CEO ATTACHMENT BOOKLET FOR

ORDINARY COUNCIL MEETING

21 August 2024 at 5:00pm

INDEX

11. CHIEF EXECUTIVE OFFICER

Provided under separate confidential cover as per s.5.23(2)(e)(ii)(iii):

FORM OF APPLICATION FOR PLANNING APPROVAL

(PLEASE COMPLETE ALL BOXES)

OWNER DETAILS:

Name(s): Perpetual Corporate Trust Limited as Trustee for the Altora Ag Land Trust

Postal Address: Level 17, 20 Bond Street, Sydney NSW Postcode: 2000

Contact Person: Troy Bungey Phone: 0429 103 077

Email: troy.bungey@altoraag.com.au

Signature: DocuSigned by: Giuseppe Marco Capizzi Manager Date: 06 August 2024 | 10:44 AM AEST

Signature: DocuSigned by: Khouloud Malla Manager Date:

Executed by attorney 8470C311C2F84DA... Power of Attorney dated 16th September 2014

NOTE: The signatures of ALL the owner(s) is required to process this application.

APPLICANT DETAILS: (if different from owner)

Name: Mineral Resources Limited

Postal Address: 20 Walters Drive, Osborne Park WA Postcode: 6017

Contact Person: Rana Murad Harris

Phone: 0427 959 860 Email: rana.muradharris@mrl.com.au

Signature: Date: 30 July 2024

PROPERTY DETAILS:

Lot/Location No: Lot M433 House/Street No: _____

Street Name: Mooriary Road Locality/Suburb: Mooriary

Diagram/Plan No: DP 002984 _____ Volume No: 1122 Folio No: 362

EXISTING DEVELOPMENT/LAND USE:

Nature of any Existing Development/Land Use: Cropped Agricultural Farmland _____

_____

PROPOSED DEVELOPMENT/LAND USE:

Description of Proposed Development/Land Use:

Amendment to Determination of Application for Planning Consent 2024/003 by replacing Condition 3 with the following condition:

3. The applicant shall undertake a dilapidation study of the initial section of Mooriary Road (south from Midlands Road) for a distance of 7 km as soon as reasonably possible, and the applicant must maintain this section of road to at least the condition stated in the dilapidation study for the duration of occupation of the main workforce drilling camp site.

Approximate Cost: N/A

Estimated Time of Completion: N/A

REQUIRED INFORMATION & FEES:

Please refer over for the information required to be submitted with this application and the schedule of fees. This application will not be processed without all required information including payment of the appropriate fee.

OFFICE USE ONLY:

Date Received: _____ Application No: _____

Accepting Officer's Initials: _____ File Number: _____

Required Fee: $_____ Date Paid: _____

Energy Resources Limited ARBN 009 475 423 is a wholly owned subsidiary of Mineral Resources Limited ABN 33 118 549 910

20 Walters Dr, Osborne Park, WA 6017
Locked Bag 13, Osborne Park, WA 6017
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31 July 2024

Mr. Matt Fanning
CEO Shire of Mingenew
21 Victoria Street
PO Box 120
Mingenew WA 6522

Your ref: LP.APP / A603 / OPA247152

By email to: **ceo@mingenew.wa.gov.au**

RE: TEMPORARY DRILL CAMP (MOORIARY DEEP 1) - LOT M451 (P2982) MOORIARY ROAD, MOORIARY TEMPORARY DRILL CAMP (LOCKYER 6) - LOT M433 (P2984) MOORIARY ROAD, MOORIARY TEMPORARY DRILL CAMP (NORTH ERREGULLA 3) - LOT M433 (P2984) MOORIARY ROAD, MOORIARY MAIN CAMP (MREX) - LOT M433 (P2984) MOORIARY ROAD, MOORIARY

Dear Matt,

I refer to your letter of 24 July 2024 to Izzy Sulaiman on behalf of Mineral Resources Limited (**MinRes**) advising that the above referenced applications were approved by the Shire of Mingenew at the meeting of the Council on 17 July 2024 as per the Determination on Application for Planning Consent 2024/003 (the **Approval**).

As previously discussed with our Dan Barker, MinRes takes significant issue with condition 3 to the Approval (**SC3**), which mandates the sealing of a 7-kilometre section of Mooriary Road. The camp is a temporary facility designed to support a short-term exploration program. The imposition of a permanent road upgrade for such a temporary operation is disproportionate and unreasonable.

