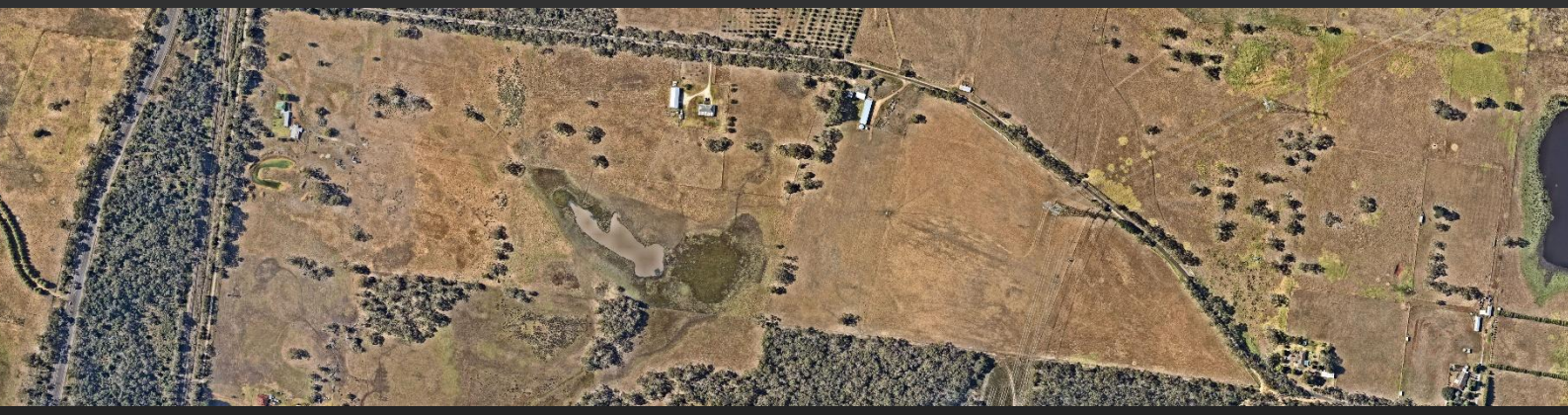
Heywood BESS

Transport Impact Assessment



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DOCUMENT INFORMATION

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***one**mile**grid** operates from Wurundjeri Woiworung Country of the Kulin nation. We acknowledge and extend our appreciation to the Wurundjeri People, the Traditional Owners of the land. We pay our respects to leaders and Elders past, present and emerging for they hold the memories, the traditions, the culture, and the hopes of all Wurundjeri Peoples.*

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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

onemile**grid** has been requested by ATMOS Renewables to undertake a Transport Impact Assessment of the proposed Battery Energy Storage System (BESS) in Heywood.

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 BESS, and identify any infrastructure necessary to support the use and mitigate potential impacts.

As part of this assessment the primary parcel has been inspected with due consideration of the development proposal, traffic data has been sourced, and relevant background information has 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 Heywood 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:

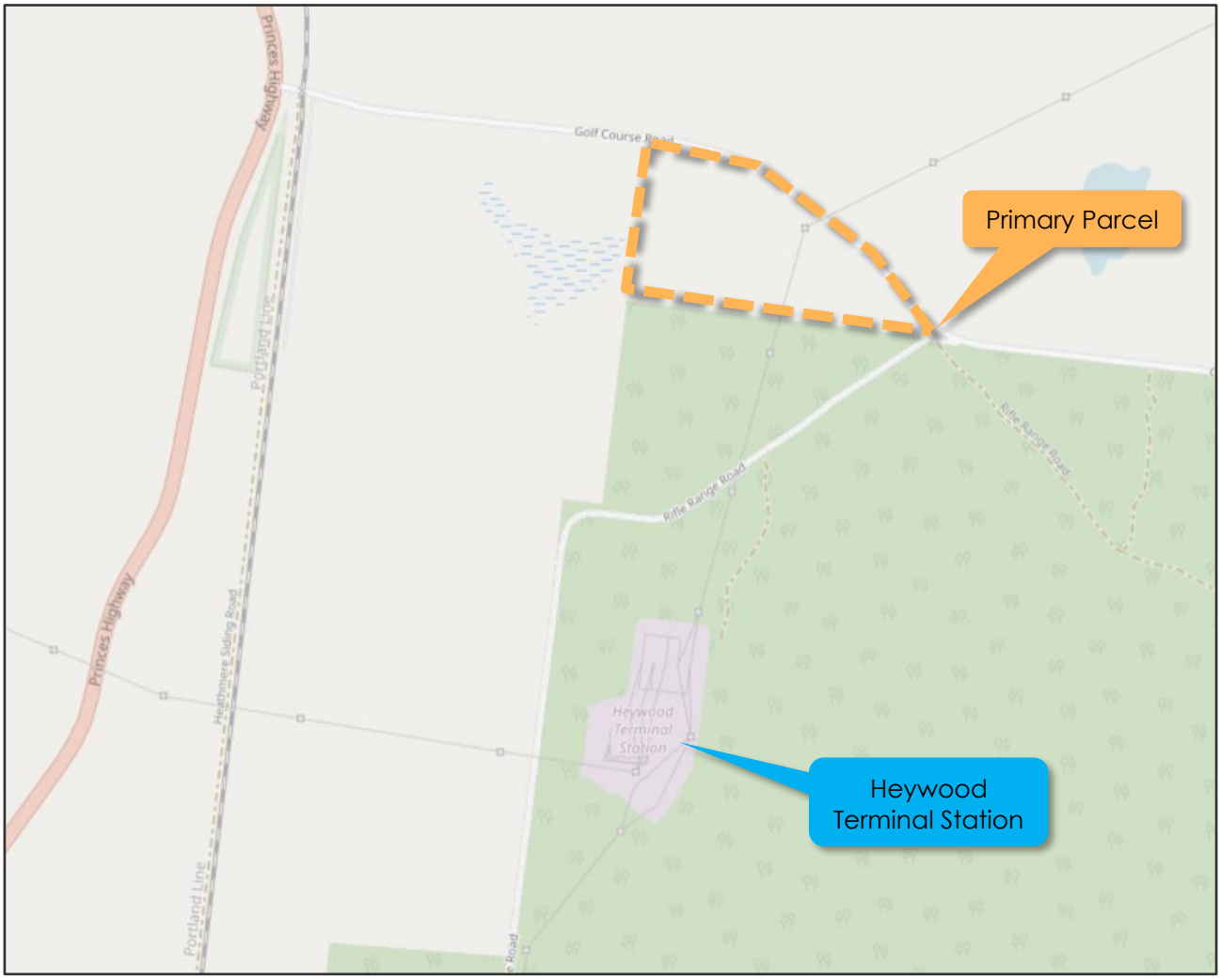
- Identify access routes and all roads that will be used to transport construction materials;
- Identify access routes, types of vehicles and traffic generation when the facility operates;
- Specify the timing, type of vehicle, daily volume and scheduled delivery times of construction materials;
- Provide 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.

3 EXISTING CONDITIONS

3.1 Site Location

The primary parcel is addressed as 100 Golf Course Road, Heywood and is located on the south side of Golf Course Road, east of Henty Highway/ Princes Highway and the Portland Railway Line as shown in Figure 1. Mount Clay State Forest is located immediately south of the primary parcel.

Figure 1 Site Location



Source: OpenStreetMap

The primary parcel is predominantly used for agricultural sheep grazing, with a single dwelling located in the northwest corner of the primary parcel. An existing 500kV transmission line, located within an AusNet owned easement, runs north-south through the primary parcel, connecting to the nearby Heywood terminal station to the south.

Access to the primary parcel is provided via two concealed crossovers in the north-west corner of the site.

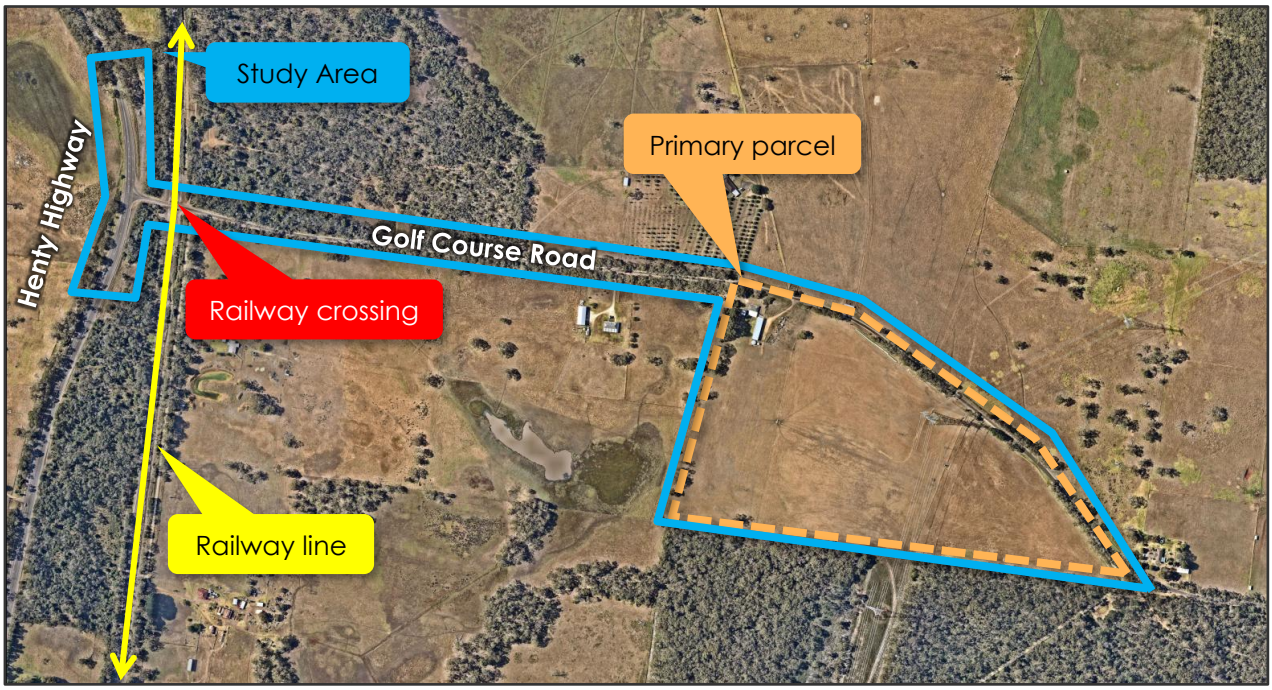
Land use in the immediate vicinity of the site is generally similar agricultural uses, though a State Forest is located to the south of the primary parcel, and a Golf Course is to the east of the primary parcel. The Portland railway line runs between the Henty Highway and the primary parcel, with an

at-grade railway crossing provided on Golf Course Road. The railway crossing is not provided with boom gates, bells or lights.

