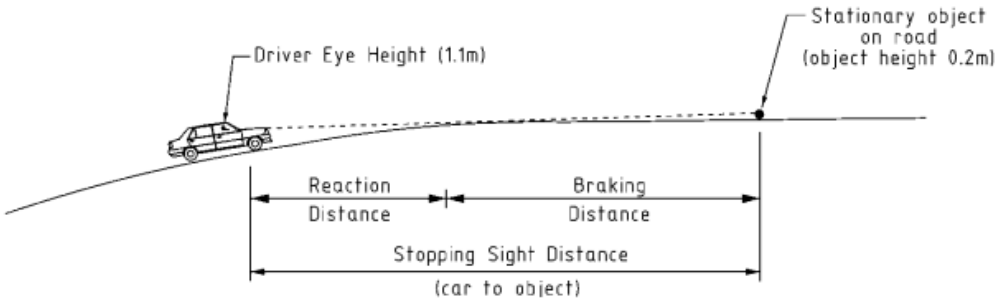
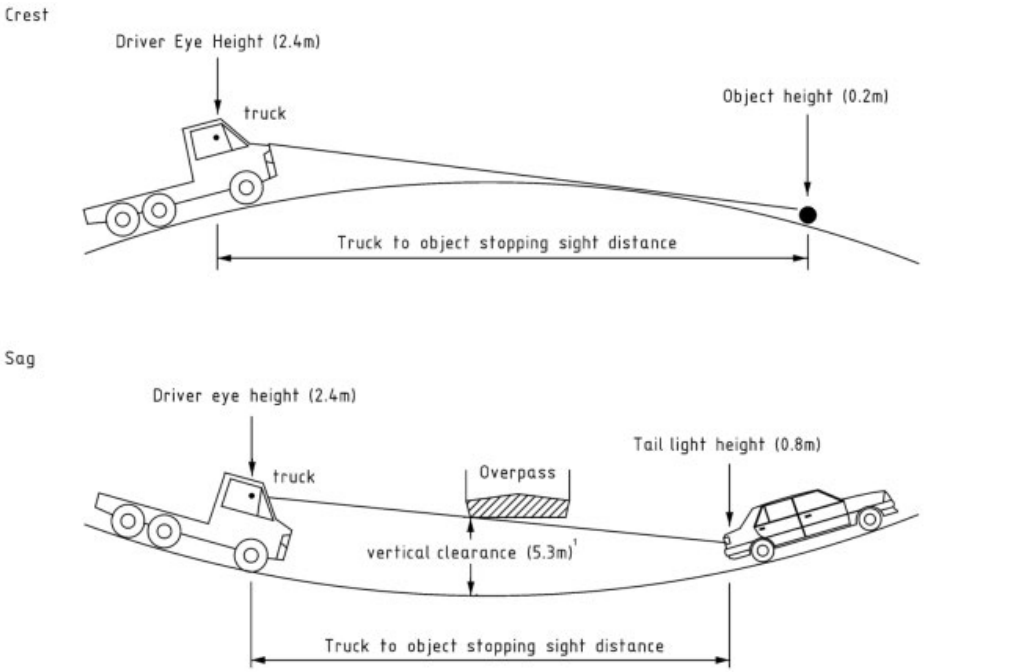


Figure 40: AGRD Part 3 car stopping sight distance



Note: The vertical clearance of 5.3 m is a nominal figure only and should not be used as an acceptable vertical clearance for all structures. Refer to relevant road agency for vertical clearance requirements.

Figure 41: AGRD Part 3 geometric design truck stopping sight distance

The Austroads SSD requirements are defined by the equation shown in Figure 42.

$$SSD = \frac{R_T V}{3.6} + \frac{V^2}{254(d + 0.01a)}$$

where

R_T = reaction time (sec)

V = operating speed (km/h)

d = coefficient of deceleration (longitudinal friction factor)

a = longitudinal grade (%, + for upgrades and – for downgrades)

Figure 42: Austroads SSD equation

The Austroads SSD requirements for trucks (including B-doubles) on flat longitudinal grades for varying road operating speeds are shown below in Table 37.

Table 37: Austroads SSD requirements for trucks on flat longitudinal grades

Travel speed	Austroads SSD minimum requirement
30km/h	36m
40km/h	54m
50km/h	76m
60km/h	101m
80km/h	161m
100km/h	233m
110km/h	275m

Table 38 presents an assessment of SSD for all project affected traffic routes.

Table 38: General SSD

Road	General SSD
Lyell Highway	Limited at curves
Fourteen Mile Road	Limited at curves
Oldina Drive (south)	Sufficient
Butlers Gorge Road	Sufficient
Palana Crescent	Sufficient

5.3.3 OSOM route survey report

The *Logistics and Transport Study: Tarraleah Hydro Redevelopment Project* written by Blue Water Shipping is primarily concerned with the transport of GRP pipes between Tasmanian Ports and Tarraleah. The report describes the constraints that may cause potential disruption/ modification to the road network based on the dimensions of the OSOM combination for the GRP pipes. The proposed vehicle for delivery of GRP pipes is a NHVR Class 1 Prime Mover and Low Loader with Dolly (Gooseneck). It is shown below in Figure 43. Note that a 4.85m maximum height is assumed, as is a maximum width of ~4.17m.

