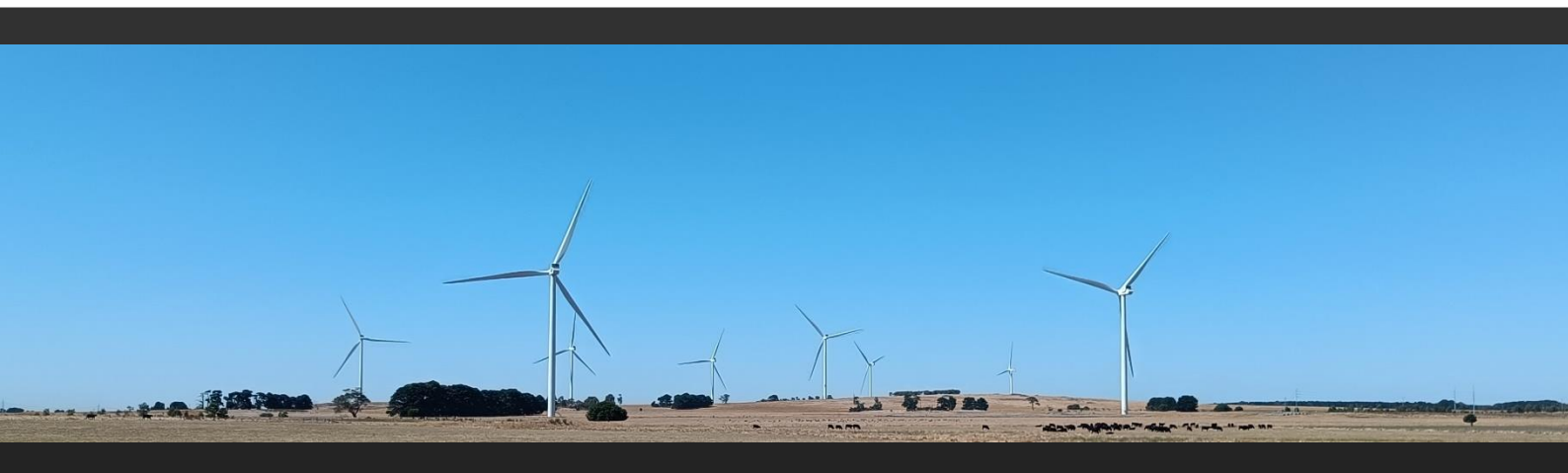


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Elaine Battery Energy Storage System
Transport Impact Assessment



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1 INTRODUCTION

onemilegrid has been requested by Cogency Australia to undertake a Transport Impact Assessment of the proposed Battery Energy Storage System (BESS) development at 225 Elaine-Blue Bridge Road, Elaine.

This analysis has been undertaken in accordance with Department of Environment, Land, Water and Planning (DELWP) *Solar Energy Facilities Design and Development Guideline* (October 2022), and aims to identify key traffic impacts associated with the construction and operation of the proposed battery energy storage system, and identify any infrastructure necessary to support the use and mitigate potential impacts.

As part of this assessment, the subject site has been inspected with due consideration of the development proposal, traffic data has been sourced and relevant background reports have been reviewed.

2 SOLAR ENERGY FACILITIES DESIGN AND DEVELOPMENT GUIDELINES

The Department of Environment, Land, Water and Planning (DELWP) prepared the *Solar Energy Facilities Design and Development Guidelines* in October 2022.

This document outlines the fundamentals of solar power facilities within Victoria in regard to policies, legislative and statutory planning arrangements. The document also includes provisions for the inclusion of battery storage facilities which are broadly considered to be applicable to the Elaine BESS.

It is intended to guide both proponents and decision makers, by providing best practice guidance and an overview of documentation that should be provided with any application.

Relevant to traffic engineering matters, the guidelines identify a requirement for a Traffic Impact Assessment, that should:

- Identify access routes and all roads that will be used to transport construction materials;
- Identify access routes, types of vehicles and traffic generation when the facility operates;
- Specify the timing, type of vehicle, daily volume and scheduled delivery times of construction materials;
- Provide timelines for the whole construction stage; and
- Identify intersection upgrades and any road works required to accommodate access to the site, and specify if these are temporary arrangements.