For the purposes of analysis, the Study Area for this report is broadly defined from the primary parcel to the road and road related areas along Golf Course Road to the intersection with Henty Highway. It should be noted the report will also include discussion of the transport route for construction materials and staff to and from the site.

An aerial view of the primary parcel, including the Study Area, is provided in Figure 2.

Figure 2 Site Context (11 November 2024)



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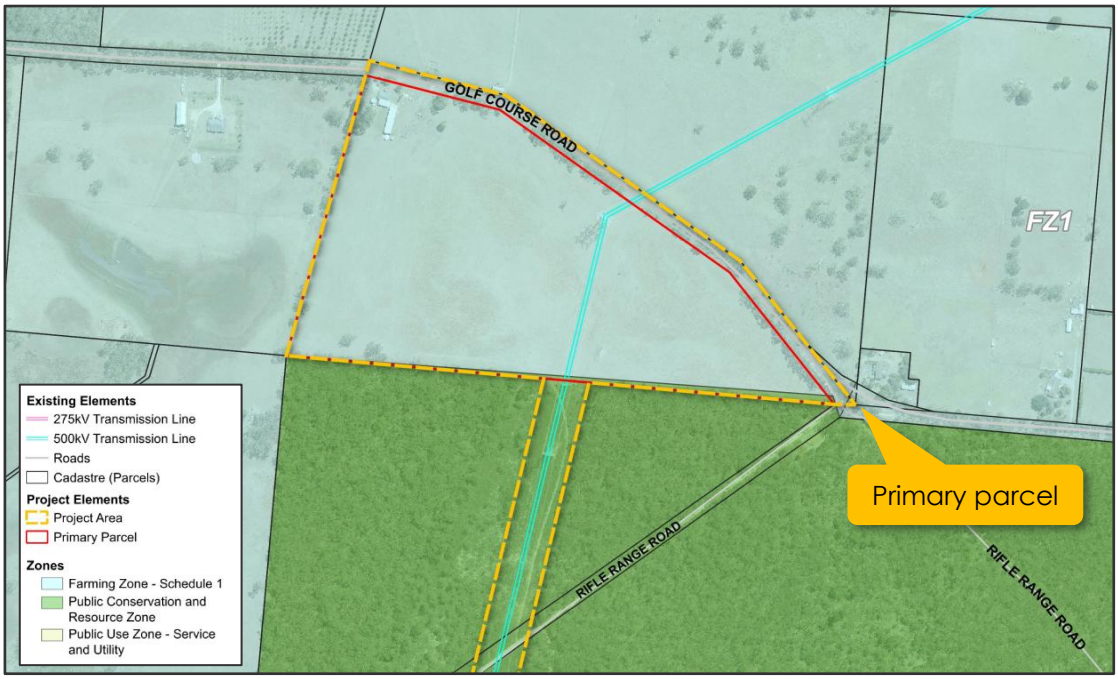
3.2 Planning Zones and Overlays

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

Figure 3 Planning Scheme Zones



3.3 Road Network

3.3.1 Golf Course Road

Golf Course Road is a local road generally aligned east-west, running between Henty Highway in the west, and Woolwash Road in the east. Golf Course Road is provided with an approximately 4m wide paved carriageway adjacent to the primary parcel with a combination of gravel and grassed shoulders on each side. The eastern section of Golf Course Road, beyond Heywood Golf Club, is unsealed.

The cross-section of Golf Course Road at the frontage of the primary parcel is shown in Figure 4.

Figure 4 Golf Course Road, looking west adjacent to the primary parcel

Image date: January 2025

The rural default 100 km/h speed limit applies to Golf Course Road in the vicinity of the primary parcel.

3.3.2 Henty Highway

Henty Highway (Princes Highway) is an arterial road generally aligned north-south, connecting between Western Highway in Horsham and Madeira Packet Road in Portland via Hamilton. The technical endpoints are Portland in the south and Lascelles in the north. Additionally, this section of Henty Highway runs concurrently with Princes Highway for approximately 21 km from Heywood in the north to Bolwarra in the south.

At the intersection with Golf Course Road, auxiliary left and right turning lanes are provided on the approach in each direction to allow for vehicles to turn into Golf Course Road without impacting on through traffic.

The cross-section of Henty Highway in the vicinity of Golf Course Road is shown in Figure 5 and Figure 7.

Figure 5 Henty Highway, looking north adjacent to Golf Course Road

Image date: January 2025

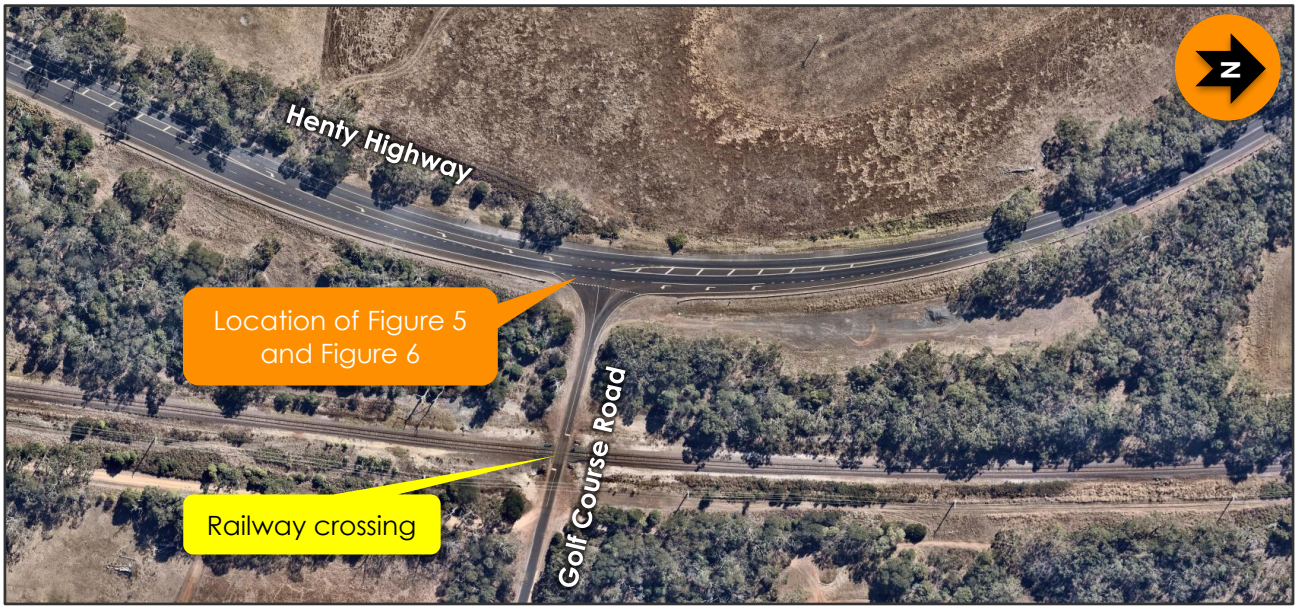
Figure 6 Henty Highway, looking south adjacent to Golf Course Road

Image date: January 2025

A 100 km/h speed limit applies to Henty Highway in the vicinity of the site.

An aerial view of the intersection between Henty Highway and Golf Course Road is provided in Figure 7.

Figure 7 Henty Highway / Golf Course Road Intersection



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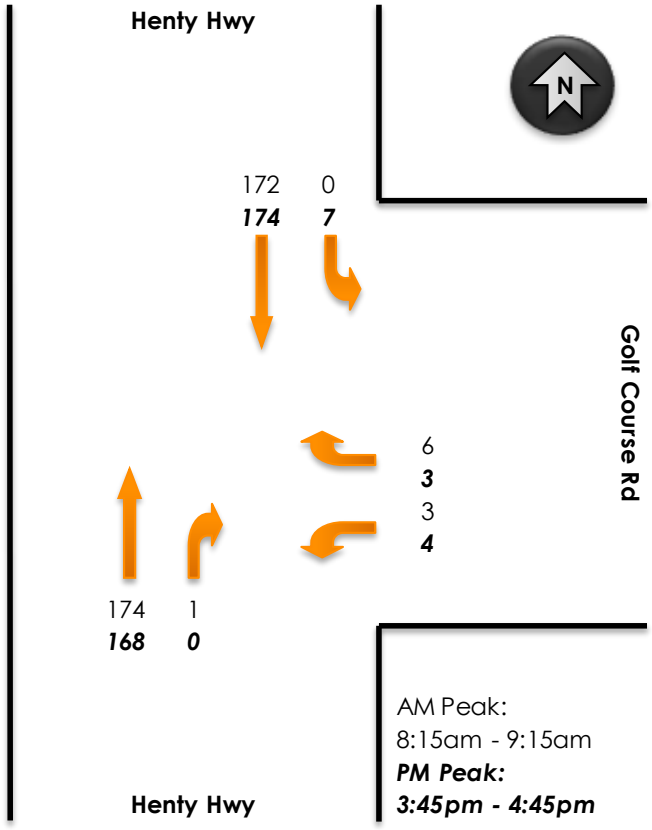
3.4 Existing Traffic Volumes

3.4.1 Turning Movement Counts

Traffic volume surveys were undertaken by Trans Traffic Survey on behalf of **one**mile**grid** at the intersection of Golf Course Road and Henty Highway, on Thursday 6th February 2025, between 6:30am and 9:30am, and between 2:30pm and 7:00pm.

The peak hour results of the surveys are shown in Figure 8.

Figure 8 Existing Traffic Volumes – Thursday 6 February 2025



To assess the operation of the existing traffic volumes on Henty Highway / Golf Course Road intersection the traffic volumes have been input into SIDRA Intersection, a traffic modelling software package.

The SIDRA Intersection software package has been developed to provide information on the capacity of an intersection with regard to a number of parameters. Those parameters considered relevant are, Degree of Saturation (DoS), 95th Percentile Queue, and Average Delay, and Level of Service (LoS), as described in Table 1 below.

Table 1 SIDRA Intersection Parameters

Parameter	Description
Degree of Saturation (DoS)	The DoS represents the ratio of the traffic volume making a particular movement compared to the maximum capacity for that particular movement.
Average Delay (seconds)	Average delay is the time delay that can be expected for all vehicles undertaking a particular movement in seconds. This includes time taken to accelerate or decelerate, time taken to undertake the manoeuvre, and delay at a hold line or stop line.
95th Percentile (95%ile) Queue	95%ile queue represents the maximum queue length in metres that can be expected in 95% of observed queue lengths in the peak hour.
Level of Service (LoS)	A qualitative measure of sign-controlled intersection performance, based on the average delay experienced by a driver. A LoS of A, B, C or D suggests acceptable intersection performance. A LoS of E or F suggests mitigation measures or upgrades may be warranted.

The value of the average delay and Level of Service for a sign-controlled intersection has a corresponding rating, as shown in Table 2 below.