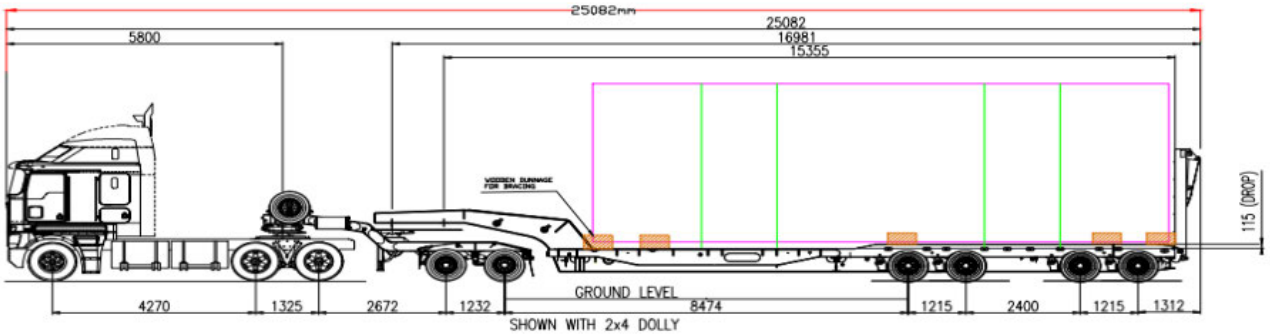


Figure 43: Indicative transport arrangement - NHVR Class 1 Prime Mover and Low Loader with Dolly (Gooseneck) carrying GRP pipes

The report does not outline the expected OSOM combination for transport of the transformers, however, it is understood that some investigations have begun regarding this. The report concludes that the Port of Bell Bay is the most appropriate location for the GRP pipes to be shipped to and stored, however, describes the route as travelling via Hollow Tree Road. It is instead anticipated that the route would be from the Port of Bell Bay to New Norfolk, and then north-west on the Lyell Highway.

A low hanging overhead power line on Butlers Gorge Road near the stockpile yards will require raising in accordance with TasNetworks requirements.

5.3.4 Summary of recommendations

The following road upgrades/ modifications/ alternatives are recommended based on the assessments presented in Sections 2.3, 2.6, 5.3.1, 5.3.2, and 5.3.3 of this report, and considering the additional risk associated with traffic generated by the Project.

Table 39: Road recommendations

Recommendation	Actions
Improve road safety on the surrounding road network	Project representatives should commit to liaise with the relevant authorities (Department of State Growth, Central Highlands Council) as appropriate to maintain road safety. Safety improvements may include: • Improving sight distance along roads by clearing and maintaining vegetation • Providing pull over bays (or appropriate temporary traffic management) on narrow roads within the Project area to simplify passing of vehicles • Install road warning signage on approach to tight curves and other hazards (where not already erected); and • Regularly maintain road signage (including temporary traffic management signage) to ensure it is clearly visible.
Develop a Construction Traffic Management Plan	A Construction Traffic Management Plan (CTMP) should be developed for the Project to manage vehicle movements throughout the Project area. In particular, it is important to discern how traffic is managed along the Switchyard Track (western end of Butlers Gorge Road), as this is a one-way section with no space for vehicles to pull over at the eastern end. Such plans will also likely be applicable for access roads to transmission line routes.

Recommendation	Actions
Complete a visual condition assessment	It is recommended that a visual road condition assessment be undertaken prior to, and post construction. The change in road condition may be discussed with the road authority. Intermediate inspections and relevant road maintenance should also be carried out to ensure that an acceptable road condition is maintained during construction.
Lift low powerlines	Low powerlines near the proposed stockpile yards on Butlers Gorge Road should be lifted to provide a minimum of 1m clearance between the largest design vehicle expected to access the site.
Upgrade safety barrier as necessary along Butlers Gorge Road	Existing road safety barrier along Butlers Gorge Road is non-compliant and may not sufficiently protect vehicles from roadside hazards, particularly in the vicinity of the Switchyard Track. Road safety barrier should be assessed, and upgraded as required for construction vehicles, to reduce the severity of potential run-off-road crashes. Alternatively, other controls such as lowering of the speed limit may be implemented.

Other road deficiencies discerned as part of assessments undertaken for this report are not required to be upgraded as part of this Project. Mitigation of these existing deficiencies is, however, expected to be beneficial to the safety of road users and thus should be considered by the relevant road authority.

Consideration should also be given to the following:

Table 40: Road considerations

Consideration	Actions
Upgrade unprotected culvert headwall at the western end of Oldina Drive (south)	The unprotected culvert significantly increases the severity of an off-road crash at the western end of Oldina Drive (south). Consideration should be given to providing a headwall on both the northern and southern side of the culvert. It is noted that a sign has recently been installed warning of the hazard.
Line mark Oldina Drive (south)	During the site visit, line marking was not observed along Oldina Drive (south). Consideration should be given to providing centreline marking to reduce the risk of head-on crashes.