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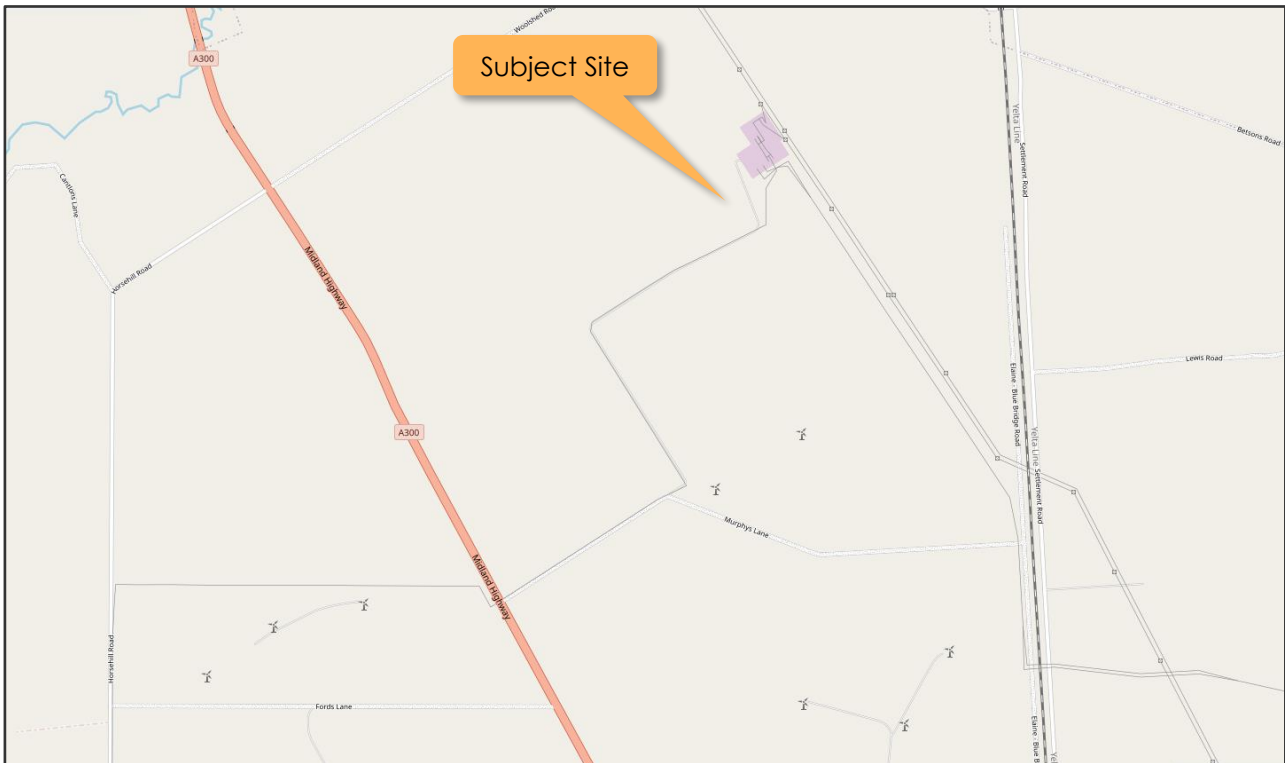
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3 EXISTING CONDITIONS

3.1 Site Location

The subject site is addressed as 225 Elaine-Blue Bridge Road, Elaine. The site is accessed from a gravel access track on the southern boundary of the site, connecting to Murphys Road and then Midland Highway to the southwest, as shown in Figure 1.

Figure 1 Site Location



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The site is currently vacant and is situated adjacent the Elaine Terminal Station and in the vicinity of the Elaine Windfarm.

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An aerial view of the subject site in the context of its surrounds is provided in Figure 2.

Figure 2 Site Context (19 December 2022)



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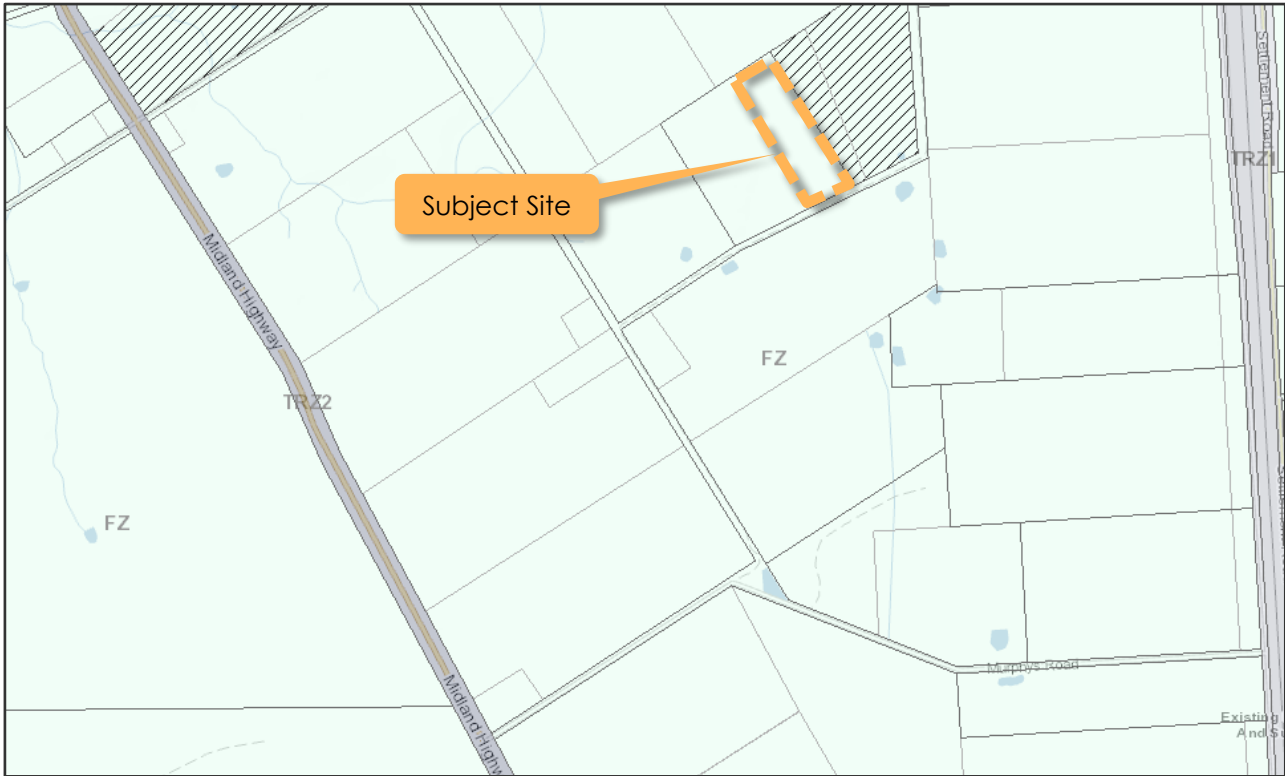
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3.2 Planning Zones and Overlays

It is shown in Figure 3 that the site is located within a Farming Zone (FZ).