Table 2 Rating of Delay and Level of Service

Rating	Delay in seconds (d)	Level of Service
Excellent	$d \leq 10$	A
Very Good	$10 < d \leq 15$	B
Good	$15 < d \leq 25$	C
Fair	$25 < d \leq 35$	D
Poor	$35 < d \leq 50$	E
Very Poor	$50 < d$	F

Table 3 Henty Highway / Golf Course Road Existing Conditions

Approach	Movement	DoS	Avg. Delay (sec)	Queue (m)	Level of Service
AM Peak					
Henty Highway (S)	Through	0.107	0	0	A
	Right	0.001	8.9	0	A
Golf Course Road (E)	Left	0.015	8.3	0.4	A
	Right	0.015	11.2	0.4	B
Henty Highway (N)	Left	0.001	8.4	0	A
	Through	0.105	0	0	A
PM Peak					
Henty Highway (S)	Through	0.103	0	0	A
	Right	0.001	8.9	0	A
Golf Course Road (E)	Left	0.01	8.3	0.3	A
	Right	0.01	11.2	0.3	B
Henty Highway (N)	Left	0.005	8.4	0	A
	Through	0.107	0	0	A

The above results indicate that the Henty Highway / Golf Course Road intersection is generally operating under excellent conditions, with negligible delays to vehicles turning right out of Golf Course Road.

3.4.2 Tube Counts – Daily Traffic

In addition, traffic volume, speed and classification surveys were undertaken for a one-week period on Golf Course Road adjacent the primary parcel, from Thursday 6th February 2025 to Wednesday 13th February 2025 inclusive. The results of the surveys are summarised in Table 4.

Table 4 Traffic Volume and Speed Surveys – Golf Course Road

Time Period	Direction	Traffic Volume (vpd)	Average Speed (km/h)	85th Percentile Speed (km/h)
Weekday Average	Eastbound	49	80.3	85.7
	Westbound	51	80.3	86.3
	Both Directions	100	80.3	86.0
7 Day Average	Eastbound	52	79.5	84.8
	Westbound	53	79.1	84.6
	Both Directions	105	79.1	84.3

The above data indicates that Golf Course Road is currently operating with lower speeds than the default speed limit of 100 km/hr.

The traffic volumes were greatest on the Saturday with a total of 131 vehicles observed, which is understood to coincide with an event at the Heywood Golf Club.

Additionally, the surveys identified that 94.2% of existing traffic on Golf Course Road were light vehicles up to 5.5 m long.

The data was further assessed to determine the traffic volumes during the weekday peak periods, which are shown below:

Table 5 Weekday Peak Hour Averages

Period	Eastbound	Westbound	Both Directions
AM Peak (8:00 AM to 9:00 AM)	5	4	9
PM Peak (5:00 PM to 6:00 PM)	5	5	10

This data is generally consistent with the turning movement counts.

3.5 Road Safety – Crash Data

Crash history information for the study area and surrounds was obtained through the Department of Transport and Planning (VicRoads) CrashStats (the Victorian accident statistics and mapping program) for the latest available 5-year period. The severity of each incident is classified as either fatal, serious, or other, as described below:

- **Fatal**: At least one person was killed or died within 30 days of the crash
- **Serious Injury**: At least one person was injured and admitted to hospital and did not die within 30 days of the crash
- **Other Injury**: Those involved were injured and required medical treatment, such as, bruising, contusions, unconscious, pain, soreness, etc and were not admitted to hospital nor died within 30 days of the crash

It is acknowledged that the crash stats only include the incidents recorded by police and therefore may exclude minor incidents which were not reported.

Each of the recorded crashes is shown below in Figure 9 and detailed in Table 6.

Figure 9 Crash History

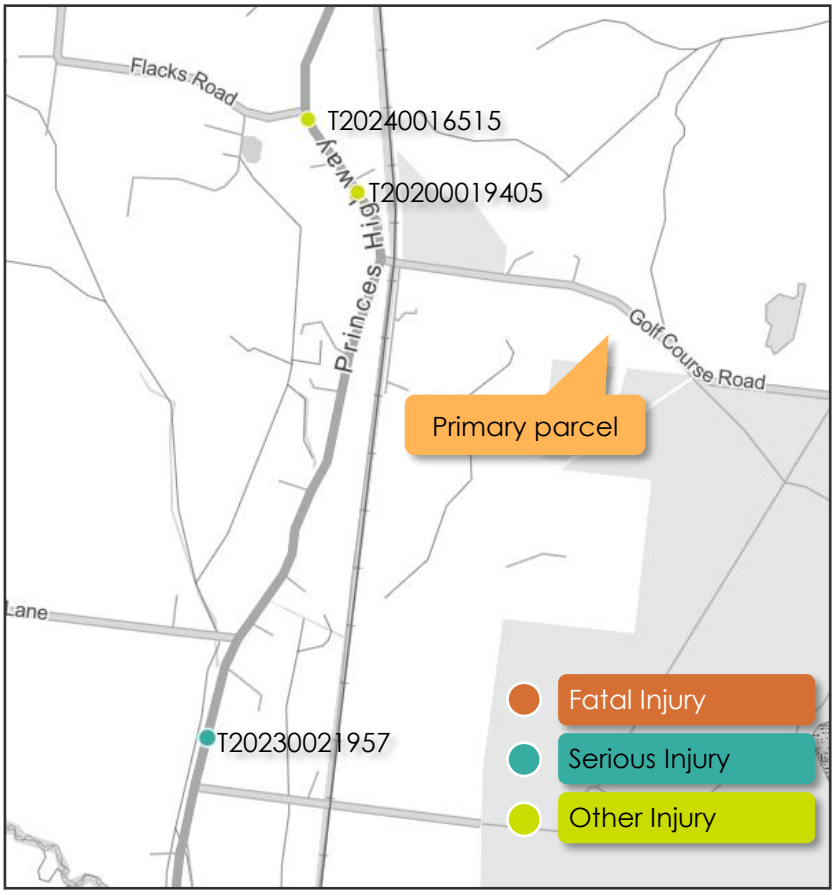


Table 6 Crash Data Summary

Accident No.	Crash Day/Date	Crash Time	Crash Type	DCA Code	Severity
T20200019405	Tuesday 3/11/2020	17:20	Collision with a fixed object	Left off carriageway into object / parked vehicle	Other
T20230021957	Tuesday 19/09/2023	14:10	Collision with vehicle	Right through	Serious Injury
T20240016515	Saturday 29/06/2024	10:00	Collision with a fixed object	Off left bend into object / parked vehicle	Other

The crash information is summarised below:

- A total of 3 crashes were recorded over the 5-year period; and
- Of these, 1 involved a serious injury and 0 involved a fatal injury.

The crash data indicates a slight trend of vehicles veering off the carriageway and colliding with a fixed object north of the site on Henty Highway.

4 PROPOSAL

4.1 General

It is proposed to develop the primary parcel for the purposes of a BESS with conceptual capacity up to 300MW/1,200MWh , with associated infrastructure including inverters, an on-site substation, and underground transmission cable connection to the Heywood Terminal Station.

In addition to the key components outlined above, there will be temporary infrastructure required to facilitate the construction and commissioning 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 primary parcel.

The proposed BESS units are to be located west of the existing transmission line easement, with the eastern portion of the primary parcel to remain largely vacant.

The existing dwelling at the primary parcel is to be vacated.

4.2 Construction / Installation

- Construction of the facility is expected to take place over an 18 to 24-month period. This can be divided up into three key phases, as described below:
- Phase 1: Site Preparation – 6 months;
- Phase 2: Construction/Equipment delivery – 10 months;
- Phase 3: Commissioning – 8 months;

The operator, Atmos Renewables, has advised that the largest vehicles that will access the site will be OSOM vehicles between 30 and 40 metres in length associated with the delivery of the HV transformers, site sheds and control room infrastructure. It is expected that a maximum of 15 OSOM vehicle deliveries will occur over the course of the construction of the facility.

The majority of heavy vehicle deliveries are expected to be via 19 metre semi-trailers and 20 m tandem tipper and trailers (truck and dogs). Other heavy vehicles that many require occasional access are 26 m B-Double's (BD), and 6.4 m to 12.5m rigid trucks.

Additionally, construction hours are generally to be limited to the following (unless required for specific activities):

- Monday to Friday: 7:00 AM to 5:00 PM;
- Saturday: 7:00 AM to 1:00 PM.

A breakdown of the typical construction periods and peak construction periods is discussed below.

4.2.1 Typical Construction Phase

During the typical construction period associated with the facility, the site is expected to accommodate a maximum of 40 staff on-site at a given time. Additionally, up to 30 heavy vehicle deliveries are expected per day, with the timing of these deliveries distributed throughout the day.

4.2.2 Peak Construction Phase

The operator has indicated that peak construction activity will occur during the following construction months:

- Between months 3 to 8 for civil works;
- Between months 10 to 18 for BESS delivery and installation works.

During the peak construction phases, the site is expected to accommodate a maximum of 150 staff on-site, and up to a maximum of 50 heavy vehicle deliveries per day, evenly distributed throughout the day.

The operator has advised they will consider the opportunity for staff to travel to the site via the bus during the peak periods, in consultation with construction contractors. Staff will meet at a designated point and coordinate travel to the site during these periods if provided.

4.2.3 Temporary Speed Limit Reduction

It is recommended that a temporary speed limit reduction to 80 km/hr will be sought along Henty Highway and to 60km/h along Golf Course Road in the vicinity of the primary parcel during the construction of the facility, which will be implemented in conjunction with any other construction traffic management measures required for the development.

4.3 Operation

The operator has outlined the site may accommodate a maximum of two maintenance staff on-site during the typical operations of the site.

Annual access to the site will be necessary for major maintenance and inspections, with a maximum of six staff expected on-site, including two heavy vehicles.

4.4 Access

Vehicular access to the primary parcel is proposed to be established from Golf Course Road. The proposed primary access will facilitate fully directional vehicle movements into and out of the site to Golf Course Road, although noting the likely origin and destination movements will be right in, left out only.

An existing crossover to Golf Course Road is proposed to be retained to provide secondary/emergency access to the primary parcel.

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

4.5 Car Parking

Car parking for construction staff will be provided within a parking area on-site, nominated within the north western portion of the primary parcel on the Concept Design, though the location is expected to be finalised in the detailed design phase of the project. Additionally, the eastern portion of the primary parcel can be used for any overspill and therefore all car parking demands will be accommodated on-site. The operator will ensure that no parking associated with the construction or operation of the site occurs external to the primary parcel boundary. Noting the nature of the development and the context, the car parking surface will comprise a gravel construction.

For the operational phase of the project a car parking area with a total of approximately 10 car parking spaces is proposed.