5.4 Site layout

5.4.1 Parking

A sufficient number of light and heavy vehicle parking spaces must be provided to cater for all vehicles on the sites at a single time. Sufficient space must also be provided for the laydown of all construction vehicles expected to be located on the sites concurrently.

Light and heavy vehicle parking during construction will primarily occur at Tarraleah Village (and Tarraleah Village laydown area), Tarraleah Power Station, Paddy's Quarry, and off Butlers Gorge Road in the vicinity of the headrace tunnel and pipeline. Due to the relatively high number of concurrent vehicles proposed to utilise Tarraleah Village during construction, it is recommended that parking spaces and or areas within the laydown area be signed and or line marked, such that space is utilised efficiently, and vehicles use the laydown areas appropriately, limiting the risk of type 140 – 149 Manoeuvring crashes. It is expected that the necessitated clearing of vegetation surrounding transmission lines will provide space for parking of vehicles during construction.

5.4.2 Circulation roads

It is currently not well understood as to the vehicle types and vehicle volumes that will operate on sites during construction, other than those travelling to, from and around the Project site (i.e. special purpose vehicles that will be utilised in construction, such as cranes, articulated dump trucks etc).

All internal roads should be designed to be suitable for the proposed construction vehicles. Road design should consider relevant Austroads Guides and the *ARRB Unsealed Roads Best Practice Guide 2.* Where it is not considered viable to provide sufficient width for two-way operation of design vehicles, sufficient SSD and regular passing bays should be provided. The construction traffic management plan may include the provision of signage to necessitate communication to other drivers via UHF radio, limiting the likelihood of reversing manoeuvres.

Focus should also be given to ensuring that the OSOM vehicles can navigate the circulation roads whilst under permitted temporary traffic management arrangements. This includes provision of sufficient road width and radii at curves, appropriate road gradient, changes in grade, crossfall and superelevation, clearance to obstructions such as surrounding vegetation, and suitable pavement design for the construction vehicles. It is noted that in some cases, these dimensions or limitations may not be imposed by the OSOM combination but by other construction vehicles. For example, on a straight section of road, two moxy trucks passing one another will require a greater road width than the OSOM combination.

6. Planning Scheme assessment

6.1 Parking and Sustainable Transport Code

6.1.1 Use Standards

The Project has been assessed against the Use Standards of the Planning Scheme's Parking and Sustainable Transport Code, shown below in Table 41.

Table 41: Parking and Sustainable Transport Code - Use Standards

C2.5.1 Car parking numbers	
Objective: That an appropriate level of car parking spaces are provided to meet the needs of the use.	
Acceptable Solution/ Performance Criteria	**Comment**
Acceptable Solution A1 The number of on-site car parking spaces must be no less than the number specified in Table C2.1, less the number of car parking spaces that cannot be provided due to the site including container refund scheme space, excluding if: a) the site is subject to a parking plan for the area adopted by council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan; b) the site is contained within a parking precinct plan and subject to Clause C2.7; c) the site is subject to Clause C2.5.5; or d) it relates to an intensification of an existing use or development or a change of use where: i. the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional on-site car parking is required; or ii. the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows: N = A + (C- B) N = Number of on-site car parking spaces required A = Number of existing on site car parking spaces	**Complies with Acceptable Solution A1** As the Project Use Class is Utilities, there is no parking requirement and thus the Project complies with Acceptable Solution A1. The Project will, however, provide sufficient parking for vehicles at both the power station and pump station, in accordance with Hydro Tasmania's operational requirements. Parking will be designed in accordance with Australian Standard AS 2890 – Parking Facilities, Parts 1–6.

B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1 C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.	

C2.5.2 Bicycle parking numbers

Objective:

That an appropriate level of bicycle parking spaces are provided to meet the needs of the use.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 Bicycle parking spaces must: a) be provided on the site or within 50m of the site; and b) be no less than the number specified in Table C2.1.	**Complies with Acceptable Solution A1** As the Project Use Class is Utilities, there is no bicycle parking requirement and thus the Project complies with Acceptable Solution A1.

C2.5.3 Motorcycle parking numbers

Objective:

That the appropriate level of motorcycle parking is provided to meet the needs of the use.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 The number of on-site motorcycle parking spaces for all uses must: a) be no less than the number specified in Table C2.4; and b) if an existing use or development is extended or intensified, the number of on-site motorcycle parking spaces must be based on the proposed extension or intensification, provided the existing number of motorcycle parking spaces is maintained.	**Complies with Acceptable Solution A1** As the Project Use Class is Utilities, there is no car parking requirement and thus no motorcycle parking requirement. As such, the Project complies with Acceptable Solution A1.

C2.5.4 Loading bays

Objective:

That adequate access for goods delivery and collection is provided, and to avoid unreasonable loss of amenity and adverse impacts on traffic flows.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 A loading bay must be provided for uses with a floor area of more than 1000m² in a single occupancy.	**Complies with Acceptable Solution A1** As the Project Use Class is Utilities, there is no loading bay requirement and thus the Project complies with Acceptable Solution A1. The Project will, however, provide loading bays as necessitated by construction and operation.