As detailed in the attached memo from Thompson Geer dated 30 July 2024, SC3 is likely to be overturned by the State Administrative Tribunal (**SAT**) should MinRes pursue a review. However, given the critical timelines of our exploration program, we cannot afford the delay associated with the tribunal process.

To expedite a resolution, MinRes has prepared an application to amend the Condition of Planning Consent (**Application**), which is attached and signed by the landowner. The Application proposes removing the requirement to seal Mooriary Road, as such a condition is typically associated with long-term developments.

The road upgrade is estimated to cost up to $1,500,000 and delay the commencement of operations by up to six months, depending on the standard of road specified by the Shire of Mingenew. To mitigate potential access issues during the exploration phase, MinRes is prepared to continue implementing temporary road improvements, such as gravel sheeting or additional maintenance, as required.

To ensure minimal disruption to our operations, we respectfully request that the Shire:

(i) waives the requirement to advertise the Application and proceed directly to consideration by Council; and
(ii) schedule the earliest possible Special Council Meeting to consider the Application, pursuant to section 5.4 of the Local Government Act 1995 (WA).

We would appreciate the opportunity to discuss this matter further and believe a cooperative approach is in the best interests of all parties.

Yours sincerely,

Darren Hardy
Chief Executive Energy
Mineral Resources Limited

Copies to:

Mr. Troy Bungey
General Manager – West
Altora Ag Pty Ltd
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Sydney NSW 2000

By email to: **troy.bungey@altoraag.com.au**

Mr. Gary Cosgrove
Shire President
PO Box 120
Mingenew WA 6522

By email to: **crcosgrove@mingenew.wa.gov.au**

Ms. Hellene McTaggart
Deputy Shire President
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By email to: **crmctaggart@mingenew.wa.gov.au**

Thomson Geer
Lawyers

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152-158 St Georges Terrace
Perth WA 6000 Australia

PO Box Z5025, St Georges Terrace
Perth WA 6831

T +61 8 9404 9100
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Our ref JS:5049176

30 July 2024

Electronic

Justin Kennedy
Manager Legal - Energy & Iron Ore
Mineral Resources
20 Walters Drive
Osborne Park WA 6017

Dear Justin

Condition 3 - Shire of Mingenew Development Approval for Temporary Workers' Accommodation Camps

Thank you for your instructions regarding the development approval granted by the Shire of Mingenew (**Shire**) subject to condition 3, as set out below.

In short, we believe that Mineral Resources would likely be successful in the State Administrative Tribunal (**Tribunal**) for the review of condition 3 for the following reasons.

Background

1. Mineral Resources intends to construct a number of temporary workers' accommodation camps (**camps**), which are connected via a portion of Mooriary Road (**Road**). The Shire has issued development approval 2024/003, which includes a number of conditions. In particular, condition 3 provides as follows (**C3**):

   3. The applicant must seal the initial section of Mooriary Road (south from Midlands Road) for a distance of 7km to the approval of the local government to ensure that all weather access is available from commencement of occupation.

2. C3 does not specify the standard to which the Road is to be "sealed", other than that this is to be to the approval of the Shire, and that it is intended to ensure "all weather access'" is available to the temporary worker's camps. For the purposes of this advice, however, we have assumed the Shire may require that the section of the Road be sealed with a bitumen finish and to a commensurate standard. If a lesser standard of works is approved by the Shire, such as sealing with a layer of compacted gravel, our advice may be different.

3. For a condition to be valid, it must be:

   (a) for a planning purpose and not for any ulterior purpose;

   (b) fairly and reasonably relate to the approved development; and

   (c) not be so unreasonable that no reasonable planning authority could have imposed such a condition.[1]

[1] *WAPC v Temwood Holdings Pty Ltd* (2004) 221 CLR 30.

4. In particular, as an aspect of the second of these criteria, a condition must have a real connection or nexus between the approved development and the matters required by a condition.[2] This must be established as a matter of fact, between the purpose for which the condition is imposed, and the likely consequence of the approved development which is intended to be addressed by the condition.[3]

Planning purpose

5. On its face, the purpose underlying C3 is to improve the condition or standard of the relevant section of the Road and specifically to ensure all-weather access to the proposed temporary workers' camps.

6. It is arguable that this is a planning purpose sufficient to satisfy the first of the criteria for the validity of a condition of development approval, as opposed to C3 being imposed for an ulterior or improper purpose, unrelated to planning.