5 ACCESS ROUTE REVIEW

5.1 General

The operator, Atmos Renewables, has advised that construction vehicles and deliveries will originate / depart from the Ports of Portland, Melbourne and Geelong. It is therefore expected that heavy vehicles will approach the site from both the north and the south on Henty Highway.

onemile**grid** has prepared swept paths for the Henty Highway / Golf Course Road intersection using an articulated vehicle with a total length of 29 metres, including a 4.6 m wide trailer to replicate the likely OSOM required for the HV Transformers. The swept paths demonstrate that the existing intersection can accommodate movements into and out of Golf Course Road to and from the north and the south. Road upgrades are therefore not required to allow for OSOM vehicles to traverse the Henty Highway / Golf Course Road intersection. Furthermore, it is expected that all movements via OSOM vehicles will be managed via traffic management along the journey.

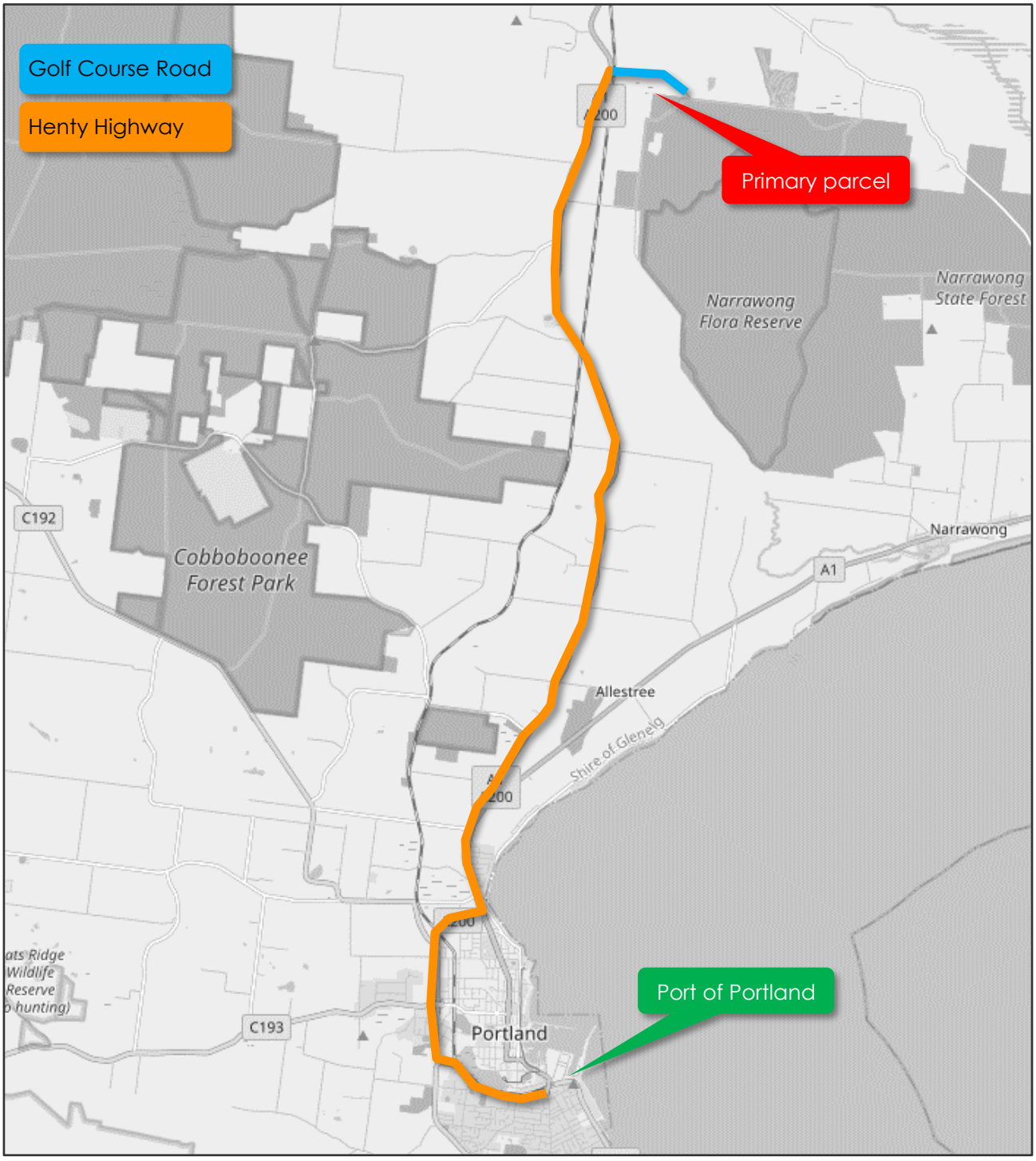
Additionally, **one**mile**grid** has reviewed Victoria's Oversize and Overmass (OSOM) Network in the vicinity of the site and prepared the following recommended access routes for OSOM vehicles to the site. Eligible vehicles up to 5m wide, 5m high, 30m long, and 100t mass are permitted to travel on the OSOM network, subject to meeting all relevant eligibility requirements. With the exception of Golf Course Road, which is Council managed, and the internal roads within each respective port, all roads nominated in the access routes (both Option 1 and Option 2) are arterial roads managed by the Department of Transport and Planning (DTP).

As part of the detailed design process, a swept path assessment using a suitable OSOM vehicle shall be undertaken to ensure suitable path for the entirety of the route to the site. Noting large / wide loads will be escorted it is not expected that there would be any impassable locations along either route.

5.2 Portland Route

Deliveries arriving via the Port of Portland are expected to utilise Henty Highway to access the site. The route is approximately 26 km, with the route shown in Figure 10. A vehicle travelling at 30 km/hr would take approximately an hour to complete this route.

Figure 10 Access Route Review – Port of Portland



Source: OpenStreetMap

5.3 Melbourne and Geelong

It is expected that deliveries arriving via the Port of Melbourne or Port of Geelong will utilise one of two routes to the site.

Option 1

Princes Highway, Tyrendarra-Ettrick Road, Woolsthorpe-Heywood Road, Henty Highway and Golf Course Road to access the site.

It should be noted the route passes over a bridge on Woolsthorpe-Heywood Road, with a 49.5 tonne mass limit. The bridge is approximately 850 metres east of Henty Highway and passes over Sunday Creek.

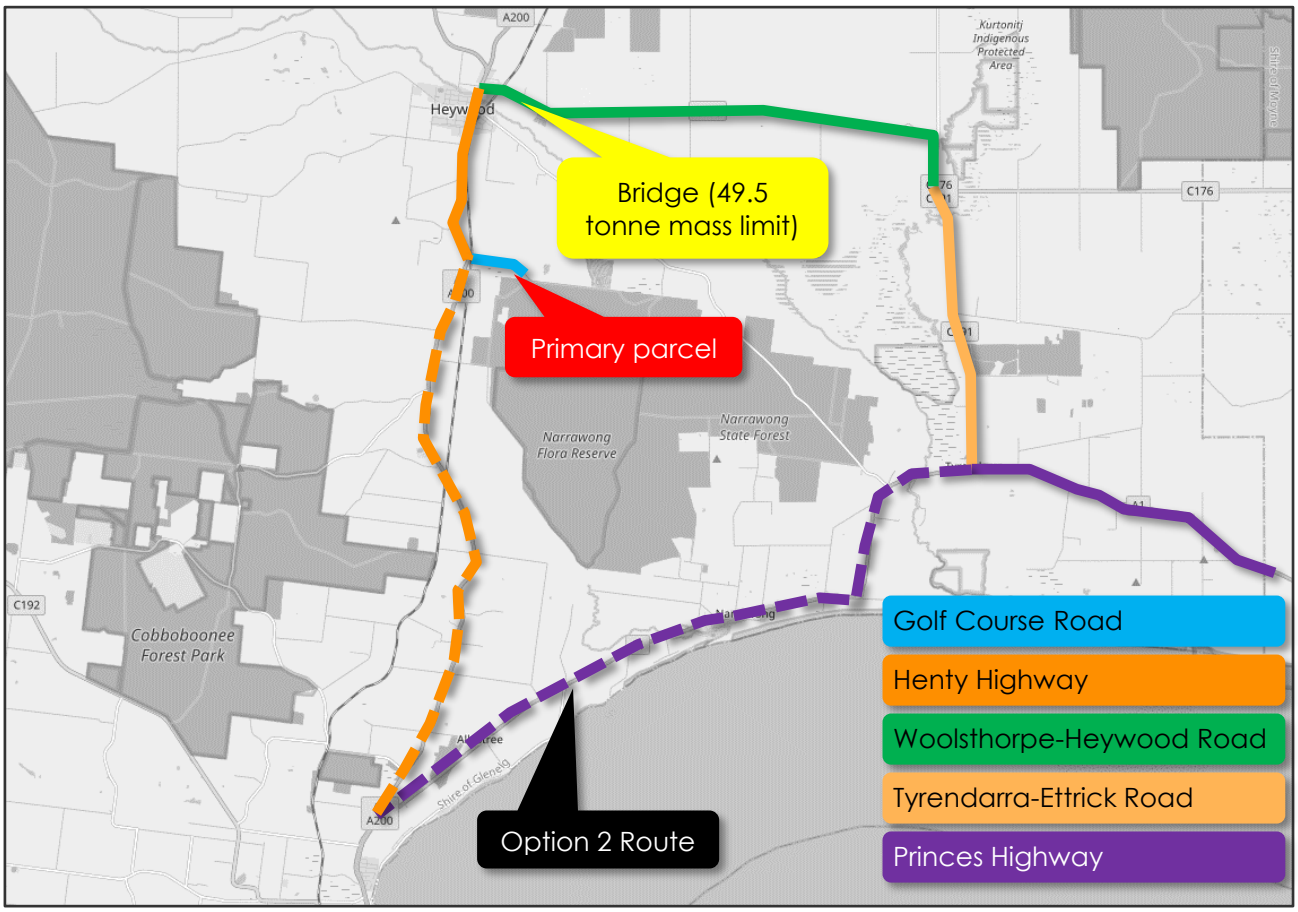
The Option 1 Route via Woolsthorpe-Heywood Road and Tyrendarra-Ettrick Road is approximately 362 km from the Port of Melbourne. A vehicle travelling at 30 km/hr would take approximately 12 hours to complete this route.

Option 2

If vehicles larger than 49.5 tonnes require access to the site, the option 2 route can be utilised. The option 2 route continues through on Princes Highway and approaches the site from the south, similar to vehicles approaching the site from the Port of Portland.

Travelling via the Option 2 Route would increase the travel distance marginally to approximately 370 km to the Port of Melbourne. A vehicle travelling at 30 km/hr would take approximately 12.3 hours to complete this route.

Figure 11 Access Route Review – Port of Melbourne



Source: OpenStreetMap

5.4 Railway Crossing

It is noted that the access route crosses over the existing railway crossing between Golf Course Road and the Portland Railway Line, adjacent to the Henty Highway intersection. As noted, the crossing is not provided with boom gates, bells or lights, as is typical for rural railway crossings on lower order roads. It is understood that approximately one train passes through this crossing per day, though proposed upgrades to the Portland Line in the future may increase this frequency. There are no current plans by the relevant agencies for any increases in train frequency.