Figure 3 Planning Scheme Zones



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3.3 Road Network

3.3.1 Midland Highway

Midland Highway is a Major Arterial Road (Named Highway) generally aligned northwest to southeast, running beyond Ballarat to the north and to Geelong in the southeast. Midland Highway provides a single traffic lane and sealed shoulders in each direction in the vicinity of the site. A 100 km/h speed limit applies to Midland Highway in the vicinity of the site.

The cross-section of Midland Highway at the frontage of the site is shown in Figure 4.

Figure 4 Midland Highway, looking south (left) and north (right) from Murphys Road



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3.3.2 Murphys Road

Murphys Road is a local road generally aligned east-west, running between Midland Highway in the west and Elaine-Blue Bridge Road in the east. Murphys Road provides a 7 m gravel carriageway that acts as a two-way roadway between Midland Highway and the access road to the subject site, where it reduces to 6 m wide.

The cross-section of Murphys Road at the frontage of the site is shown in Figure 5.

Figure 5 Murphys Road, looking west (left) and east (right)



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3.3.3 Access Road

Access between the subject site and Murphys Road is provided by a gravel roadway with a carriageway width of approximately 6 m.

The cross-section of the access road at the frontage of the site is shown in Figure 6.

Figure 6 Access Road, looking west (left) and east (right) adjacent the subject site



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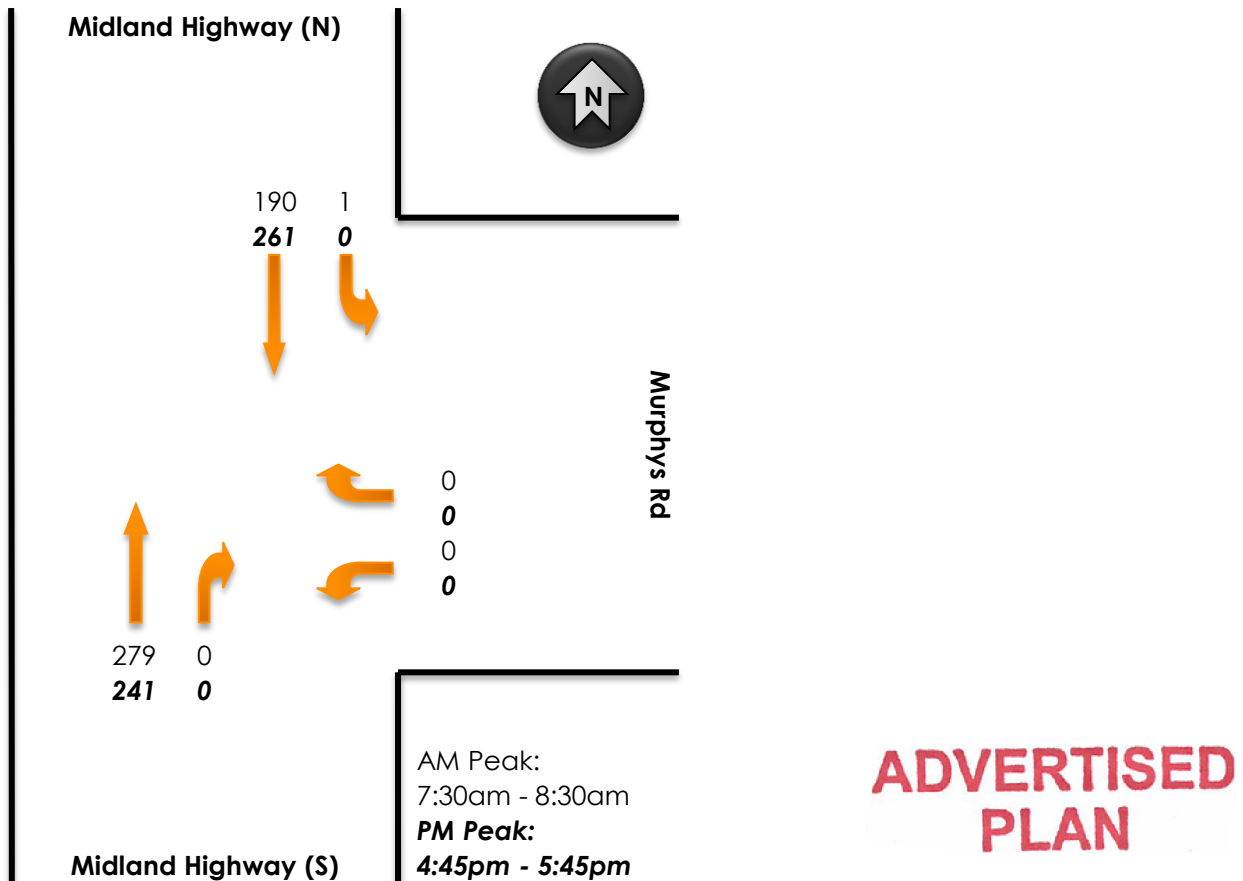
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3.4 Traffic Volumes

Traffic volume surveys were undertaken by Trans Traffic Survey on behalf of **onemilegrid** at the intersection of Midland Highway and Murphys Road, on Tuesday 7th February 2023, between 6:30am and 9:30am, and between 2:00pm and 6:00pm.

The peak hour results of the surveys are shown in Figure 7.