C2.5.5 Number of car parking spaces within the General Residential Zone and Inner Residential Zone

Objective:

To:

a) facilitate the reuse of existing non-residential buildings within the General Residential Zone and Inner Residential Zone; and

b) to not cause an unreasonable impact on residential amenity by the car parking generated by that reuse.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 Within existing non-residential buildings in the General Residential Zone and Inner Residential Zone, on-site car parking is not required for: a) Food Services uses up to 100m² floor area or 30 seats, whichever is the greater; and b) General Retail and Hire uses up to 100m² floor area, provided the use complies with the hours of operation specified in the relevant Acceptable Solution for the relevant zone.	**Not Applicable**

6.1.2 Development Standards

The Project has been assessed against the Development Standards of the Planning Scheme's Parking and Sustainable Transport Code, shown below in Table 42.

Table 42: Parking and Sustainable Transport Code - Development Standards

C2.6.1 Construction of parking areas	
Objective: That parking areas are constructed to an appropriate standard.	
Acceptable Solution/ Performance Criteria	**Comment**
Acceptable Solution A1 All parking, access ways, manoeuvring and circulation spaces must: a) be constructed with a durable all weather pavement; b) be drained to the public stormwater system, or contain stormwater on the site; and c) excluding all uses in the Rural Zone, Agriculture Zone, Landscape Conservation Zone, Environmental Management Zone, Recreation Zone and Open Space Zone, be surfaced by a spray seal, asphalt, concrete, pavers or equivalent material to restrict abrasion from traffic and minimise entry of water to the pavement.	**Can comply with Acceptable Solution A1** Should parking, access ways, manoeuvring and circulation spaces be constructed with a durable all-weather seal (a spray seal or similar in the Utilities Zone (Power Station Site) and Village Zone (Tarraleah Village)) and be drained to the public stormwater system, the development will meet the requirements of Acceptable Solution A1. Please note that the Pump Station site is also intended to be sealed.
C2.6.2 Design and layout of parking areas	
Objective: That parking areas are designed and laid out to provide convenient, safe and efficient parking.	

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1.1 Parking, access ways, manoeuvring and circulation spaces must either: a) comply with the following: i. have a gradient in accordance with *Australian Standard AS 2890 - Parking facilities, Parts 1-6;* ii. provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces; iii. have an access width not less than the requirements in Table C2.2; iv. have car parking space dimensions which satisfy the requirements in Table C2.3; v. have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table C2.3 where there are 3 or more car parking spaces; vi. have a vertical clearance of not less than 2.1m above the parking surface level; and vii. excluding a single dwelling, be delineated by line marking or other clear physical means; or *b)* comply with *Australian Standard AS 2890- Parking facilities, Parts 1-6.* **Acceptable Solution A1.2** Parking spaces provided for use by persons with a disability must satisfy the following: a) be located as close as practicable to the main entry point to the building; b) be incorporated into the overall car park design; and c) be designed and constructed in accordance with *Australian/ New Zealand Standard AS/NZS 2890.6:2009 Parking facilities, Off-street parking for people with disabilities.*	**Can comply with Acceptable Solution A1.1** Should accesses and circulation roads at the Power Station Site and No. 2 Pump Station Site be slightly modified in detailed design, as discussed in this report, to meet the requirements of AS 2890.1 and AS 2890.6, they will comply with Acceptable Solution A1.1. Should any other proposed parking, access ways, manoeuvring and circulation spaces be designed to comply with the *Australian Standard AS 2890- Parking facilities, Parts 1-6*, the development will comply with Acceptable Solution A1.1.

C2.6.3 Number of accesses for vehicles

Objective:

That:

a) access to land is provided which is safe and efficient for users of the land and all road network users, including but not limited to drivers, passengers, pedestrians and cyclists by minimising the number of vehicle accesses;

b) accesses do not cause an unreasonable loss of amenity of adjoining uses; and

c) the number of accesses minimise impacts on the streetscape.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 The number of accesses provided for each frontage must: a) be no more than 1; or b) no more than the existing number of accesses, whichever is the greater.	**Complies with Acceptable Solution A1** As specific sites provide no more than one access, or, where they already exist, provide no new accesses off State or Council owned roads, the Project complies with Acceptable Solution A1.

