Amber

Traffic & Transportation Direction

Anakie Solar Farm

ADVERTISED PLAN

1435-1475 Ballan Road, Anakie

Traffic Impact Assessment

May 2022

Reference: 389 rep 220504 final

Anakie Solar Farm

1435-1475 Ballan Road, Anakie

Traffic Impact Assessment

Prepared for: NGH Pty Ltd

Status: Final report

Date: 4 May 2022

Reference: 389 rep 220504 final

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1. Background

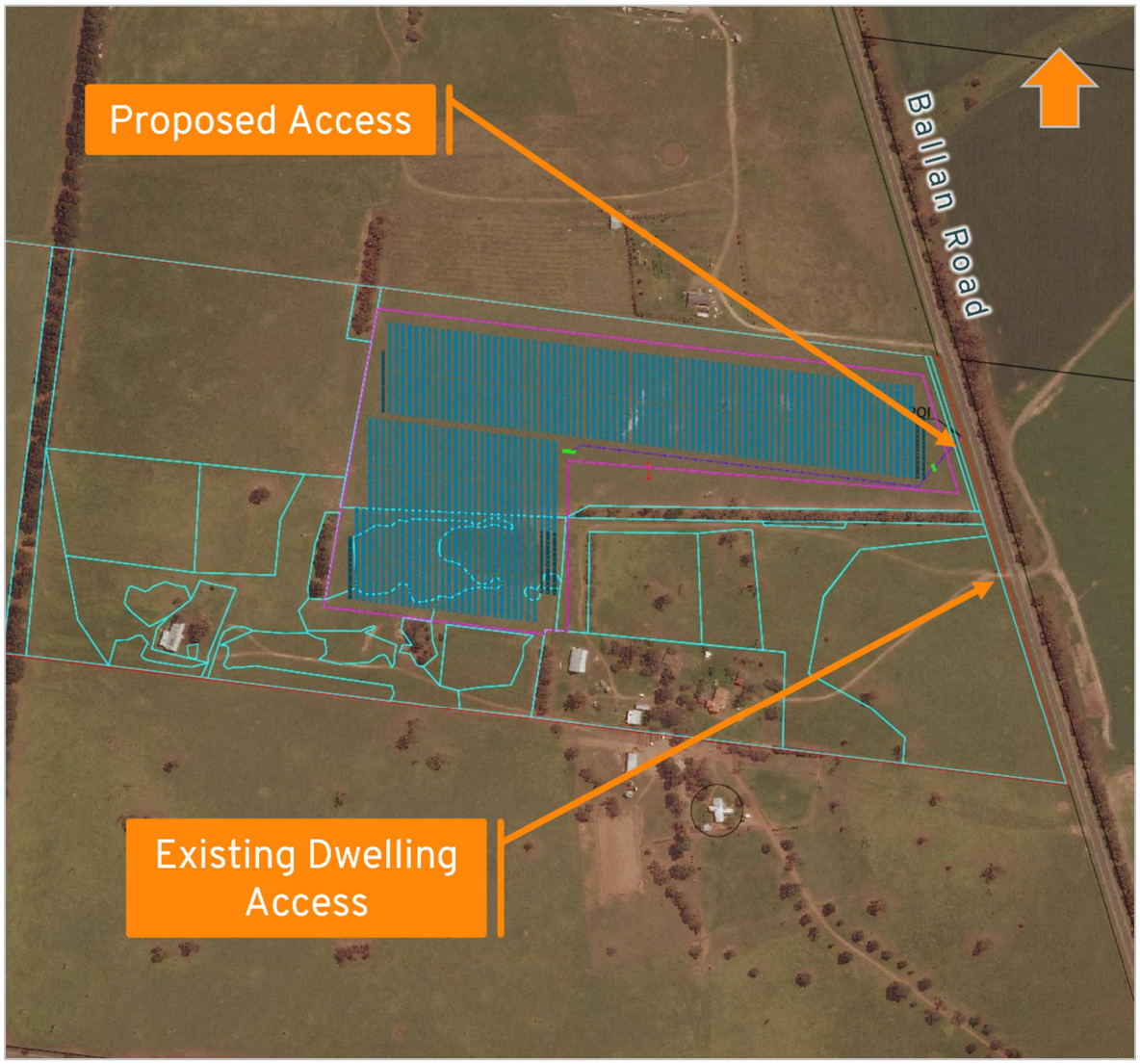
1.1 Background

Amber Organisation Pty Ltd has been engaged by NGH Pty Ltd to conduct a review of the traffic implications of the Anakie Solar Farm and prepare a Traffic Impact Assessment.