Fair and reasonable connection

7. For a number of reasons, in our view C3 (particularly if the Shire requires that the section of Road be sealed with a bitumen finish) is very unlikely to satisfy the second of the criteria for the validity of a condition of development approval, in that it does not fairly and reasonably relate to the approved development. Some of the reasons for this are set out below, in no particular order:

   (a) the Road is not currently sealed with bitumen, and we understand has never been;

   (b) no upgrade of the Road is specified in the Shire's 2024/25 Capital Works Program;

   (c) the Road has not been listed as requiring any upgrade works in the last two annual budgets published by the Shire;

   (d) we are instructed that the costs associated with sealing the Road with bitumen will be substantial, and out of proportion to the costs associated with the approved development, as referred to in the applications for development approval;

   (e) we understand that the Road is not currently in a state of disrepair, and that Mineral Resources is in fact currently engaged in works to ensure that the Road remains in at least the same, if not better, condition than it has previously been – including renewing sections of the Road to avoid 'blow-outs', by the provision of a compacted layer of gravel that is 150mm thick and 8 meters wide;

   (f) any additional vehicle traffic generated by the approved development will be limited, both in numbers of vehicles and duration, given the small size and temporary nature of the approved workers' camps; and

   (g) the nature and timing of the approved development is unlikely to require all-weather access, and if it does then we are instructed there are alternatives to provide such access that do not require the sealing of the Road with bitumen (including, for example, the works referred to in paragraph (e) above).

8. In addition we note that in the report to Council recommending the imposition of C3, part of the justification for C3 is a statement that "*... the applicant would use Mooriary Road on a permanent basis, in addition to during the temporary workforce accommodation camp period, when they install and service their permanent gas wells...*". This statement explicitly links the works required by C3 with a development that is not the development the subject of the application, or as approved.

9. In summary, for the reasons set out above, and particularly given that sealing of the Road with a bitumen seal is a long-term or permanent measure, yet the approved camps are of a temporary

[2] *Hoey and Shire of Serpentine Jarrahdale* [2009] WASAT 155; *Empire Securities Pty Ltd and Western Australian Planning Commission* [2005] WASAT 98
[3] *Reid v Western Australian Planning Commission* [2016] WASCA 181.

nature and small in scale, it is likely that the Tribunal would set aside the condition on the basis that there does not exist a fair and reasonable connection between the condition and the use of the Road to access the approved camps.

Unreasonable

10. For reasons closely related to those referred to above in relation to the second criteria, in our view the Tribunal would also be very likely to find, either in addition or alternatively, that C3 is unreasonable having regard to the nature of the approved development.

11. Particular indicators of unreasonableness, if the Shire was to require the sealing of the Road with bitumen, includer the following:

    (a) the Road is not currently, and has not historically, been provided by the Shire to that standard;

    (b) additional vehicle traffic associated with the approved development does not give rise to any need for the Road to be provided to that standard;

    (c) the scale and costs of works required for C3 will be disproportionate to the scale and value of the approved development; and

    (d) there are alternative works, such as those currently being carried out by Mineral Resources, which result in the Road providing for appropriate and acceptable access to the approved development.

Please contact me if you have any queries regarding the above.

Yours sincerely

Julius Skinner
Partner
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M +61 402 836 551
E jskinner@tglaw.com.au

Traffic Impact Assessment

Project:	Lockier Project Traffic Impact Assessment
Client:	Mineral Resources
Author:	N. Baby / J. Bridge
Date:	12th August 2024
Doc No:	2309009-TIA-004
Revision:	C

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Document Status: For Client Review

Revision	Prepared By	Reviewed By	Approved By	Issue	Date
A	J. Bridge / N.Baby	J. Bridge	J. Bridge	Issued for Review	11.07.24
B	N. Baby	J. Bridge	J. Bridge	Issued for Review	17.07.24
C	J. Bridge	-	J. Bridge	Issued for Review	12.08.24

Disclaimer

File Reference: \\shawmacserver\NewData\Jobs Active 2023\CE -Roads & Drainage\MRL_Lockier Project TIA_2309009\3. Documents\3.6 TIA\TIA-004\2309009-TIA-004_C.docx

Contents

Figures

Tables

1. Introduction

1.1. Background

Mineral Resources (MRL) are currently progressing studies for their proposed Lockier Project.

As part of the study is the assessment of the traffic impact of their proposed construction and operation phases of the project.