Figure 7 Existing Traffic Volumes – Tuesday 7 February 2023



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4 DEVELOPMENT PROPOSAL

4.1 General

Based on concept plans, it is proposed to develop the site for a Battery Energy Storage System (BESS), including 16 battery and inverter groups distributed across the subject site.

Other infrastructure within the area will include underground and/or above ground electrical cabling, telecommunications equipment, a substation, amenities and storage facilities, along with security fencing and gates.

In addition to the key components outlined above, there would be temporary infrastructure required to facilitate the construction and decommissioning phases of the proposed BESS. The construction compound would likely include:

- Temporary construction offices;
- A site office; and
- Laydown areas.

These will all be accommodated within the subject site.

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4.2 Construction / Installation

During the construction phase of the project, we have been advised of the following operational characteristics:

- Construction timeframe of approximately 18 months across three stages including the following anticipated stages:
 - + Civil Works
 - + Construction
 - + Commissioning
- Construction hours/days:
 - + Monday to Friday 7am to 5pm
 - + Saturday 8am to 3pm
- No. of staff: 25 persons

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During the construction stages, the following vehicle movements are expected.

Table 1 Construction Vehicle Traffic (Average Daily)

Stage	Duration of Stage	Light Vehicles	Semi-trailers (19.0m)	26m B-Double (BD)	Total
Civil Works	6 months	25	19	1	45
Construction	6 months	50	11	7	68
Commissioning	6 months	25	1	-	26

4.3 Operation

During operation, the site has minimal requirements for staff due to largely automated operation. Consequently, on a daily basis staff are unlikely to be required to attend. There will be occasional need to access the site for maintenance and inspection.

4.4 Access

Vehicular access to the site is proposed to be established from the access road along the southern boundary. The proposed access will facilitate left-in and right-out movements, noting that the road does not provide a connection to the northeast.

Further afield, access to the site will be provided from the Midland Highway/Murphys Road intersection providing fully-directional vehicle movements.

It is anticipated that the site access will be secured against unauthorised access outside of construction hours/days, and at all times once operational.

4.5 Car Parking

Car parking for staff will be provided within a parking area adjacent the access point.

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5 ACCESS REVIEW

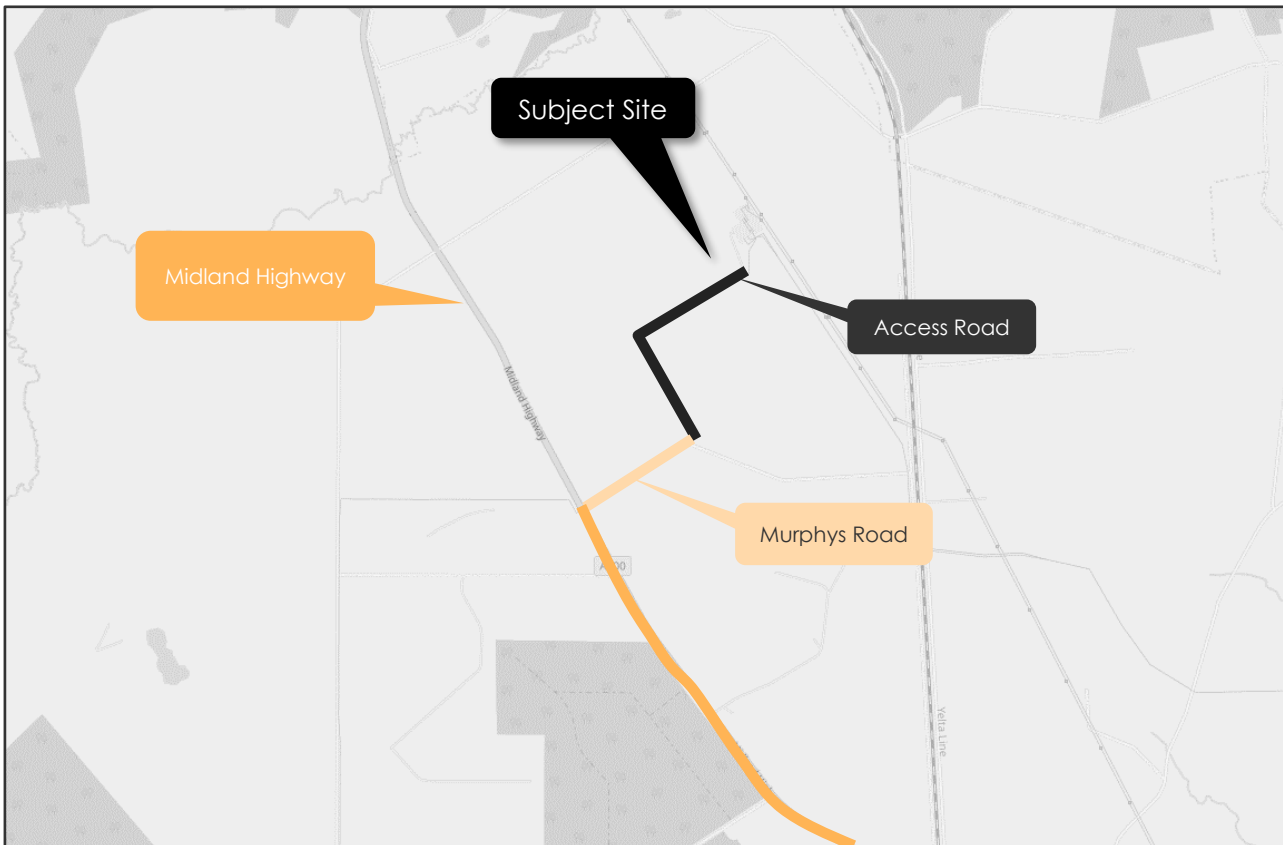
It is expected that all vehicles will approach the site from the south along Midland Highway, then through to the site along Murphys Road and then the access road.