It is recommended that the construction traffic management strategy coordinates delivery schedules and staff movements with train timetables to minimize overlap. Additionally, the construction traffic management plan should consider the use of spotters along the railway line to temporarily halt vehicle movements into and out of the primary parcel on the shoulders of the train schedule window.

6 DESIGN ASSESSMENT

6.1 Site Access

6.1.1 Sight Distance Review

As part of our site investigation, it was observed that due to the existing curvature of Golf Course Road, sight lines may be restricted at the proposed access point.

In this regard, as part of **one**mile**grid**'s investigations, a sight distance assessment was undertaken along Golf Course Road in the vicinity of the primary parcel, using both in person observations and verification using Google Streetview Imagery. The safe intersection sight distance (SISD) requirements, as outlined within *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, is summarised below in Figure 12.

A reaction time of 2.0 seconds is considered the absolute minimum value for alert driving situations in rural areas, however the general minimum value for high speed rural roads is 2.5 seconds. The corresponding sight distance criteria for both 2 seconds and 2.5 seconds reaction time are highlighted below in orange and red, respectively.

Figure 12 Austroads SISD

Design speed (km/h)	Based on safe intersection sight distance for cars[1] h_1 = 1.1; h_2 = 1.25, d = 0.36[2]; Observation time = 3 sec					
	R_T = 1.5 sec[3]		R_T = 2.0 sec		R_T = 2.5 sec	
	SISD (m)	K	SISD (m)	K	SISD (m)	K
40	67	4.9	73	6	–	–
50	90	8.6	97	10	–	–
60	114	14	123	16	–	–
70	141	22	151	25	–	–
80	170	31	181	35	–	–
90	201	43	214	49	226	55
100	234	59	248	66	262	74
110	–	–	285	87	300	97
120	–	–	324	112	341	124
130	–	–	365	143	383	157

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections

It was determined that there was likely no location along the frontage of the primary parcel that would provide the required sight lines for a road with a speed limit of 100 km/hr, though it should be noted the traffic surveys described in Section 3.4 found that Golf Course Road is currently operating with an 85th percentile speed of approximately 85 km/hr.

Based on the reduced sight lines available and the existing speed of vehicles, it is proposed to seek a temporary speed reduction along Golf Course during construction of the facility. The speed reduction would be in conjunction with any construction traffic management requirements of the development, with a reduction to 60km/hr recommended. Under a 60km/h speed limit, the sight distance requirement would reduce to 123 metres, which is available in either direction and is therefore satisfactory. Further, it is also recommended that advanced warning signage is implemented along Golf Course Road and Henty Highway as part of the construction traffic management strategy to warn motorists that vehicles may be entering or exiting the site. Again, this will be managed through the construction traffic management plan.

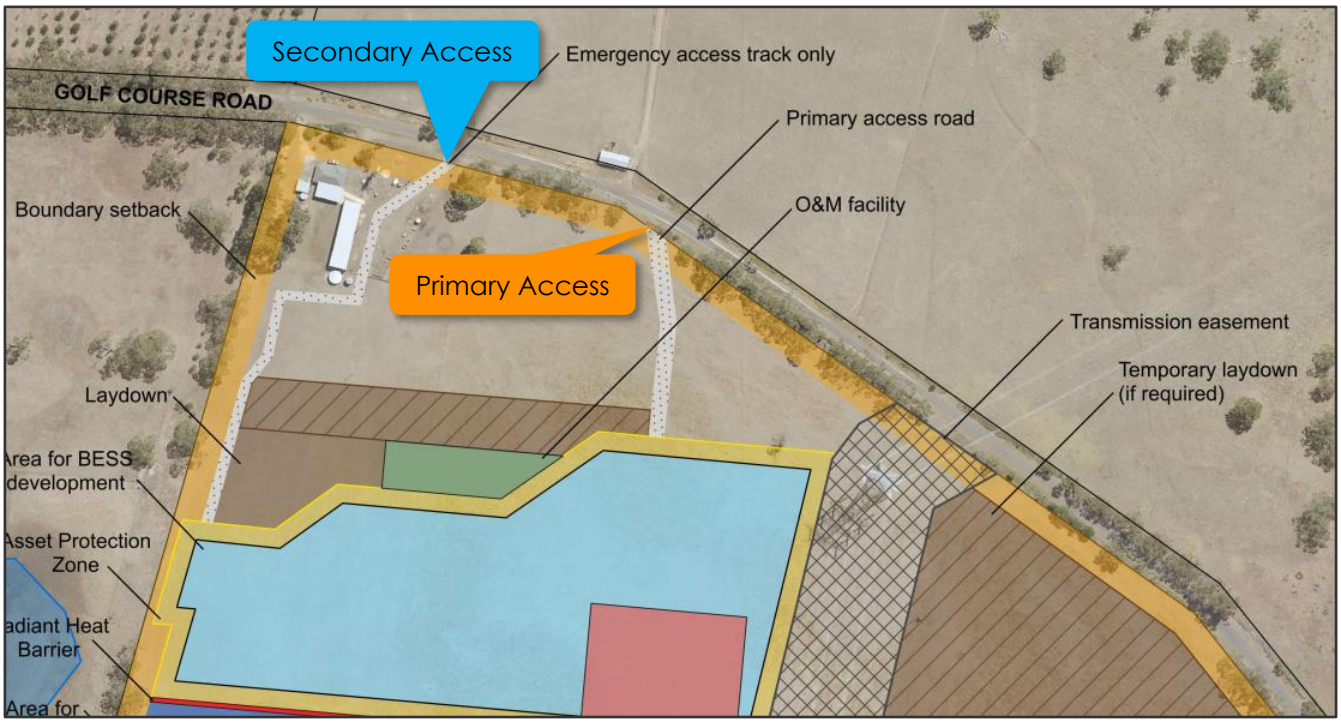
6.1.2 Access Design

Detailed designs for the site access points have not been undertaken at this stage. The site access should be designed to accommodate the largest typical vehicles that will access the site during the construction and operational phases of the facility. In relation to the OSOM vehicles it is expected that movements will be managed under traffic management and accordingly additional widening at the site access will be limited and therefore avoid impacts to existing flora and fauna.

The secondary access is proposed to utilise the existing crossover to the dwelling, and is intended solely as an emergency-only access to satisfy CFA requirements for fire trucks to have multiple ingress/egress points. It will not be used for construction or operational traffic.

The location and alignment of the proposed site access locations is shown below.

Figure 13 Site Access



7 TRAFFIC

7.1 Traffic Generation

The majority of traffic generated by the proposed development will be generated during the construction / installation phases associated with trade persons, facility staff and deliveries. During the future operational phase, the level of traffic generated will be significantly reduced due to the low employee intensity requirements of the facility. Notwithstanding an assessment of the anticipated traffic generated by the site during each phase of the project follows.

7.1.1 Typical Construction Phase

As noted in Section 4.2.1, approximately 40 staff will be accommodated on-site during the typical construction phase. Due to the location of the site, carpooling will be necessary and can be managed by the operator and individual trades. A driver ratio of 1:2 will be applied, equating to 20 private vehicles accessing the site each day, and it will be assumed that all staff arrive and depart during a single peak hour.

During the typical construction phase, it is expected that the 30 heavy vehicle deliveries will occur at regular intervals throughout the day, and therefore 10% will be assumed to occur during the peak periods, equating to 3 trucks arriving and departing during the peak periods.

7.1.2 Peak Construction Phase

The peak construction phase of the project requires a maximum of 150 construction staff on-site.

Due to the large volume of staff travelling to the site during the peak construction phases, the operator has outlined that they will consider the opportunity for staff to travel to the site via buses, with a communal meeting point or accommodation venue for staff.

Based on this, it will be assumed that one third of staff will arrive via buses provided by the operator. It will be assumed that 3 standard buses will be provided, each accommodating 10-20 staff, therefore approximately 50 staff will arrive via bus. This equates to 6 vehicle movements associated with buses arriving and departing the site during the peak hours (3 arrivals and 3 departures).

Further, a driver ratio of 1:2 will be applied to the remaining 100 staff, equating to 50 private vehicles accessing the site each day, and it will be assumed that all staff travelling via private vehicles arrive and depart during a single peak hour. This equates to 50 vehicle movements during the AM and PM peak hours.

It will again be assumed that 10% of the 50 heavy vehicle deliveries occur during the peak periods, equating to 5 trucks arriving and departing during the peak periods.

7.1.3 Anticipated Daily Traffic Generation

Based on the above, the anticipated daily traffic generation of the proposed development is shown below. For clarity the traffic generation of the operational phases, as discussed in Section 4.3 has been included.

Noting the location of the site approximately 5 km from Heywood, there has been an allowance made for return trips to the site for staff to purchase lunch. For the purposes of analysis, it will be assumed that one quarter of the private vehicles that access the site during the typical and peak construction periods will depart and return back to the site over the course of the day. This equates to an additional 10 inbound and outbound trips during the typical construction period, and 25 inbound and outbound trips during the peak construction period.

Table 7 Anticipated Daily Traffic Movements

Stage	*Light Vehicles*	*Buses*	*Heavy Vehicles*	*Total*
Typical Construction	40	0	60	**100**
Peak Construction	150	12	100	**262**
Typical Operation	40	0	0	**4**
Annual Inspections	12	0	4	**16**

As shown above, the peak period for traffic generation of the site is during the peak construction period, when the site is expected to generate 262 daily trips.

7.1.4 Peak Hour Traffic Generation

Based on the above, the following traffic generation is expected during the AM and PM peak periods.

Table 8 Anticipated Peak Hour Traffic Movements

Stage	*Light Vehicles*	*Buses*	*Heavy Vehicles*	*Total*
Typical Construction	20	0	6 (3 arrivals 3 departures)	32
Peak Construction	**50**	**6** (3 arrivals 3 departures)	**10** (5 arrivals 5 departures)	**66**
Typical Operation	2	0	0	2
Annual Inspections	6	0	2	8

As detailed above, during the peak period for construction the site is anticipated to generate a maximum of 66 vehicle movements during the AM and PM peak periods.