C2.6.4 Lighting of parking areas within the General Business Zone and Central Business Zone

Objective:

That parking and vehicle circulation roads and pedestrian paths within the General Business Zone and Central Business Zone, which are used outside daylight hours, are provided with lighting to a standard which:

a) enables easy and efficient use;

b) promotes the safety of users;

c) minimises opportunities for crime or anti-social behaviour; and

d) prevents unreasonable light overspill impacts.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 In car parks within the General Business Zone and Central Business Zone, parking and vehicle circulation roads and pedestrian paths serving 5 or more car parking spaces, which are used outside daylight hours, must be provided with lighting in accordance with Clause 3.1 “Basis of Design” and Clause 3.6 “Car Parks” in *Australian Standard/New Zealand Standard AS/NZS 1158.3.1:2005 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements.*	**Not applicable**

C2.6.5 Pedestrian access

Objective:

That pedestrian access within parking areas is provided in a safe and convenient manner.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1.1 Uses that require 10 or more car parking spaces must: a) have a 1m wide footpath that is separated from the access ways or parking aisles, excluding where crossing access ways or parking aisles, by: i. a horizontal distance of 2.5m between the edge of the footpath and the access way or parking aisle; or ii. protective devices such as bollards, guard rails or planters between the footpath and the access way or parking aisle; and	**Not Applicable** As discussed, there is no parking requirement for Utilities uses. Therefore, Acceptable Solution A1.1 is not applicable for the development during operation. **Can comply with Acceptable Solution A1.2** The DDA accessible shared space provided at the Power Station Site opens directly on to the personnel access door, thus providing a footpath width exceeding 1.5m. As such, the Power Station Site complies with Acceptable Solution A1.2.

b) be signed and line marked at points where pedestrians cross access ways or parking aisles. **Acceptable Solution A1.2** In parking areas containing accessible car parking spaces for use by persons with a disability, a footpath having a width not less than 1.5m and a gradient not steeper than 1 in 14 is required from those spaces to the main entry point to the building.	Should any other proposed DDA spaces also provide pedestrian paths to the main entry point to building, the development will comply with Acceptable Solution A1.2.

C2.6.6 Loading bays

Objective:

That the area and dimensions of loading bays are adequate to provide safe and efficient delivery and collection of goods.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 The area and dimensions of loading bays and access way areas must be designed in accordance with *Australian Standard AS 2890.2–2002, Parking facilities, Part 2: Off-street commercial vehicle facilities*, for the type of vehicles likely to use the site.	**Complies with Acceptable Solution A1** Loading bays have been designed in accordance with AS 2890.2. No other formal loading bays are anticipated. Therefore, the Project complies with Acceptable Solution A1.
Acceptable Solution A2 The type of commercial vehicles likely to use the site must be able to enter, park and exit the site in a forward direction in accordance with *Australian Standard AS 2890.2 – 2002, Parking Facilities, Part 2: Parking facilities - Off-street commercial vehicle facilities.* **Performance Criteria P2** Loading bays must have an area and dimensions suitable for the use, having regard to: a) the types of vehicles likely to use the site; b) the nature of the use; c) the frequency of loading and unloading; d) the area and dimensions of the site; e) the topography of the site; f) the location of existing buildings on the site; and g) any constraints imposed by existing development.	**Satisfies Performance Criteria P2 in place of Acceptable Solution A2** As heavy vehicles will be required to reverse into the No. 2 Pump Station loading bays, the development cannot comply with Acceptable Solution A2. The development does, however, satisfy the requirements of Performance Criteria P2 as follows: a) Vehicles up to the size of a 19m semi-trailer are expected to use the site, however, will reverse into the site under traffic management b) Heavy vehicles travelling to and from the site are expected to be infrequent c) Loading and unloading within the loading bay is expected to occur infrequently d) The site is large, however, the building is situated towards Fourteen Mile Road e) The site gently grades towards Fourteen Mile Road f) No buildings exist on the site; and g) No constraints are imposed by existing development. It is noted that traffic volumes on Fourteen Mile Road are low. Combined with the infrequent delivery schedule, the impact on the safety and efficient use of Fourteen Mile Road is expected to be low.

C2.6.7 Bicycle parking and storage facilities within the General Business Zone and Central Business Zone

Objective:

That parking for bicycles are safe, secure and convenient, within the General Business Zone and Central Business Zone.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 Bicycle parking for uses that require 5 or more bicycle spaces in Table C2.1 must: a) be accessible from a road, cycle path, bicycle lane, shared path or access way; b) be located within 50m from an entrance; c) be visible from the main entrance or otherwise signed; and d) be available and adequately lit during the times they will be used, in accordance with Table 2.3 of *Australian/New Zealand Standard AS/NZS 1158.3.1: 2005 Lighting for roads and public spaces - Pedestrian area (Category P) lighting - Performance and design requirements.*	**Not applicable**
Acceptable Solution A2 Bicycle parking spaces must: a) have dimensions not less than: i. 1.7m in length; ii. 1.2m in height; and iii. 0.7m in width at the handlebars; b) have unobstructed access with a width of not less than 2m and a gradient not steeper than 5% from a road, cycle path, bicycle lane, shared path or access way; and c) include a rail or hoop to lock a bicycle that satisfies *Australian Standard AS 2890.3-2015 Parking facilities -- Part 3: Bicycle parking.*	**Not applicable**

C2.6.8 Siting of parking and turning areas

Objective:

That the siting of vehicle parking and access facilities in an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone, General Business Zone or Central Business Zone does not cause an unreasonable visual impact on streetscape character or loss of amenity to adjoining properties.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 Within an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone or General Business Zone, parking spaces and vehicle turning areas, including garages or covered parking areas must be located behind the building line of buildings, excluding if a parking area is already provided in front of the building line.	**Can comply with Acceptable Solution A1** Should any car parking at Tarraleah Village be located behind the building line, the Project will comply with Acceptable Solution A1.
Acceptable Solution A2	**Not applicable**

Within the Central Business Zone, on-site parking at ground level adjacent to a frontage must: a) have no new vehicle accesses, unless an existing access is removed; b) retain an active street frontage; and c) not result in parked cars being visible from public places in the adjacent roads.	