The solar farm is located approximately 6km south of Anakie and is proposed to have a capacity of 4.95MW. Access to the site is proposed via a new access to Ballan Road at the northern end of the site. Staff are expected to primarily be located in Anakie and Geelong with all plant expected to be delivered from GeelongPort.

Figure 1 shows the proposed layout of the site in relation to the road network, access locations and existing infrastructure.

Figure 1: Site Layout



Source: NGH Pty Ltd

1.2 Purpose of Document

This Traffic Impact Assessment has been prepared to assess the construction and operational traffic impacts, and the access arrangements of the solar farm. The assessment details how road impacts of the project traffic, particularly from heavy vehicle use and oversize and overmass vehicles, will be avoided or managed using road-use management strategies.

More specifically, the report addresses the following key matters:

- Details of both light and heavy vehicle traffic volumes and proposed transport routes;
- An assessment of the potential traffic impacts of the project on road network function and safety;
- An assessment of the capacity of the existing road network to accommodate the type and volume of traffic generated by the project;
- Details of measures to mitigate and / or manage potential impacts, including construction traffic control, road dilapidation surveys and measures to control soil erosion and dust generated by traffic volumes; and
- Details of access roads and how these connect to the existing road network and ongoing operational maintenance.

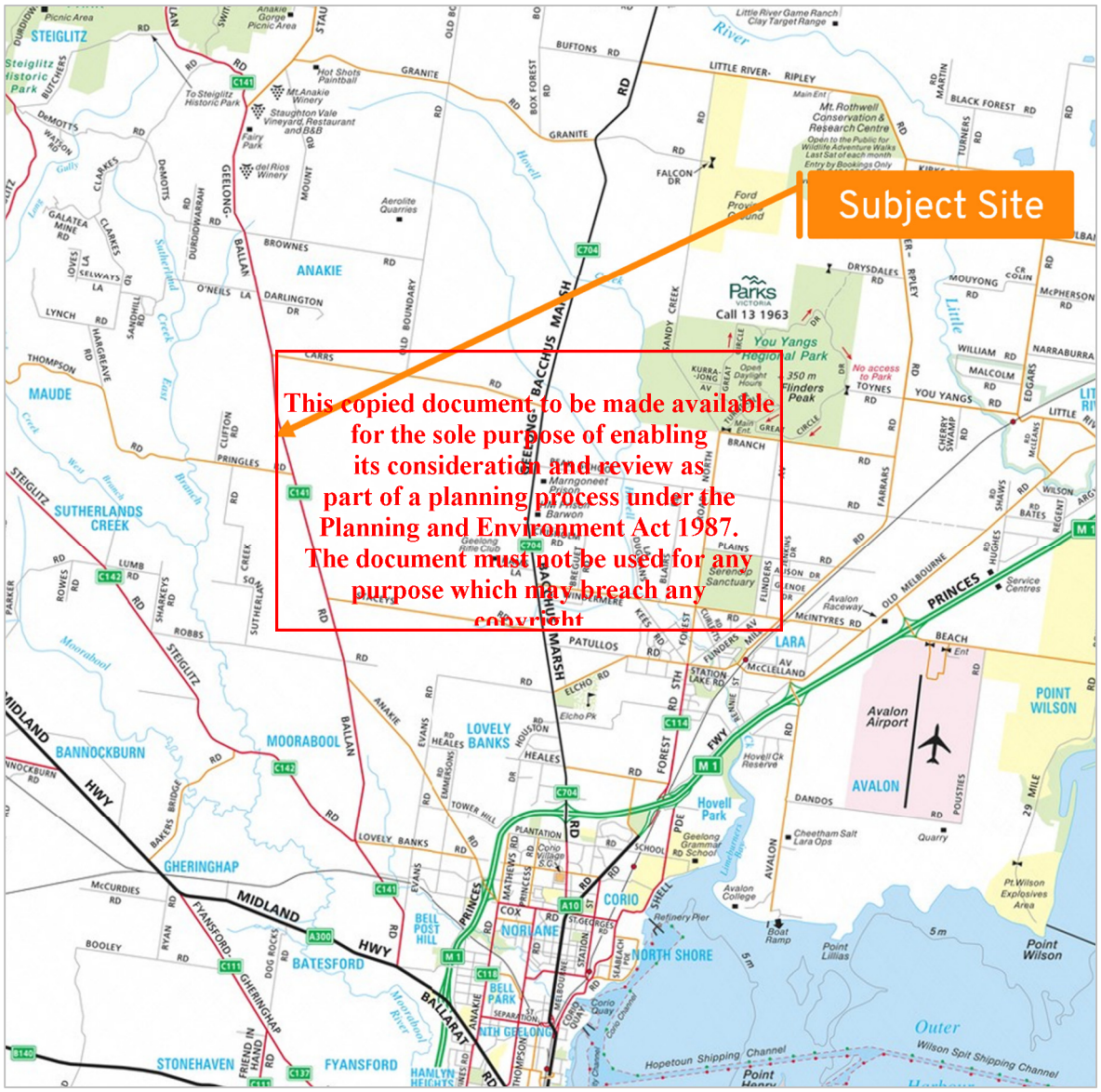
The traffic assessment has been undertaken in conjunction with consultation with Department of Transport and City of Greater Geelong. It also responds to the requirements outlined within the *Department of Environment, Land, Water and Planning Solar Energy Facilities Design and Development Guideline 2019.*