7.2 Traffic Distribution

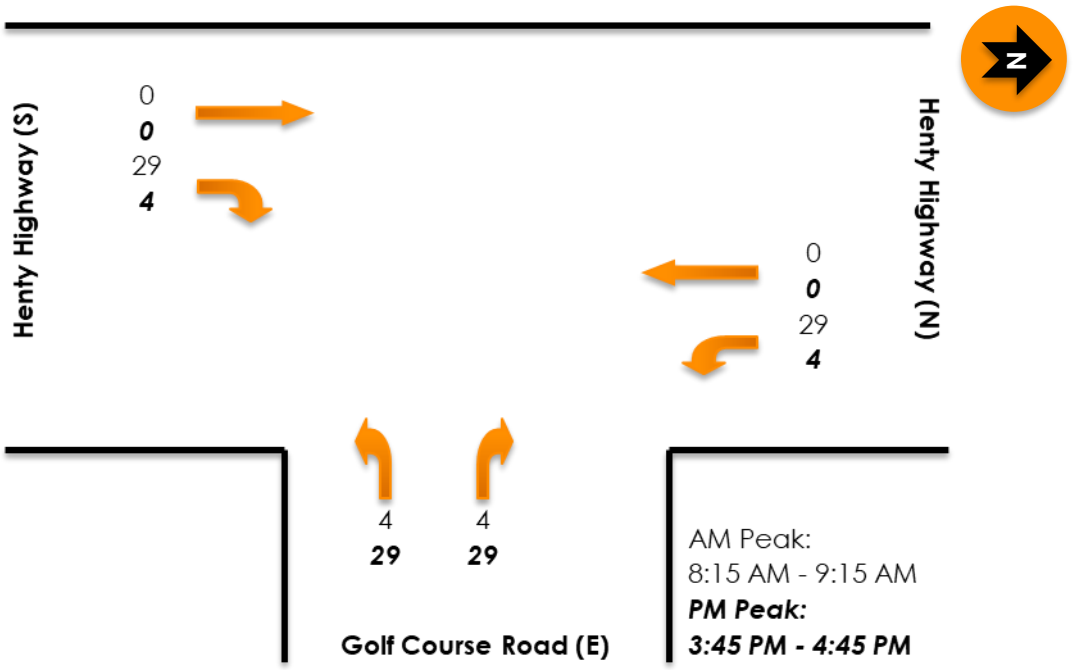
All traffic movements to and from the site will be distributed from the site via the intersection of Henty Highway and Golf Course Road.

The site is in close proximity to the small town of Heywood, though the closest major town is Portland, which is 20 km south of the primary parcel. The operator has advised that temporary accommodation is most likely to be arranged in Portland, though it is understood that accommodation may also be organised in Hamilton or Heywood. Therefore, private vehicles / buses will be assumed to be evenly distributed between the south and the north.

As noted in Section 5, heavy vehicles will originate from and depart to both Melbourne, Geelong and Portland. Therefore, heavy vehicle movements will be assumed to be evenly distributed between the south and the north.

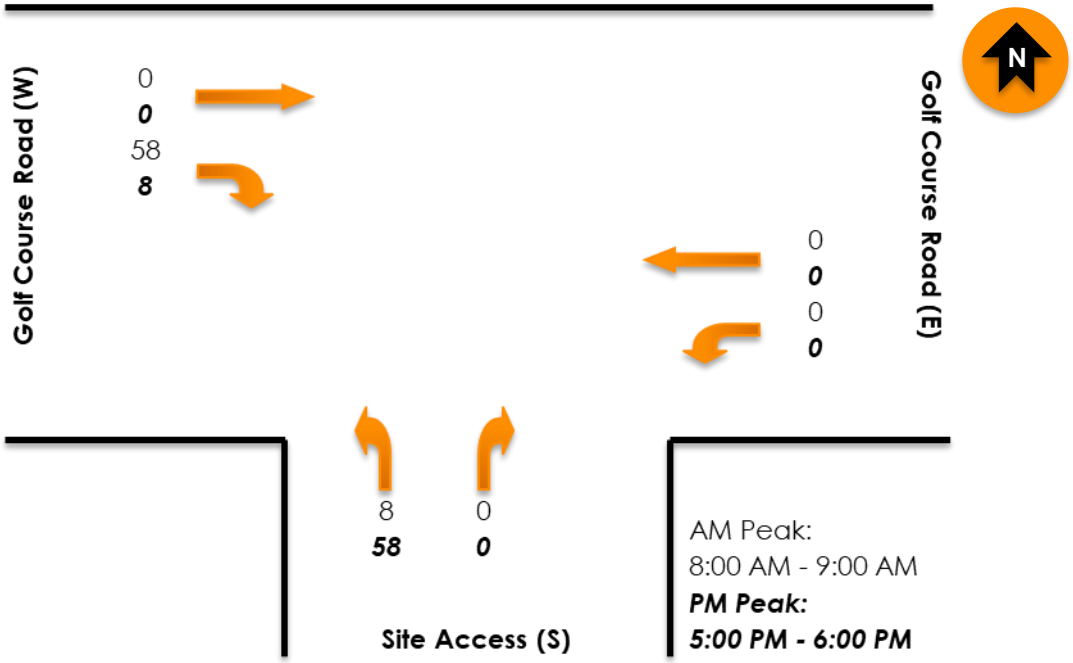
Application of the above assumptions returns the anticipated turning movements at the Henty Highway / Golf Course Road intersection as depicted in Figure 14.

Figure 14 Generated Traffic Volumes – Henty Hwy / Golf Course Rd (Peak Construction)



Additionally, at the proposed site access along Golf Course Road, the following traffic volumes are expected.

Figure 15 Generated Traffic Volumes – Site Access (Peak Construction)

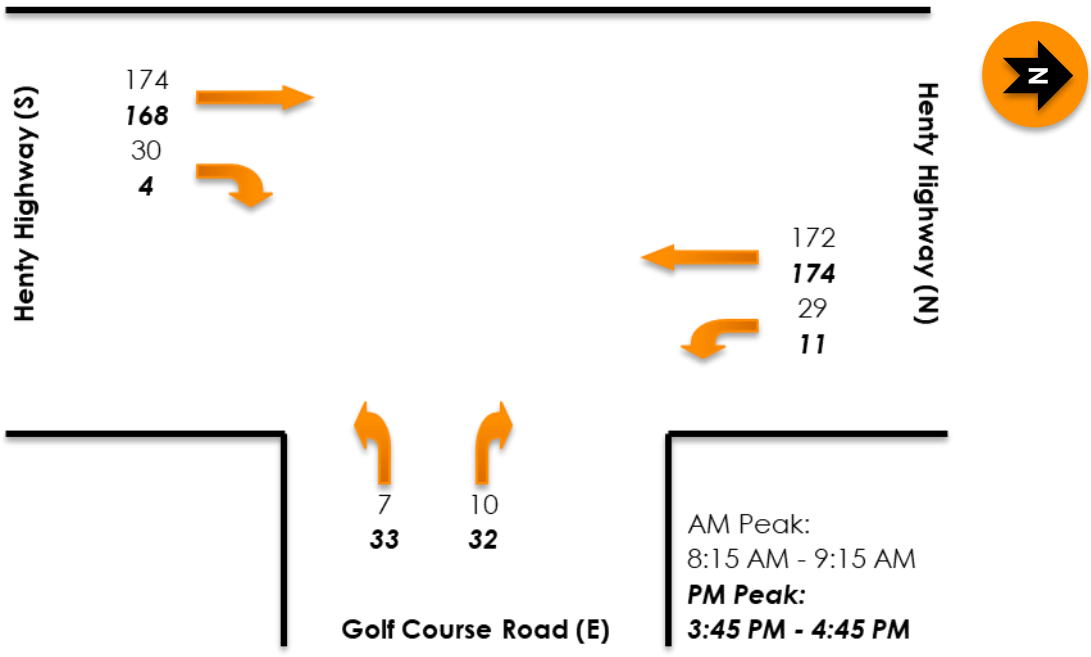


7.3 Resultant Traffic Volumes

Based on the above, the future volumes at the Henty Highway / Golf Course Road intersection can be calculated by superimposing the existing volumes with the anticipated traffic generated by the proposed development.

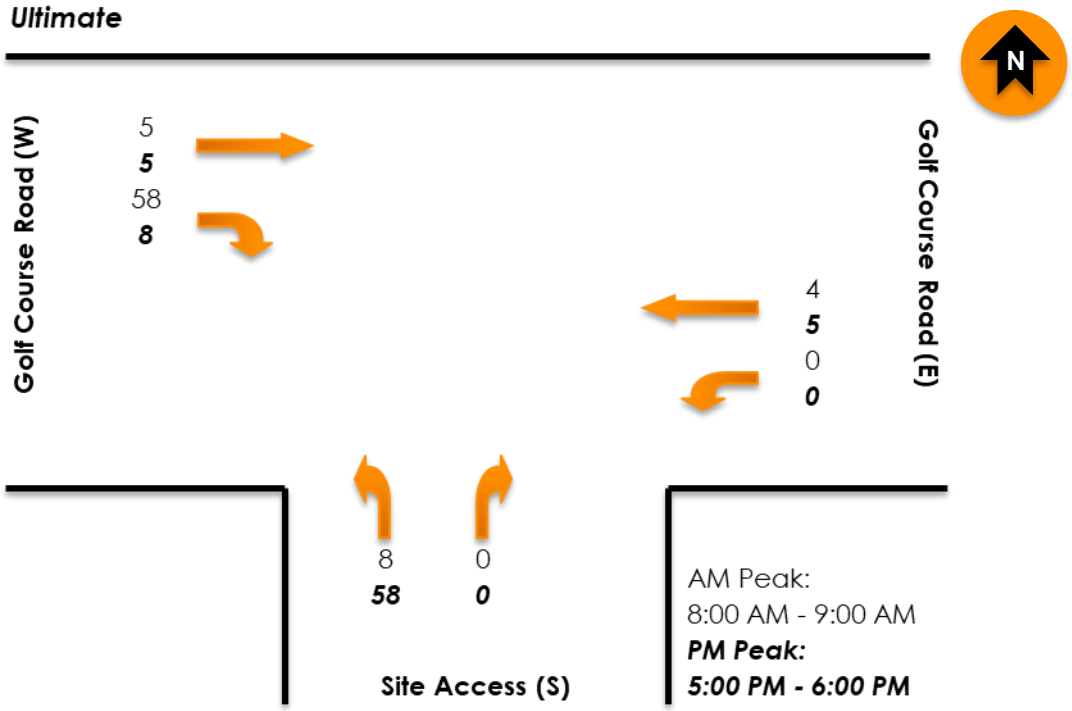
The resultant peak hour traffic volumes during the peak construction period are shown in Figure 16.

Figure 16 Resultant Future Traffic Volumes – Henty Hwy / Golf Course Rd (Peak Construction)



Additionally, the future volumes at the site access along Golf Course Road are shown in Figure 17.

Figure 17 Resultant Future Traffic Volumes – Site Access (Peak Construction)



7.4 Intersection Capacity Analysis

To assess the future operation of the Henty Highway / Golf Course Road intersection the traffic volumes have been input into SIDRA Intersection, a traffic modelling software package.