6.2 Road and Railway Assets Code

6.2.1 Use Standards

The Project has been assessed against the Use Standards of the Planning Scheme's Road and Railway Assets Code, shown below in Table 43.

Table 43: Road and Railways Assets Code - Use Standards

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction	
Objective: To minimise any adverse effects on the safety and efficiency of the road or rail network from vehicular traffic generated from the site at an existing or new vehicle crossing or level crossing or new junction.	
Acceptable Solution/ Performance Criteria	**Comment**
Acceptable Solution A1.1 For a category 1 road or a limited access road, vehicular traffic to and from the site will not require: a) a new junction; b) a new vehicle crossing; or c) a new level crossing. **Acceptable Solution A1.2** For a road, excluding a category 1 road or a limited access road, written consent for a new junction, vehicle crossing, or level crossing to serve the use and development has been issued by the road authority. **Acceptable Solution A1.3** For the rail network, written consent for a new private level crossing to serve the use and development has been issued by the rail authority. **Acceptable Solution A1.4** Vehicular traffic to and from the site, using an existing vehicle crossing or private level crossing, will not increase by more than: a) the amounts in Table C3.1; or b) allowed by a licence issued under Part IVA of the *Roads and Jetties Act 1935* in respect to a limited access road. **Acceptable Solution A1.5** Vehicular traffic must be able to enter and leave a major road in a forward direction. **Performance Criteria P1** Vehicular traffic to and from the site must minimise any adverse effects on the safety of a junction, vehicle	**Satisfies Performance Criteria P1 in place of Acceptable Solution A1.2 and A1.4.** As the Project, during construction, will increase vehicular traffic by more than the amounts specified in Table C3.1, it does not comply with Acceptable Solution A1.4. Furthermore, written consent has not been provided for any new accesses. The development does, however, satisfy Performance Criteria P1 as follows: a) As discerned in Section 5.1 of this report, all intersections/ accesses will operate at LOS A (minimal queueing and delays) during the AM and PM peak hour b) Traffic generated during construction will travel subject to relevant permits and restrictions. Most construction vehicles generated by the development are classified as general access vehicles. Intersections/ accesses, where considered both necessary and viable, will be modified to accommodate heavy vehicles c) The Project will utilise existing accesses to public roads which are currently, or have previously been, used for similar construction and operational activities. Due to the existing road constraints, tourism and the like, vehicles generally travel much more slowly than the 100km/h Tasmanian rural default speed limit d) As discussed, the Lyell Highway, in the vicinity of the Project area, generally has a far lower operating speed than the Tasmanian rural default speed limit of 100km/h in which it is subject to. Heavy vehicles are expected to travel more slowly through the greater Tarraleah area and thus may slow light vehicles travelling through Tarraleah between Hobart and Tasmania's West Coast. Given the distance between the proposed Power Station and Butlers Gorge Road is only 6.5km, the impact on slowed vehicles within the Project area is minimal. Traffic speed on Fourteen Mile Road is

crossing or level crossing or safety or efficiency of the road or rail network, having regard to: a) any increase in traffic caused by the use; b) the nature of the traffic generated by the use; c) the nature of the road; d) the speed limit and traffic flow of the road; e) any alternative access to a road; f) the need for the use; g) any traffic impact assessment; and h) any advice received from the rail or road authority.	not expected to be substantially impacted by the increase in heavy vehicles e) As discussed, the Project will utilise existing accesses to public roads. There is no suitable alternative access f) The Project is of national significance, aligning with Tasmania's Renewable Energy Target and will inject money into Tasmania's economy, create local jobs, and improve energy security g) As determined in this report, the road network, during both construction and operation of the Project, is expected to function with limited queueing and delays at intersections, and minor impact to the speed of through vehicles. Should the recommendations contained within this report be implemented, a safe and efficient road network is anticipated to be maintained; and h) Advice from road authorities has been considered in this submission. **Complies with Acceptable Solution A1.5** As the Project will ensure vehicles can enter and leave the Lyell Highway in a forward direction, it complies with Acceptable Solution A1.5.

6.2.2 Development Standards

The Project has been assessed against the Development Standards of the Planning Scheme's Road and Railways Assets Code, shown below in Table 44.