Midland Highway is specified as a B-double approved route.

When approaching the site, it is recommended that trucks and other heavy vehicles avoid Perdrisat Road as it has a steep 15% incline.

The access route in the vicinity of the site is depicted in Figure 8 below.

Figure 8 Access Route Review



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6 TRAFFIC

6.1 Traffic Generation

Importantly, it should be noted that during the normal operation of the battery storage facility, the traffic generation of the site will be minimal, with only occasional access required for maintenance and inspection.

The vast majority of traffic is anticipated to occur during the construction and installation phase for the proposed BESS, as such our assessment of traffic impacts will be confined to the construction phase only, expected to occur over an 18 month period.

The anticipated traffic generation is shown in Table 2 below, based on information provided in Section 4.2.

Table 2 Anticipated Traffic Movements

Stage	Duration of Stage	Light Vehicles	Semi-trailers (19.0m)	26m B-Double (BD)	Total
Civil Works	6 months	25	19	1	45
Construction	6 months	50	11	7	68
Commissioning	6 months	25	1	-	26

Given the length of operating hours during the week, it is expected that the arrival of staff and deliveries will be distributed across the hours of operation. Based on the above, the development is therefore expected to generate up to 7 vehicle movements per hour during the Construction stage, with lower peak traffic generation in the Civil Works and Commissioning stages.

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6.2 Traffic Distribution

All traffic movements to and from the site will be distributed via the Midland Highway/Murphys Road intersection.

It is anticipated that all traffic movements will originate and depart to/from the south.

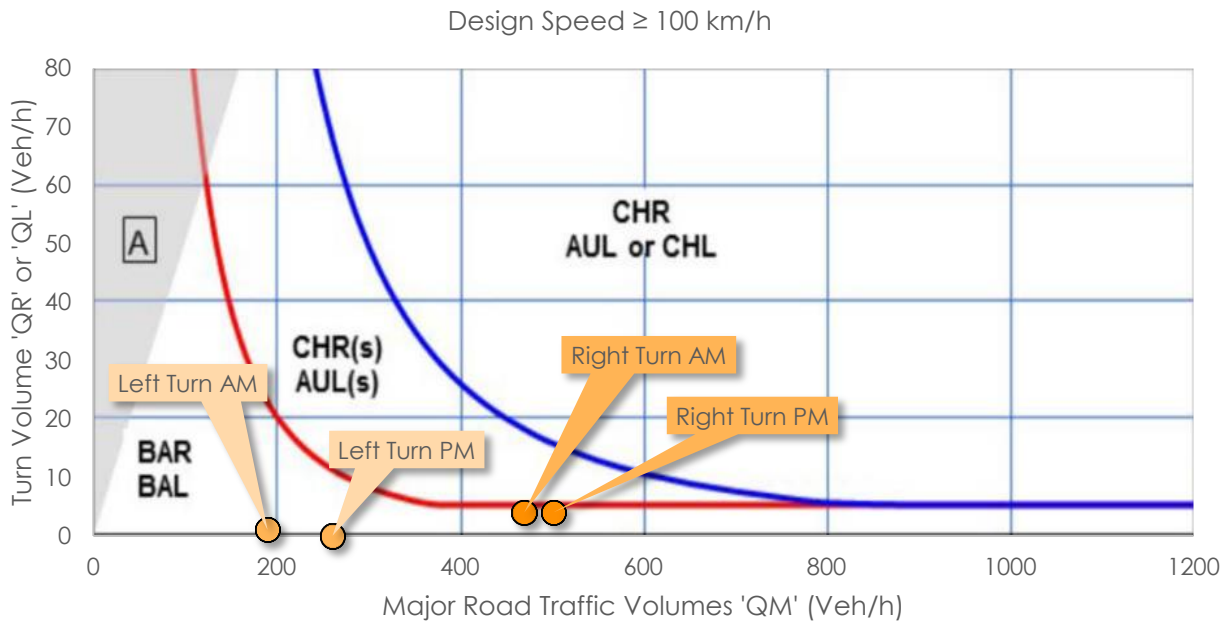
6.3 Traffic Impact

In evaluating the suitability of the proposed intersection design at Midland Highway/Murphys Road, reference is made to the *Austrroads Guide for Road Design Part 4A: Unsignalised and Signalised Intersections* which outlines what physical form of turn treatment will provide an appropriate level of safety at priority controlled intersections, balanced with additional construction costs associated with higher level treatments.

A review of the warrants for Basic, Auxiliary and Channelised turn treatments has been undertaken for the intersection, based on the existing traffic volumes and the generated construction traffic volumes presented above. The turn lane requirements are demonstrated in Figure 9.

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Figure 9 Austroads Turn Treatment Warrants



The figure above suggests that peak hour traffic volumes to and from the development would warrant provision of at most a basic right turn treatment (BAR) which provides localised widening to allow through traffic to overtake. This document is not to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright

It is noted that these warrants effectively balance the additional construction cost of higher-order treatments against the reduction in estimated crash costs. Commentary within the associated Austroads Guide to Traffic Management Part 6 does however note that these warrants are based on the construction of intersections on new roads (i.e., greenfield sites), and are not strictly applicable for the construction of new intersections on existing roads, where construction costs of these treatments may be higher due to the presence of existing infrastructure or other site constraints.