2. Existing Conditions

2.1 Site Location

The site forms Lot 6 TP434281 and is located approximately 6km south of Anakie on the western side of Ballan Road. Figure 2 shows the location of the site in relation to the surrounding transport network.

Figure 2: Site Location



Source: Melways

The site is zoned as Farming Zone (FZ) and is occupied by a dwelling and agricultural land. Access to the dwelling is currently provided via a single-width access to Ballan Road.

2.2 Road Network

Ballan Road is a Secondary State Arterial Road under the care and management of Department of Transport and is classified as a TRZ2 Principal Road Network Zone. It runs in a general northwest-southeast alignment between Western Freeway and Midland Highway. Within the vicinity of the site, it has a carriageway width of approximately 6.0 metres accommodating one lane of traffic in each direction and has unsealed shoulders. It adopts the default speed limit of 100km/hr for non-built-up areas.

2.3 Traffic Volumes

Traffic volume data for Ballan Road was obtained from the DoT traffic volume database. The closest available data suggests that Ballan Road currently carries in the order of 1,100 vehicle movements per day and 110 vehicle movements in each of the peak hours. The vehicle movements are relatively evenly distributed between north and southbound movements. Accordingly, Ballan Road currently accommodates a low level of traffic.

2.4 Public Transport Services

No public transport services are provided within the vicinity of the site.