Table 44: Road and Railways Assets Code - Development Standards

C3.6.1 Habitable buildings for sensitive uses within a road or railway attenuation area	
Objective: To minimise the effects of noise, vibration, light and air emissions on sensitive uses within a road or railway attenuation area, from existing and future major roads and the rail network.	
Acceptable Solution/ Performance Criteria	**Comment**
Acceptable Solution A1 Unless within a building area on a sealed plan approved under this planning scheme, habitable buildings for a sensitive use within a road or railway attenuation area, must be: a) within a row of existing habitable buildings for sensitive uses and no closer to the existing or future major road or rail network than the adjoining habitable building; b) an extension which extends no closer to the existing or future major road or rail network than:	**Not applicable**

i. the existing habitable building; or ii. an adjoining habitable building for a sensitive use; or c) located or designed so that external noise levels are not more than the level in Table C3.2 measured in accordance with Part D of the *Noise Measurement Procedures Manual, 2nd edition, July 2008*.	

C3.7.1 Subdivision for sensitive uses within a road or railway attenuation area

Objective:

To minimise the effects of noise, vibration, light and air emissions on lots for sensitive uses within a road or railway attenuation area, from existing and future major roads and the rail network.

Acceptable Solution/ Performance Criteria	Comment
Acceptable Solution A1 A lot, or a lot proposed in a plan of subdivision, intended for a sensitive use must have a building area for the sensitive use that is not within a road or railway attenuation area.	**Not applicable**

7. Conclusion

An assessment of the traffic impacts associated with the Tarraleah Hydropower Scheme Project has been prepared with reference to the Department of State Growth's Publication *Traffic Impact Assessments (TIA) Guidelines* and the *Tasmanian Planning Scheme* with reference to the *Central Highlands Local Provision Schedule*. The TIA found that there is expected to be limited impact to the performance of intersections during construction and operation within the Project area, however, discerned various opportunities to improve safety on the roads, and at existing and proposed intersections/ junctions to be utilised as part of the Project. Recommendations based on the findings of the TIA are presented in Sections 5.2.4, 5.3.4 and 5.4 of this report.

Site Plans

Appendix A

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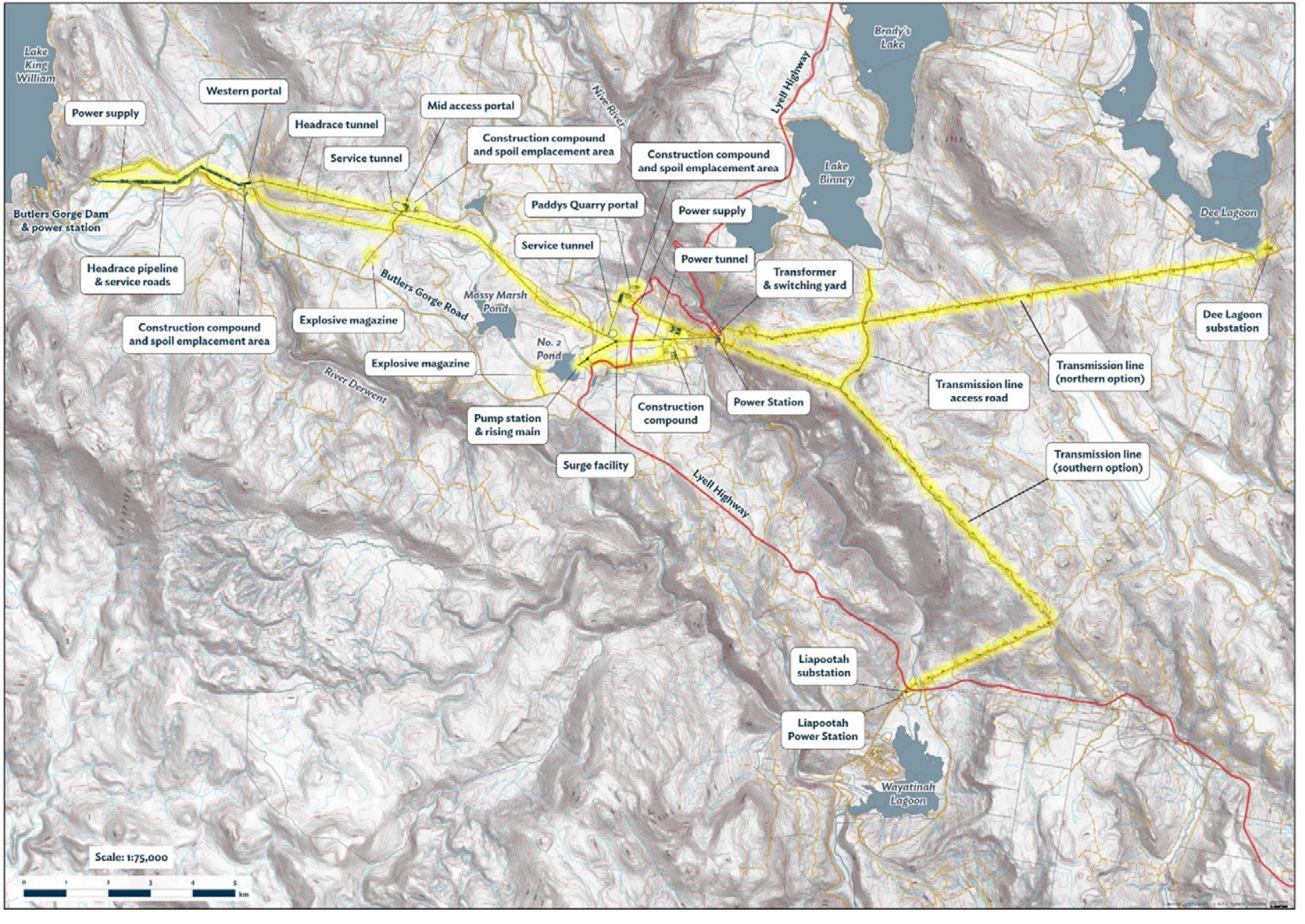
Lake King William
Power supply
Western portal
Headrace tunnel
Service tunnel
Mid access portal
Construction compound and spoil emplacement area
Nive River
Lyell Highway
Brady's Lake
Construction compound and spoil emplacement area
Lake Binney
Butlers Gorge Dam & power station
Paddys Quarry portal
Power supply
Dee Lagoon
Service tunnel
Power tunnel
Transformer & switching yard
Headrace pipeline & service roads
Butlers Gorge Road
Mossy Marsh Pond
Explosive magazine
Construction compound and spoil emplacement area
No. 2 Pond
Dee Lagoon substation
Explosive magazine
River Derwent
Transmission line (northern option)
Transmission line access road
Pump station & rising main
Construction compound
Power Station
Surge facility
Transmission line (southern option)
Lyell Highway
Liapootah substation
Liapootah Power Station
Wayatinah Lagoon
Scale: 1:75,000
0 1 2 3 4 5 km