Table 9 Henty Highway / Golf Course Road – Existing/Future Conditions

Approach	Movement	DoS		Avg. Delay (sec)		Queue (m)		Level of Service	
		Existing	Future	Existing	Future	Existing	Future	Existing	Future
AM Peak									
Henty Highway (S)	Through	0.107	0.107	0	0	0	0	A	A
	Right	0.001	0.031	8.9	9.1	0	1	A	A
Golf Course Road (E)	Left	0.015	0.029	8.3	8.3	0.4	0.8	A	A
	Right	0.015	0.029	11.2	12	0.4	0.8	B	B
Henty Highway (N)	Left	0.001	0.019	8.4	8.4	0	0	A	A
	Through	0.105	0.105	0	0	0	0	A	A
PM Peak									
Henty Highway (S)	Through	0.103	0.103	0	0	0	0	A	A
	Right	0.001	0.004	8.9	8.9	0	0.1	A	A
Golf Course Road (E)	Left	0.01	0.098	8.3	8.4	0.3	3	A	A
	Right	0.01	0.098	11.2	11.7	0.3	3	B	B
Henty Highway (N)	Left	0.005	0.003	8.4	8.4	0	0	A	A
	Through	0.107	0.107	0	0	0	0	A	A

The table above indicates that performance of the Henty Highway/Golf Course Road intersection is not anticipated to be materially impacted during the peak construction period, with nominal increases to delays and queues.

7.5 Traffic Impact

7.5.1 Peak Period Impacts

During the peak construction phase of the proposed development, the anticipated traffic generation of the development is 66 vehicle movements during the peak periods. This is considered low in traffic engineering terms, and is equivalent to approximately one vehicle movement every minute. Even when focussed into the Henty Highway / Golf Couse Road intersection, the traffic volumes generated by the proposed development are low, and Henty Highway, Golf Course Road and the surrounding road network are expected to be able to accommodate the traffic generated by the proposed development, as demonstrated by the SIDRA results.

It should be noted the above analysis conservatively assumes that all staff arrive during the AM peak hour, and all staff depart during the PM peak hour. Based on the proposed construction hours 7:00 AM to 5:00 PM on weekdays, it is expected that the majority of staff will arrive prior to the existing AM peak period of 8:15 AM to 9:15 AM. Similarly, outbound staff movements are expected to be more evenly distributed throughout the afternoon, rather than being concentrated within the

PM peak period of 3:45 PM to 4:45 PM. Nevertheless, the SIDRA results demonstrate the traffic generated during the peak construction period are expected to be comfortably accommodated by the Henty Highway / Golf Course Road intersection.

Additionally, the turn lanes provided on Henty Highway are expected to be appropriate to allow for vehicles to safely turn into Golf Course Road without impacting on through traffic.

Furthermore, the swept paths provided in Appendix A show that vehicles up to a 29 m articulated truck are able to manoeuvre the Henty Highway / Golf Course Road intersection, with additional road works not expected to be required to allow OSOM vehicles to access the site, with all movements by OSOM vehicle expected to be managed via traffic management.

7.5.2 Daily Traffic Volumes

It is acknowledged that the proposed development will increase daily traffic volumes along Golf Course Road during the construction period.

Currently, Golf Course Road carries approximately 100 vehicles per day on weekdays, while the proposed development is expected to generate a maximum of 262 movements during the peak construction period. Consequentially, during the peak construction period total traffic volumes on Golf Course Road are expected to be in the range of 360 vehicles per day.

The Infrastructure Design Manual (IDM) identifies that Rural Access and Rural Collector roads should be provided a 4 m sealed surface for daily traffic volumes between 51-150 vehicles per day (vpd), and a 6.2 m sealed surface for traffic volumes in excess of 150 vpd.

Golf Course Road is currently provided with a 4 m sealed surface, in accordance with the IDM guidelines. Considering the relatively short duration of the construction period, with traffic volumes generally to return to existing volumes once construction ceases, the existing 4 m sealed carriageway is considered to be appropriate. It is acknowledged that the increased traffic volumes on Golf Course Road during construction may result in increased frequency of vehicles relying on the shoulder to pass one another other. However, considering the low speed limit and warning signage expected during the construction period, the existing arrangement is expected to be appropriate to accommodate infrequent passing, with gravel shoulders provided on both sides of Golf Course Road.

It is recommended that the pavement is monitored by the construction contractor and operator to identify if any maintenance is required during or after completion of the construction phase of the project. This process may be supported through the preparation of a pre-construction condition report and a post-construction dilapidation report, carried out by a suitably qualified professional.

8 TRAFFIC MANAGEMENT PLAN

8.1 General

As demonstrated in the above assessment, the proposed development is not anticipated to have an adverse impact on the operation of the surrounding road network, and has been designed to allow for appropriate vehicle access to the site.

Regardless, it is expected that a detailed Construction Traffic Management Plan (CTMP) will be prepared for all stages of the construction period, to be submitted by the construction contractor as part of the overall Construction Management Plan.

Broadly, the CTMP should include the following information:

- Detailed construction timeframes and phases;
- Number of construction vehicles and personnel on-site per day;
- Construction vehicle ingress and egress routes;
- Swept paths at pinch points along the entirety of the construction access route;
- Proposed construction traffic management measures (see below) for all relevant stages and scenarios, and including site hoarding, construction loading areas and traffic management equipment and signage; and
- A Worksite Hazards Assessment.

8.2 Traffic Management Recommendations

In accordance with the assessments included within this report, and based on **one**mile**grid**'s experience it is recommended that the CTMP considers the following traffic management measures:

- Temporary speed limit reduction along Golf Course Road in the vicinity of the primary parcel, recommended speed limit: 60 km/hr;
- Temporary speed limit reduction along Henty Highway in the vicinity of the Golf Course Road intersection, recommended speed limit: 80 km/hr;
- Radio communications between construction vehicles at all times;
- All construction traffic to be coordinated with timing of trains along Portland Railway Line;
- All movements by OSOM vehicles to be controlled via Traffic controllers; and
- Truck warning signage to be installed on Golf Course Road and Henty Highway in the vicinity of the primary parcel.

Additionally, the CTMP and overall construction management plan should consider how construction vehicles will interact with surge increases to traffic volumes on Golf Course Road and Henty Highway, particularly during events at the nearby Heywood Golf Club. To reduce conflicts between construction traffic and event traffic, it may be beneficial to limit construction deliveries on event days.

It should be noted the above is not intended to be exhaustive, and the final CTMP should comply with Austroads Guide to Temporary Traffic Management (AGTTM) and other relevant guidelines, and be prepared in consultation Glenelg Shire Council, Department of Transport and Planning (DTP), and other relevant stakeholders.

8.3 Resident Impacts

Given Golf Course Road provides access to a small number of dwellings (less than 10), the below traffic management techniques are recommended to alleviate concerns to affected residents.

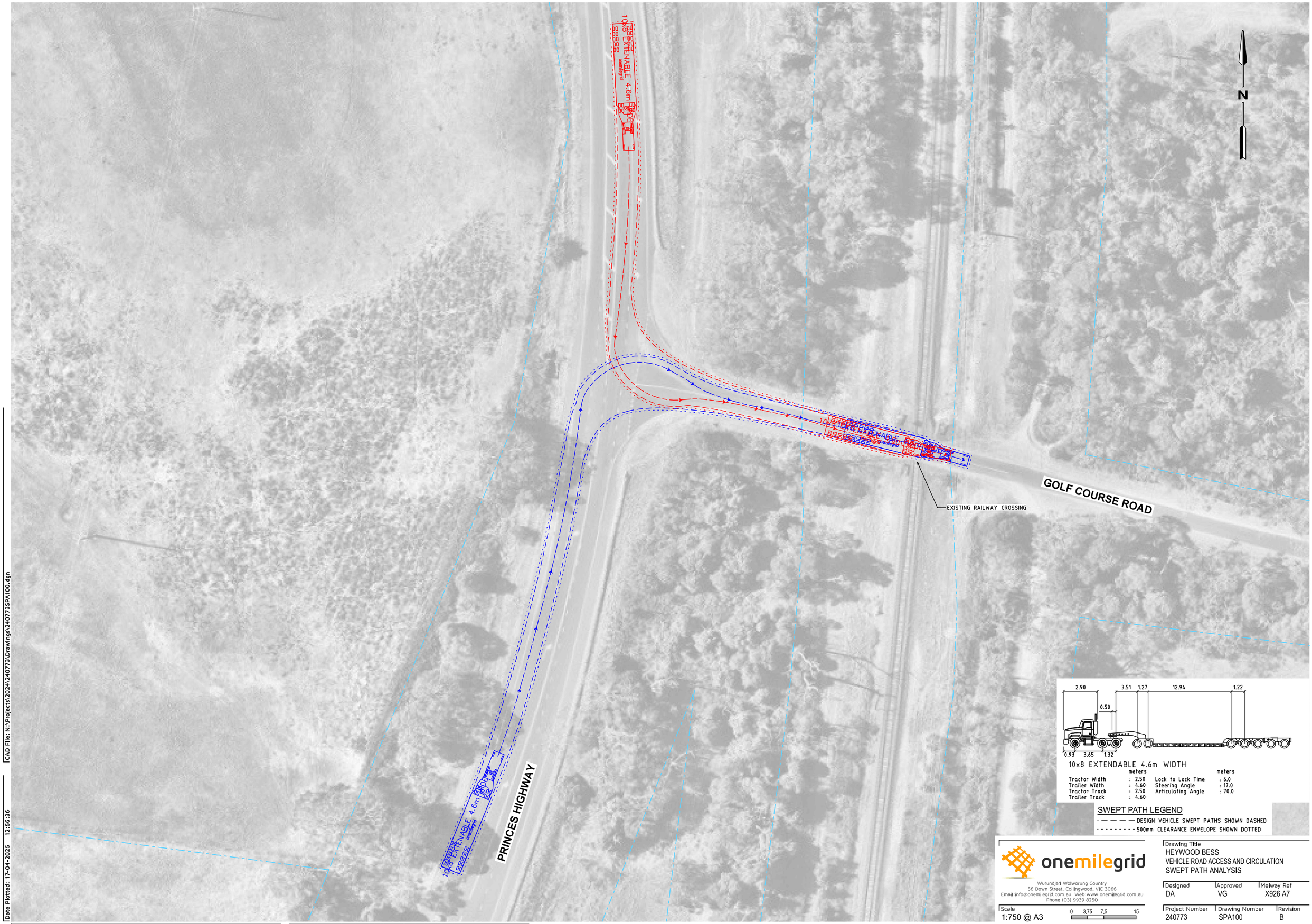
- Neighbour Engagement: Providing advanced notice to affected residents through letter drops and/or direct communication, outlining expected traffic volumes, peak periods, and any mitigation measures;
- Traffic Scheduling & Restrictions: Where feasible, scheduling heavy vehicle movements outside of peak residential access times (e.g., school runs, peak commuting hours) to minimise disruption;
- Traffic Controllers & Signage: Temporary traffic controllers or clear signage in critical sections to enhance safety and awareness, particularly along Golf Course Rd; and
- Speed & Noise Controls: Implementing reduced speed limits and noise management strategies in sensitive areas to improve safety and minimise disturbances.