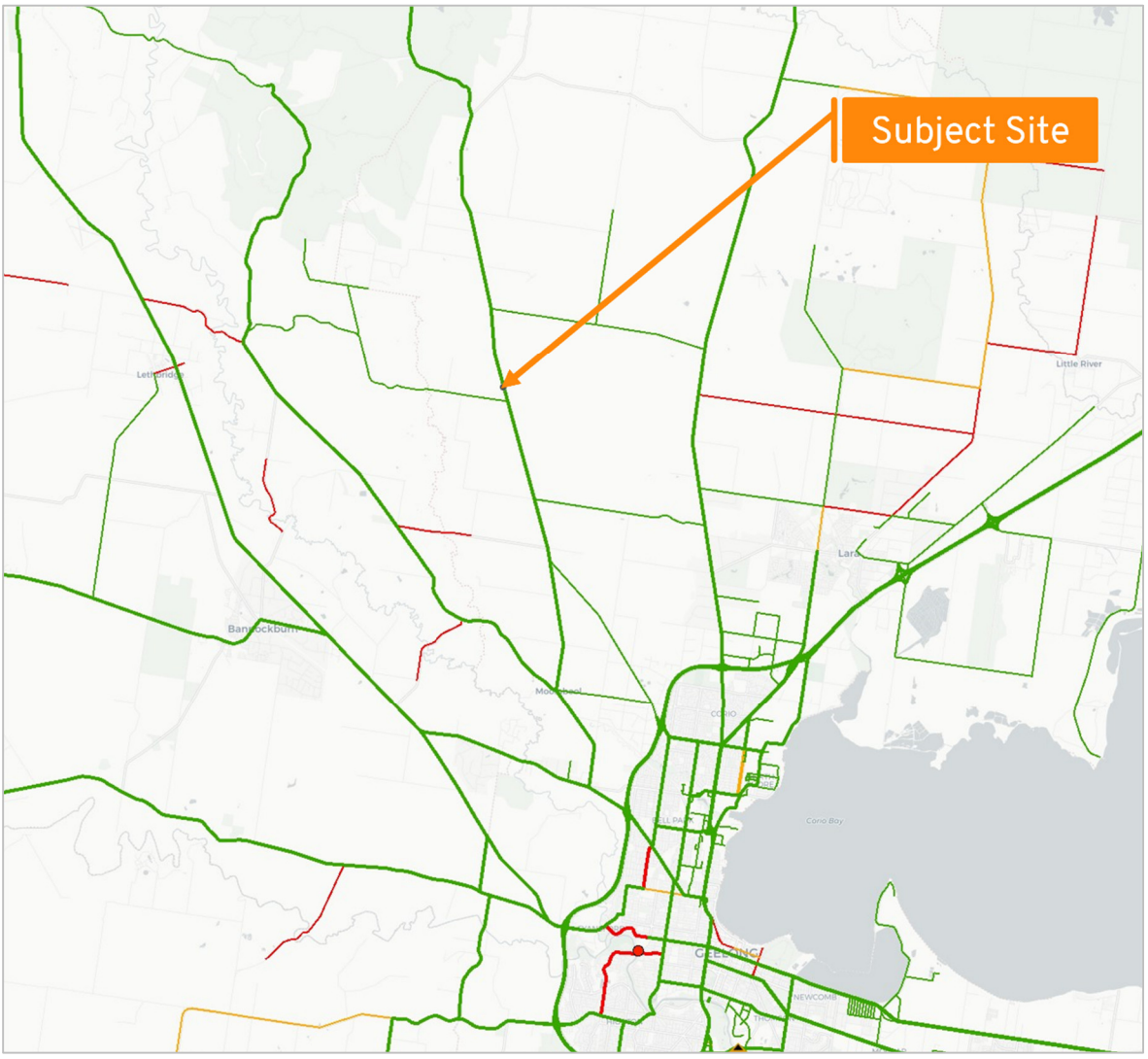
2.5 Crash History

Amber has conducted a review of the DoT Crashstats database for all injury crashes within 2 kilometres of the site. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2015 to 2019. The crash search revealed one serious injury crash at the intersection of Ballan Road and Pringles Road. Given the road classification and associated traffic volumes, it is concluded that the road network is currently operating in a relatively safe manner.

2.6 Restricted Vehicle Access

The DoT Gazetted Roads for B-Doubles Map for the surrounding area is provided within Figure 3. The green lines indicate B-Double declared roads while the orange lines represent conditionally approved roads. As can be seen from the figure, Ballan Road is a B-Double declared road.

Figure 3: DoT Gazetted Roads for B-Doubles Map



Source: VicRoads Gazetted Roads for B-Doubles Map

3. Traffic Assessment

3.1 Traffic Generation

3.1.1 Construction

The solar farm construction is expected to take approximately 6 months, with the peak construction period expected to take 1-2 months. Construction activities would be undertaken during standard daytime construction hours, as follows:

- Monday to Friday: 7am – 6pm
- Saturday: 7am – 1pm
- No work on Sundays or public holidays.

Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities.

A maximum of 50 staff will be on-site during peak construction periods. It is understood that shuttle buses will be provided that can accommodate the majority of staff, with the remaining staff to access the site using private vehicles.

Construction traffic generated by the solar farm can broadly be separated into the following three categories:

- Light vehicles associated with transporting staff to/from the site, including shuttle buses and personal vehicles;
- Medium and Heavy Rigid Trucks (MRV and HRV as defined within AS 2890.2:2018) will be used to deliver raw materials and smaller plant; and
- Articulated Vehicles and B-Doubles (AV and B-Double as defined within AS 2890.2:2018) will be used to transport larger plant.

Restricted Access Vehicles / oversized and overmass (OSOM) vehicles will be required for the delivery of larger plant to the site such as the substation transformer and are subject to separate permit applications and regulations. The impacts of the OSOM vehicles are discussed within Section 4 with the following assessment focusing on the impacts of the light and heavy vehicles which generate the bulk of the traffic and represent the typical traffic impact of the project on a day-to-day basis.

The construction traffic volumes for the project have been provided by the Applicant. It is anticipated that during peak construction the site could generate up to 38 heavy and 108 light vehicle movements per day. It is noted that a vehicle movement is classified as a vehicle travelling in one direction (i.e. a truck accessing the site would generate one movement towards the site and one movement away from the site when it departs).

Table 1 summarises the traffic movements generated during the construction period of the solar farm.

Table 1: Traffic Generation During Peak Construction Periods

Vehicle Type	Average Vehicle Movements per Day		Peak Vehicle Movements per Day	
	Daily (vpd)	Peak Hour (vph)	Daily (vpd)	Peak Hour (vph)
Light Vehicle (car / 4WD)	30	15	100	50
Shuttle Bus	4	2	8	2
MRV/HRV	6	1	8	2
AV	4	1	20	2
B-Double	4	1	10	1
Total	**48**	**20**	**146**	**57**

Overall, the site is expected to generate approximately 57 vehicle movements during the morning and evening peak hours during the peak construction period, which will reduce to 20 vehicle movements over the typical construction periods.