Furthermore, it is noted that the warrants do not allow any consideration of the duration of traffic impacts, instead assuming that traffic volumes continue in perpetuity. In the case of the proposed BESS, the access will only be trafficked for an 18-month period, after which the use will be operational and volumes generated through the access will effectively cease.

Having regard to the modest volume of traffic generated during construction (a maximum of 4 right-turn movements in the peak hour), and the short construction period, it is not considered necessary in this instance for any significant road works at the site access.

In addition to the above, Murphys Road has previously been utilised as the primary construction access for surrounding projects including the Elaine Windfarm and the Elaine Terminal Station. Similar to the proposed development, these uses have low traffic generation during the construction phase with virtually zero traffic generation once operational. This reduction in operational traffic volumes is reflected in the traffic counts at the Midland Highway/Murphys Road intersection commissioned by **onemilegrid**, which showed the arrival of 3 vehicles over the survey period.

With consideration of the low traffic generation, the previous use of Murphys Road to accommodate construction traffic, and the short duration of works, additional works at the intersection are not considered to be necessary.

It is recommended to implement advanced warning signage at the proposed site access as part of the construction traffic management strategy during the construction period to assist with vehicle access.

7 CONCLUSIONS

Based on the foregoing assessment, it is concluded as follows:-

- It is proposed to use the site for the purposes of a battery energy storage system;
- During the construction phase, the level of traffic generated is not expected to have an impact on the operation of the road network;
- During operation it is not expected that there will be any traffic impacts on the surrounding road network;
- Car parking will be provided within the site as required.

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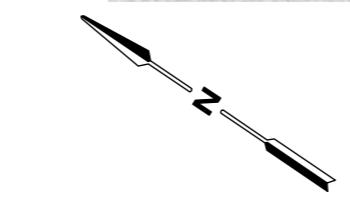
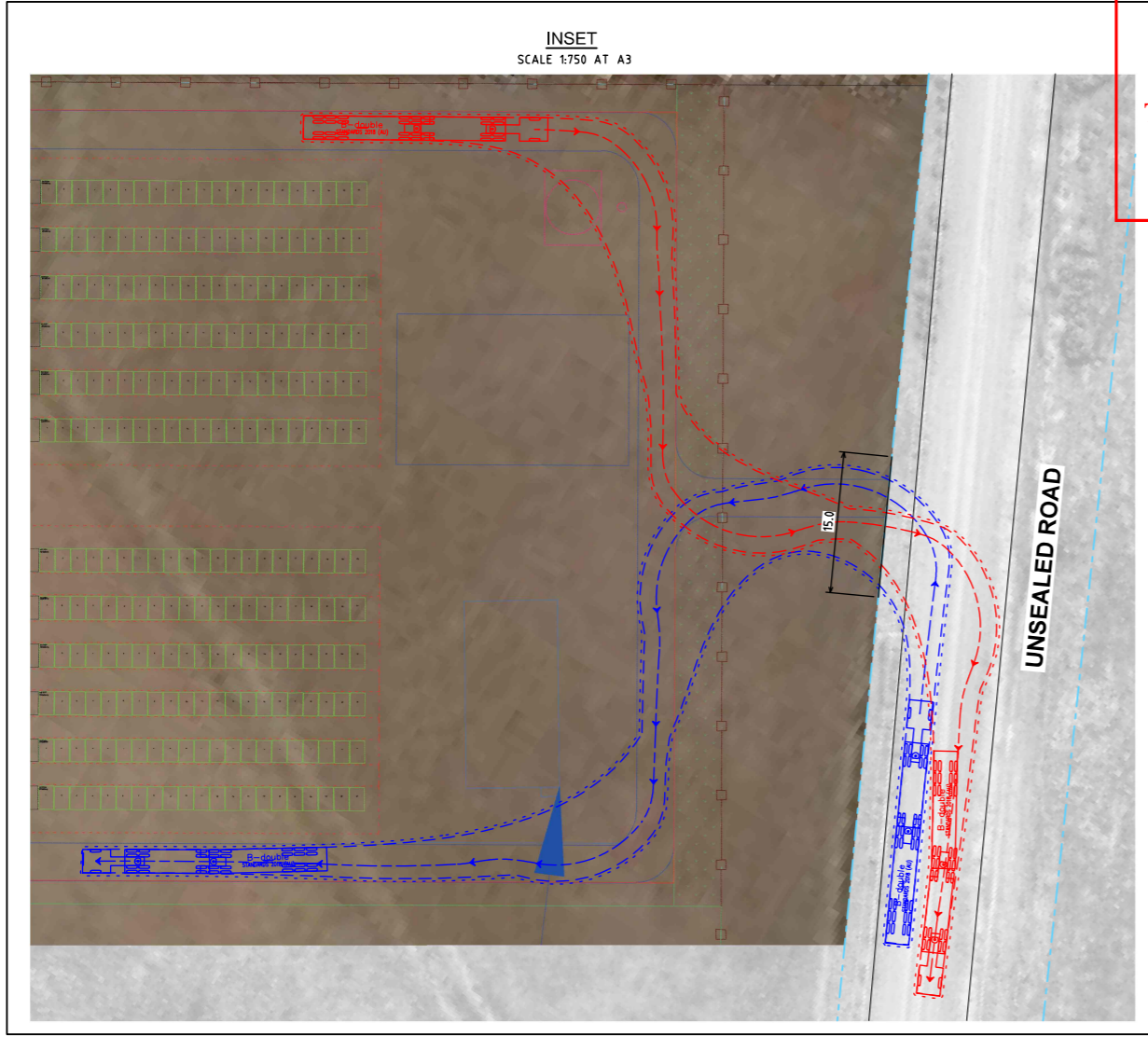
Appendix A Swept Path Diagram – 26m B-Double 15m Gate