9 CONCLUSIONS

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

- It is proposed to use the primary parcel in Heywood for the purposes of a battery energy storage system (BESS);
- The existing Henty Highway / Golf Course Road intersection has sufficient width and dedicated turning lanes to accommodate OSOM deliveries and modelled traffic movements;
- During the construction phase, the proposes BESS will create short-term, elevated levels of vehicle movements, though the level of traffic generated is expected to have a minimal impact on the operation of the external road network;
- Traffic management measures are proposed during the construction period, such as temporary speed limit reductions in the vicinity of the primary parcel;
- During operation the site is expected to have a negligible impact on the surrounding road network;
- Car parking will be comfortably provided on-site as required.

Appendix A Swept Path Diagrams



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Trailer Width	: 4.60	Steering Angle	: 17.0
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 4.60		

SWEPT PATH LEGEND

- — — — — DESIGN VEHICLE SWEPT PATHS SHOWN DASHED
- - - - - - - - - 500mm CLEARANCE ENVELOPE SHOWN DOTTED

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Drawing Title
HEYWOOD BESS
VEHICLE ROAD ACCESS AND CIRCULATION
SWEPT PATH ANALYSIS

Designed	Approved	Melway Ref
DA	VG	X926 A7

Scale
1:750 @ A3
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Project Number	Drawing Number	Revision
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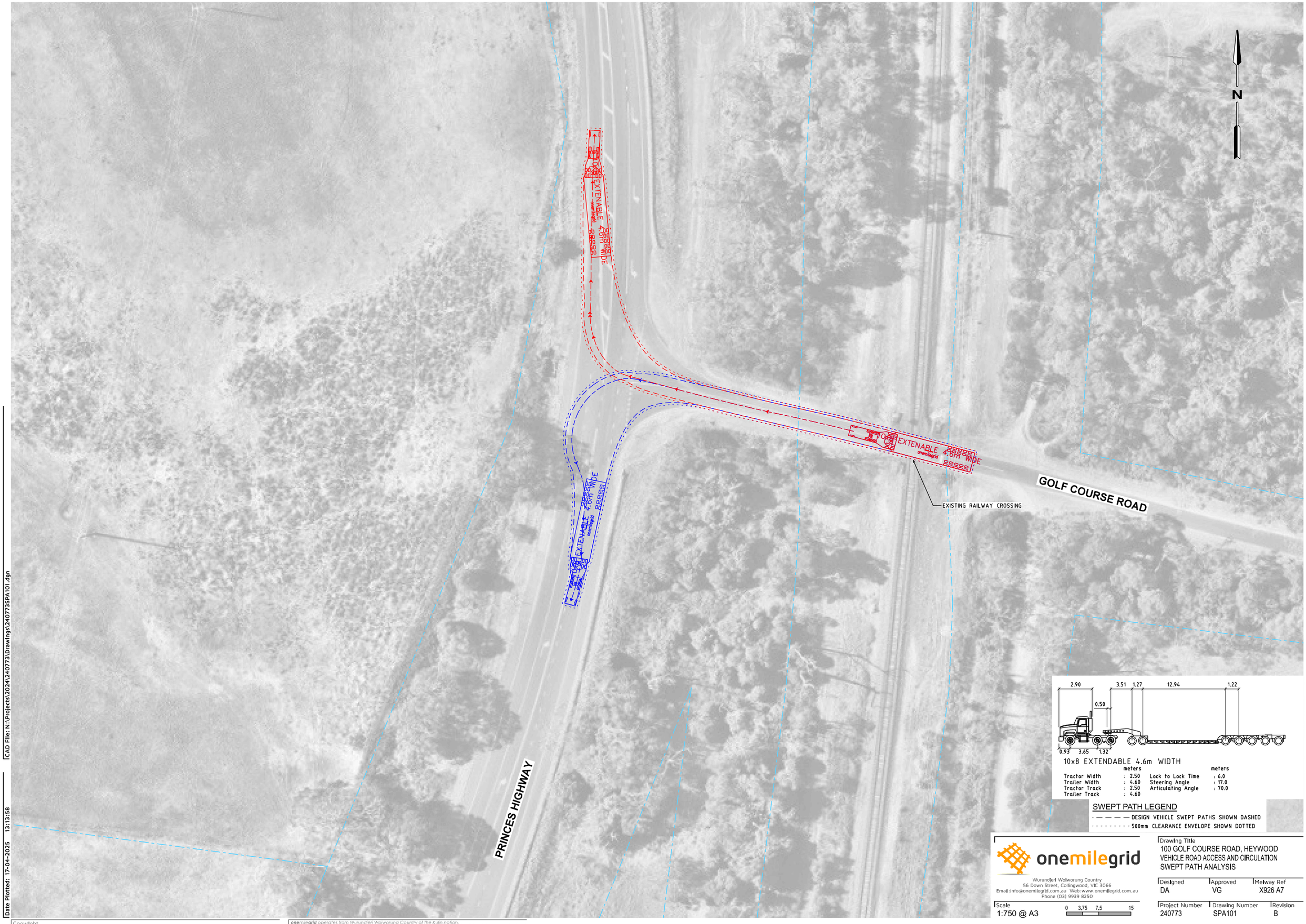

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Scale
1:750 @ A3
0 3.75 7.5 15

Drawing Title
100 GOLF COURSE ROAD, HEYWOOD
VEHICLE ROAD ACCESS AND CIRCULATION
SWEPT PATH ANALYSIS

Designed	Approved	Melway Ref
DA	VG	X926 A7

Project Number	Drawing Number	Revision
240773	SPA101	B

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N

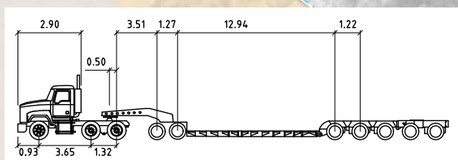
10x8 EXTENABLE 4.6m WIDE

EXISTING TREE WITHIN SITE

PROPOSED 15m WIDE GATE BASED ON SWEPT PATHS

SUBJECT SITE
100 GOLF COURSE ROAD

GOLF COURSE ROAD



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SWEPT PATH LEGEND

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Scale 1:750 @ A3 (0 3.75 7.5 15)

Drawing Title
HEYWOOD BESS
VEHICLE SITE ACCESS AND CIRCULATION
SWEPT PATH ANALYSIS

Designed	Approved	Melway Ref
DA	VG	X926 A7

Project Number	Drawing Number	Revision
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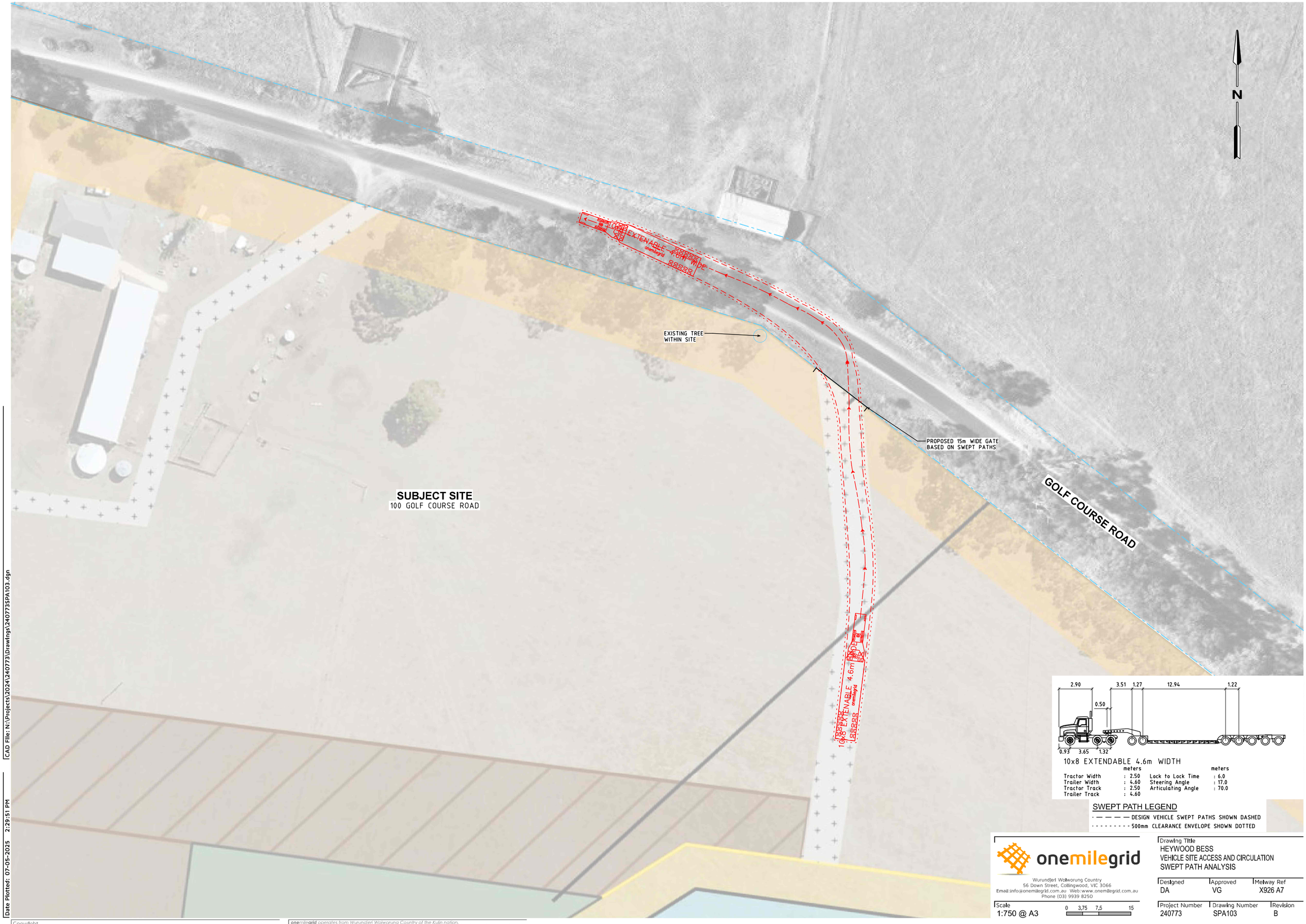

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SWEPT PATH LEGEND

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Drawing Title
HEYWOOD BESS
VEHICLE SITE ACCESS AND CIRCULATION
SWEPT PATH ANALYSIS

Designed	Approved	Melway Ref
DA	VG	X926 A7

Scale 1:750 @ A3 (0 3.75 7.5 15)

Project Number	Drawing Number	Revision
240773	SPA103	B

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