3.1.2 Operational Traffic

During operation the solar farm is expected to generate a minimal level of traffic associated with maintenance and operation services. The solar farm is expected to be operated by up to 5 staff resulting in a traffic generation of up to 10 vehicle movements per day which would result in a negligible change to the traffic environment.

3.1.3 Decommissioning Traffic

At the end of the operational life of the project all above ground infrastructure will be dismantled and removed from the project site. Internal roads, if not required for ongoing farming purposes or fire access, would be removed and the site reinstated as close as possible to its original state.

Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A comprehensive Construction Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

3.2 Traffic Distribution

Traffic accessing the site will do so via Ballan Road which is a Secondary State Arterial Road. Staff will primarily be located in Anakie and Geelong with all plant expected to be delivered from the GeelongPort.The following provides a breakdown of the access distribution for each of the vehicle classifications outlined within Table 1:

- Light Vehicles: It is anticipated that most staff will be local within Anakie and Geelong, with 90% of staff travelling from the south and 10% travelling from the north.
- MRV/HRV: These vehicles will predominantly be water trucks and vehicles transporting materials such as concrete and fencing supplies which will be sourced within the surrounding area. The Applicant has advised that 90% will be travelling from the south and 10% travelling from the north.

- AV/B-Double: Plant will be transported from GeelongPort to the site along Ballan Road from the south.

Accordingly, the majority of vehicle movements are expected to access the site from the south.

The peak hour for the solar farm will occur at the start and end of the day when staff are transported to/from the site. During the morning peak all vehicle movements will be towards the site and in the evening peak all vehicle movements will be away from the site. Heavy vehicle movements will be distributed throughout the day and will be split evenly between inbound and outbound movements.

3.3 Traffic Assessment

Ballan Road is currently estimated to be carrying in the order of 110 vehicles per hour in the peak hour. During peak construction the traffic volumes would increase to approximately 167 vehicles movements per hour at peak times. The traffic volumes can be readily accommodated on the road network and Ballan Road is expected to continue to operate with a good level of service. Accordingly, it is concluded that the road network is able to accommodate the traffic generated by the solar farm during the construction period.

3.4 Cumulative Traffic Impacts

A review has been undertaken for any other renewable projects in the surrounding area. The VicPlan Map Tool indicates that there are no other renewable projects proposed in the surrounding area.

4. Route Assessment

GeelongPort has been identified as the location where the solar farm plant will be imported. The construction traffic access route from the port to the site is expected to be via Corio Quay Road, Princes Highway, Cox Road, Anakie Road, and Ballan Road. The arterial roads are designated for B-Double vehicles as outlined within the DoT Gazetted Roads for B-Doubles Map provided within Figure 3. Accordingly, the access route is able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm.

It is also noted that some oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.

5. Access Assessment

5.1 Access Design

Following discussions with Department of Transport Officers it has been agreed that the site access is to be designed in accordance with Guideline Drawing *AGRD Part 4 – Typical Design to Rural Properties*. The drawing is provided within Appendix A and provides the design requirements for access by a B-Double vehicle. Accordingly, the site access is expected to be able to accommodate the traffic generated by the solar farm in a safe manner subject to the adoption of the guideline drawing.

5.2 Sight Distance

Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections specifies the Safe Intersection Sight Distance (SISD) as the minimum sight distance which should be provided along the major road at any intersection. Table 3.1 of the guide specifies the SISD required for various design speeds. Given Ballan Road has a speed limit of 100km/hr a design speed of 110km/hr has been adopted which requires an SISD of 285 metres.

The available sight distance at the site access greatly exceeds the Austroads requirements given the flat and straight alignment of Ballan Road and limit vegetation / buildings in the surrounding area.

6. Construction Management Plan

A Construction Traffic Management Plan (CTMP) will be prepared prior to construction commencing by the appointed contractor. The CTMP will provide additional information regarding the traffic volumes and distribution of construction vehicles that is not available at this time, including:

- Road transport volumes, distribution and vehicle types broken down into:
  - Hours and days of construction.
  - Schedule for phasing/staging of the project.
- The origin, destination and routes for:
  - Employee and contractor light traffic.
  - Heavy vehicle traffic.
  - Oversize and overmass traffic.

The following provides recommended measures that should be adopted within the CTMP to minimise the impact of construction traffic along the road network:

- Neighbours of the solar farm be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.
- Loading and unloading is proposed to occur within the work area. No street or roads will be used for material storage or parking of vehicles at any time.
- All vehicles will enter and exit the site in a forward direction.
- Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the labour force. The following code is to be implemented as a measure to maintain safety within the site:
  - Utilisation of only the designated transport routes.
  - Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
- Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas.
- All permits for working within the road reserve must be received from the relevant authority prior to works commencing.
- A map of the primary haulage routes highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.
- A complaint resolution and disciplinary procedure.
- Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather).