SIDRA Construction Operation

Appendix B

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MOVEMENT SUMMARY

Site: 101 [Lyell Highway/ Oldina Drive (south) Construction AM peak hour (Site Folder: Construction 2030 - Transmission Lines)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Lyell Highway/ Oldina Drive (south) Construction AM peak hour
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Lyell Highway															
2	T1	All MCs	29	14.3	29	14.3	0.017	0.1	LOS A	0.0	0.2	0.02	0.09	0.02	68.8
3	R2	All MCs	5	20.0	5	20.0	0.017	6.5	LOS A	0.0	0.2	0.02	0.12	0.02	59.2
Approach			35	15.2	35	15.2	0.017	1.0	NA	0.0	0.2	0.02	0.10	0.02	67.1
East: Oldina Drive (south)															
4	L2	All MCs	52	12.2	52	12.2	0.200	5.7	LOS A	0.9	7.4	0.10	0.56	0.10	52.4
6	R2	All MCs	172	19.6	172	19.6	0.200	6.1	LOS A	0.9	7.4	0.10	0.56	0.10	50.5
Approach			223	17.9	223	17.9	0.200	6.0	LOS A	0.9	7.4	0.10	0.56	0.10	50.9
North: Lyell Highway															
7	L2	All MCs	1	0.0	1	0.0	0.004	6.4	LOS A	0.0	0.0	0.00	0.09	0.00	64.2
8	T1	All MCs	6	33.3	6	33.3	0.004	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	68.3
Approach			7	28.6	7	28.6	0.004	0.9	NA	0.0	0.0	0.00	0.09	0.00	67.7
All Vehicles			265	17.9	265	17.9	0.200	5.2	NA	0.9	7.4	0.09	0.48	0.09	53.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Lyell Highway/ Power Station Construction PM peak hour (Site Folder: Construction 2030 - Transmission Lines)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Lyell Highway/ Power Station Construction PM peak hour
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Power Station															
1a	L1	All MCs	56	26.4	56	26.4	0.047	1.3	LOS A	0.2	1.6	0.27	0.25	0.27	38.6
3a	R1	All MCs	1	0.0	1	0.0	0.047	0.9	LOS A	0.2	1.6	0.27	0.25	0.27	40.6
Approach			57	25.9	57	25.9	0.047	1.3	LOS A	0.2	1.6	0.27	0.25	0.27	38.7
NorthEast: Lyell Highway															
24a	L1	All MCs	1	0.0	1	0.0	0.094	5.6	LOS A	0.5	4.0	0.07	0.57	0.07	40.4
26	R2	All MCs	146	27.3	146	27.3	0.094	5.8	LOS A	0.5	4.0	0.07	0.57	0.07	50.6
Approach			147	27.1	147	27.1	0.094	5.8	NA	0.5	4.0	0.07	0.57	0.07	50.6
NorthWest: Lyell Highway															
27	L2	All MCs	41	41.0	41	41.0	0.039	7.9	LOS A	0.1	0.8	0.01	0.59	0.01	50.1
29a	R1	All MCs	9	100.0	9	100.0	0.039	11.2	LOS B	0.1	0.8	0.01	0.59	0.01	39.5
Approach			51	52.1	51	52.1	0.039	8.6	NA	0.1	0.8	0.01	0.59	0.01	48.5
All Vehicles			255	31.8	255	31.8	0.094	5.4	NA	0.5	4.0	0.10	0.50	0.10	47.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.