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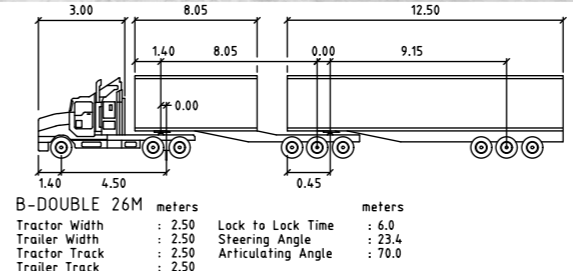
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SWEPT PATH LEGEND
 --- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
 300mm CLEARANCE ENVELOPE SHOWN DOTTED



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Scale: 1:1250 @ A3

Drawing Title ELAINE BESS VEHICLE SITE ACCESS SWEEP PATH ANALYSIS		
Designed CM	Approved JS	Melway Ref NA
Project Number 220916	Drawing Number SPA200	Revision A

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Appendix B Swept Path Diagram – 19m Semi 13m Gate

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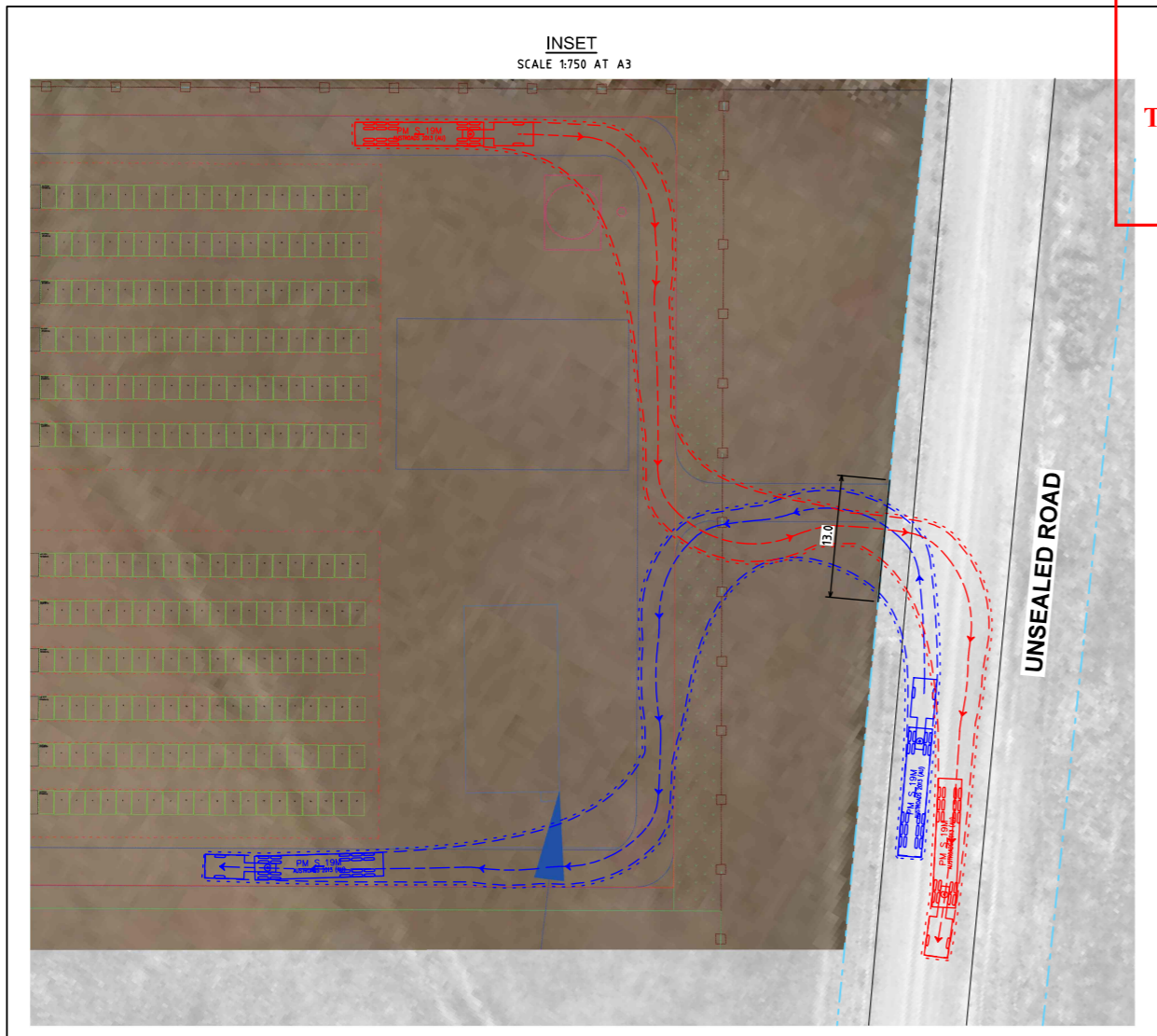
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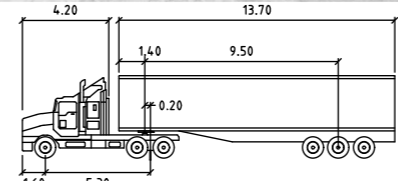