The above recommendations will ensure the construction traffic will create a minimal impact to the capacity and safety of the surrounding road network.

7. Conclusion

Amber has assessed the traffic impacts of the 4.95MW solar farm located approximately 6km south of Anakie. Access to the site will be provided via a new access to Ballan Road at the northern end of the site. Staff will primarily be located in Anakie and Geelong with all plant expected to be delivered from GeelongPort. The above assessment determined the following:

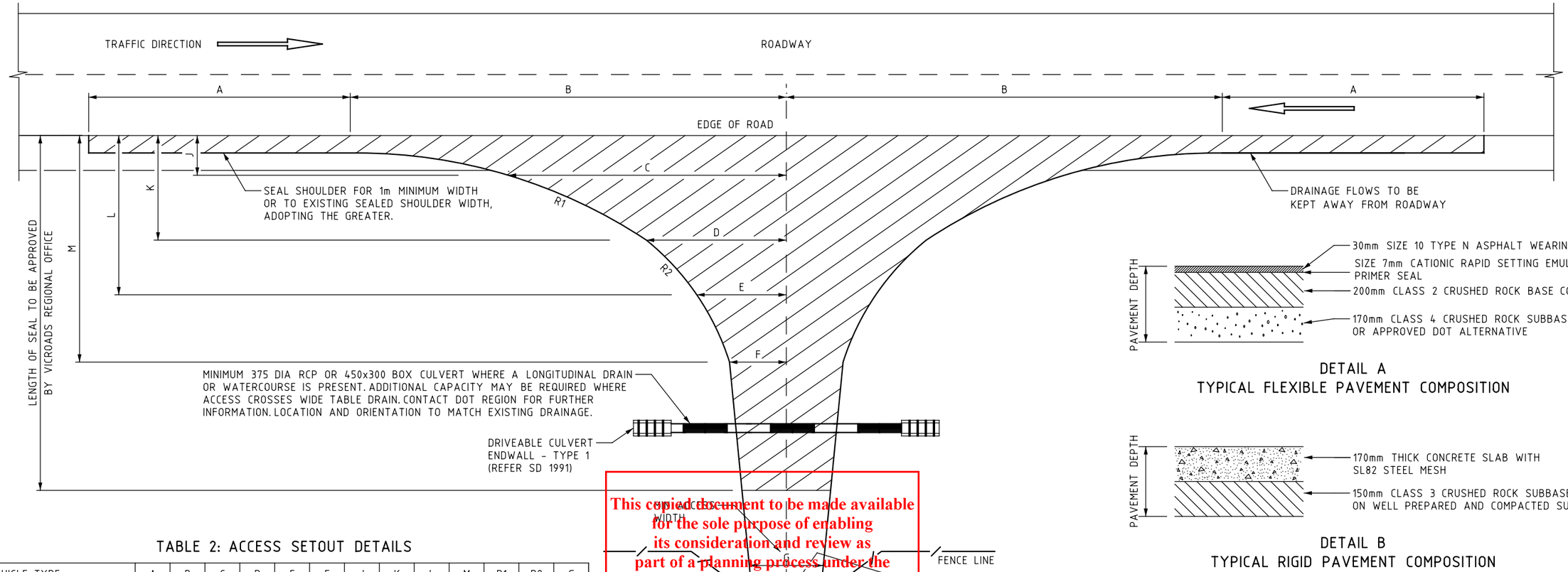
- The site will generate up to 108 vehicle movements per day during peak construction times, including 38 truck movements;
- The road network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages;
- The site access is proposed to be constructed to accommodate B-Double vehicles in accordance with the Department of Transport standard drawing for access to rural properties;
- The construction traffic access route from GeelongPort to the site is proposed to be via Corio Quay Road, Princes Highway, Cox Road, Anakie Road, and Ballan Road. The roads are designated for B-Double vehicles and as such, the access route is able to accommodate the loads and type of vehicle movement to be generated during construction of the solar farm;
- It is noted that some oversize and overmass vehicles will be required to deliver larger plant to the site such as the sub-station transformer and earthmoving equipment. The vehicles are subject to specific road permits that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known; and
- In order to mitigate the impacts of the development during construction a CTMP will be prepared which should include the recommendations provided within this document.