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PM S 19M	Tractor Width : 2.50	Tractor Track : 2.50	Tractor Wheelbase : 4.20	Trailer Width : 2.50	Trailer Track : 2.50	Trailer Wheelbase : 13.70	Tractor Height : 1.40	Offset : 0.20
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 VEHICLE SITE ACCESS
 SWEEP PATH ANALYSIS

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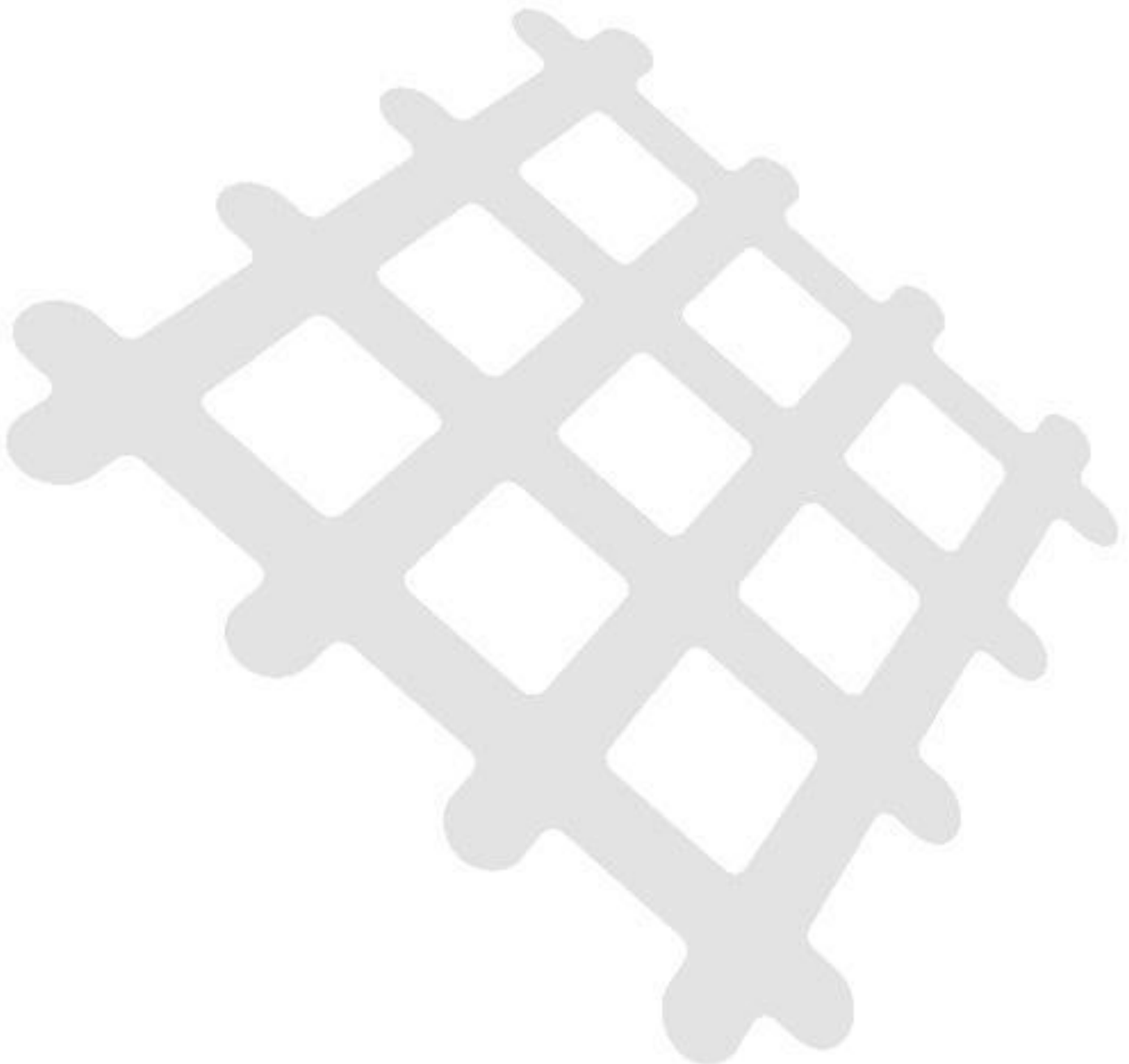
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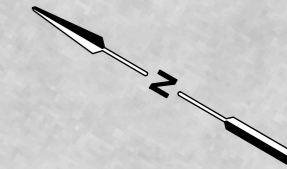
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Appendix C Swept Path Diagram – Midland Highway

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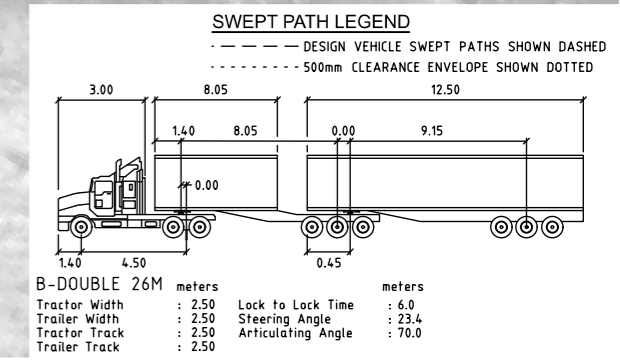




MURPHYS ROAD

MIDLAND HIGHWAY

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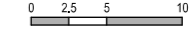


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Drawing Title
MIDLAND HIGHWAY & MURPHYS ROAD, ELAINE
EXISTING INTERSECTION LAYOUT
SWEPT PATH ANALYSIS

Designed CM	Approved JS	Melway Ref NA
Project Number 220916	Drawing Number SPA100	Revision A

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