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

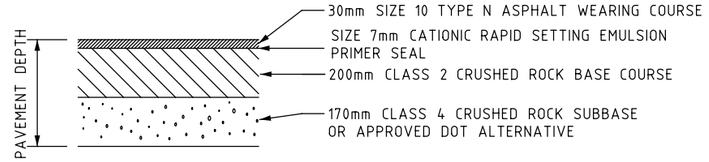
Appendix A

Intersection Design

ISSUE	APPROVED BY	DATE	AMENDMENT
A	M-RD&SSE	12/21	REVISED PAVEMENT DETAILS AND GENERAL NOTES 1, 2, 3, 4, & 5



PLAN - DRIVEWAY ACCESS LAYOUT



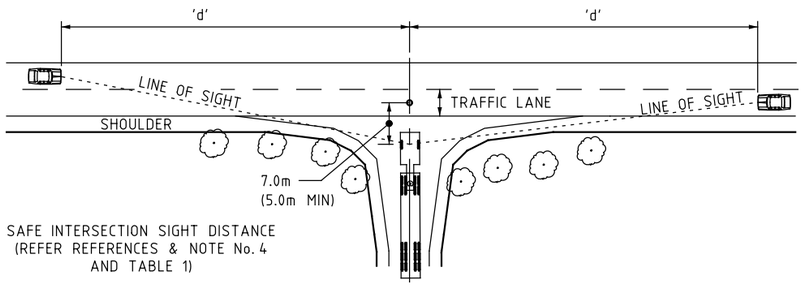
DETAIL A
TYPICAL FLEXIBLE PAVEMENT COMPOSITION

DETAIL B
TYPICAL RIGID PAVEMENT COMPOSITION

TABLE 2: ACCESS SETOUT DETAILS

VEHICLE TYPE	A	B	C	D	E	F	J	K	L	M	R1	R2	G
26m B-DOUBLE	15.0	30.3	20.4	11.0	6.1	3.7	2.1	5.3	9.4	15.3	45	13	4.3
19m SEMI TRAILER	15.0	24.6	17.2	10.3	5.2	3.0	1.9	4.6	9.3	15.7	30	14	4.2
ARTICULATED 19m BUS	15.0	21.9	14.4	7.5	4.4	2.9	2.1	5.4	9.6	14.7	26	15	4.0
12.5m SINGLE UNIT	15.0	20.1	12.9	6.4	4.1	3.0	2.2	5.6	9.7	16.3	23	18	4.0
TRUCK + 3 AXLE TRAILER	15.0	18.3	11.8	6.2	4.0	3.0	2.2	5.7	9.8	14.2	18	18	4.0
TRUCK + 4 AXLE TRAILER	15.0	19.2	12.2	6.0	4.0	3.0	2.3	5.9	9.8	14.0	20	17	4.0
8.8m SERVICE VEHICLE	15.0	12.6	8.7	5.4	4.1	3.5	1.8	4.1	6.7	9.6	10	13	4.0
PASSENGER VEHICLE	5.0	9.3	3.8	1.8	-	-	2.2	7.5	-	-	7.5	-	3.6

SETOUT DETAILS TO BE BASED ON THE DESIGN VEHICLE SELECTED.
CHECK VEHICLE MAY ENCROACH ON TO OPPOSING TRAFFIC LANE IN <80KM/H SPEED ZONE FOR LOW VOLUME ROADS WITHOUT A CENTRAL BARRIER.



SAFE INTERSECTION SIGHT DISTANCE
(REFER REFERENCES & NOTE No. 4
AND TABLE 1)

MINIMUM VISIBILITY REQUIREMENTS
(NOT TO SCALE)

TABLE 1: SIGHT DISTANCES

DESIGN SPEED (Km/h)	'd' SAFE INTERSECTION SIGHT DISTANCE (m)	CORRECTION (m)							
		ROADWAY UPGRADE				ROADWAY DOWNGRADE			
		2%	4%	6%	8%	2%	4%	6%	8%
60	123	-2	-4	-6	-7	2	5	8	11
70	151	-3	-5	-8	-10	3	7	11	15
80	181	-4	-7	-10	-13	4	9	14	20
90	226	-5	-9	-13	-16	5	11	18	25
100	262	-6	-11	-16	-20	6	14	22	31
110	300	-7	-13	-19	-24	8	17	26	38

THE DESIGN SPEED IS ASSUMMED TO BE 10km/h GREATER THAN THE POSTED SPEED LIMIT FOR RURAL HIGHWAYS AND ROADS

GENERAL NOTES:

1. THE DIAGRAM IS A GUIDE FOR A TYPICAL LAYOUT OF A DRIVEWAY ACCESS FOR A RURAL PROPERTY FOR VEHICLES AS SPECIFIED IN TABLE 2. THIS GUIDE WAS DEVELOPED IN THE INTEREST OF ROAD SAFETY AND TO PROTECT THE ARTERIAL ROAD PAVEMENT AT THE ACCESS LOCATION.
2. SLIGHT VARIATIONS MAY OCCUR AFTER SITE INSPECTION, ANALYSIS AND APPROVAL OF THE LOCATION.
3. THE PAVEMENT COMPOSITION SHALL BE IN ACCORDANCE WITH THAT SHOWN IN DETAIL A. THE PAVEMENT TYPE SHOWN IN DETAIL B IS ONLY SUITABLE FOR INFREQUENT HEAVY VEHICLE TRAFFIC. AN ALTERNATIVE PAVEMENT COMPOSITION WILL REQUIRE APPROVAL BY THE DEPARTMENT OF TRANSPORT. NEW PAVEMENT MUST BE KEYED INTO EXISTING PAVEMENT AND CRACK SEALED.
4. ANY PROPOSED ALTERNATIVE PAVEMENT DESIGNS SHALL BE UNDERTAKEN IN ACCORDANCE WITH VICROADS CODE OF PRACTICE RC 500.22 SELECTION AND DESIGN OF PAVEMENTS AND SURFACINGS AND AUSTROADS GUIDE TO PAVEMENT TECHNOLOGY PART 2 PAVEMENT STRUCTURAL DESIGN.
5. PAVEMENT MATERIALS AND EARTHWORK LAYERS NEED TO BE IN ACCORDANCE WITH DOT STANDARD SECTIONS AND/OR LOCAL GOVERNMENT SPECIFICATION REQUIREMENTS.
6. A PLANNING PERMIT IS REQUIRED FOR A NEW ACCESS OR ALTERATION TO AN EXISTING DRIVEWAY AND MAY BE REQUIRED FOR THE REMOVAL OF NATIVE VEGETATION.
7. A TRAFFIC MANAGEMENT PLAN MUST COMPLY WITH THE ROAD MANAGEMENT ACT AND APPLICABLE CODES IN RELATION TO ANY WORKS UNDERTAKEN WITHIN THE ROAD RESERVE.
8. TRUCK WARNING SIGNS & GUIDE POSTS SHOULD BE INSTALLED IN ACCORDANCE WITH AUSTROADS GUIDE TO TRAFFIC MANAGEMENT & VICROADS SUPPLEMENTS.
9. THE DRIVEWAY ACCESS CONSTRUCTION AND MAINTENANCE IS THE RESPONSIBILITY OF THE PROPERTY OWNER. MAINTENANCE ALSO INCLUDES ASSOCIATED DRAINAGE WORKS.

SIGHT DISTANCE:

10. A DRIVER, WHEN LOCATED 7.0M (5.0M MIN) FROM THE CONFLICT POINT TAKEN AS THE CENTRE OF THE TRAFFIC LANE, NEEDS TO SEE A VEHICLE APPROACHING IN EITHER DIRECTION. REFER TABLE 1 FOR APPROPRIATE SIGHT DISTANCES.
11. TREE CANOPIES, BUSHES OR OTHER OBJECTS SHALL BE REMOVED TO PROVIDE GOOD VISIBILITY. ANY TREE CANOPIES OVERHANGING THE PATH OF A TRUCK SHALL BE A MINIMUM OF 5.0M ABOVE THE GROUND SURFACE.
12. SIGHT LINES MUST ACHEIVE THE MINIMUM SAFE INTERSECTION SIGHT DISTANCE BASED ON AN EYE HEIGHT OF 1.1M TO AN OBJECT HEIGHT OF 1.25M.

NOTES:

1. ALL DIMENSIONS ARE IN METRES, UNLESS SHOWN OTHERWISE
2. THIS DRAWING FORMS PART OF THE VRS TO AGRD PART 4 AND SHOULD BE READ IN CONJUNTION WITH THOSE REFERENCES

REFERENCES:

AUSTROADS GUIDE TO ROAD DESIGN PART 4
AUSTROADS GUIDE TO ROAD DESIGN PART 4A
AUSTROADS GUIDE TO ASSET MANAGEMENT PART 5
AUSTROADS GUIDE TO PAVEMENT TECHNOLOGY PART 2
AUSTROADS GUIDE TO TRAFFIC MANAGEMENT
VICROADS SUPPLEMENTS TO AUSTROADS GUIDES
VICROADS CODE OF PRACTICE RC 500.22
- SELECTION AND DESIGN OF PAVEMENTS AND SURFACINGS
SD 1991 DRIVEABLE CULVERT ENDWALLS (TYPE 1)

vicroads

GUIDELINE DRAWING

AGRD PART 4

TYPICAL ACCESS TO RURAL PROPERTIES

NOT TO SCALE	APPROVED		GD NO.	ISSUE
	M-SSE	07/2020	GD4010	A

VicRoads Drawing No. 720453