Site access is currently proposed on Strawberry North East Road.

It is currently proposed for deliveries/loadout operational traffic to be distributed to/from the north with light vehicles to the south. Construction traffic is to all be distributed to/from the south.

Figure 1 shows the site access location.

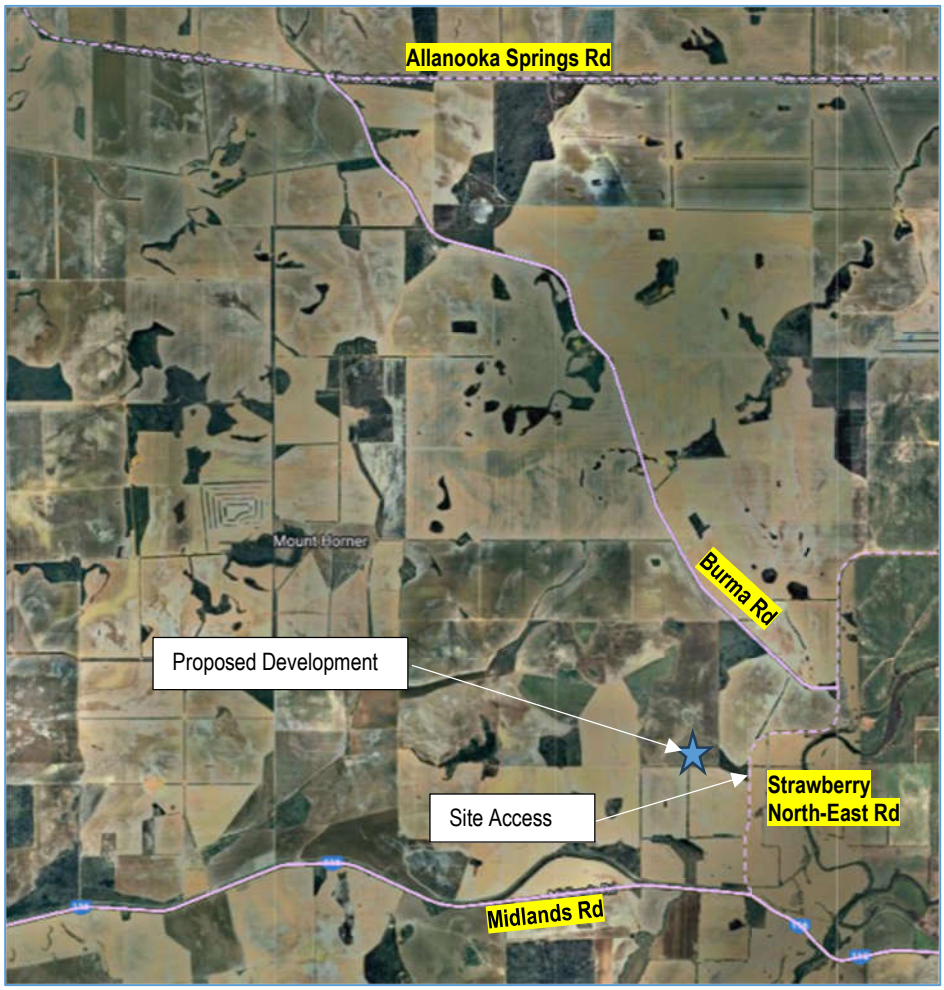


Figure 1: Site Location

1.2. Purpose

Shawmac has been engaged by MRL to prepare a Transport Impact Assessment (TIA) to assess the proposed site access, Burma Road/Allanooka Springs Road and Midlands Road intersection.

The TIA will be prepared generally in accordance with the Western Australian Planning Commission's (WAPC) Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016) and specifically includes:

- Document the detail of the proposed expansion works.
- Document the existing situation including road network, traffic volumes (MRL and background), crash history, RAV network etc.
- Confirm future traffic generation and trip distribution based on MRL proposed traffic.
- Assess the suitability of each option in terms of:
    - Conformance to RAV network requirements
    - Intersection configuration/warrants (i.e., whether there is a need for turn pockets)
    - Sight distance
    - Vehicle swept paths.
    - Acceleration lane warrants
    - Site specific issues
- Conclusions and Recommendations.

2. Existing Situation

2.1. Road Network

The layout and hierarchy of the existing road network according to the Main Roads WA Road Information Mapping System is shown in **Figure 2**.

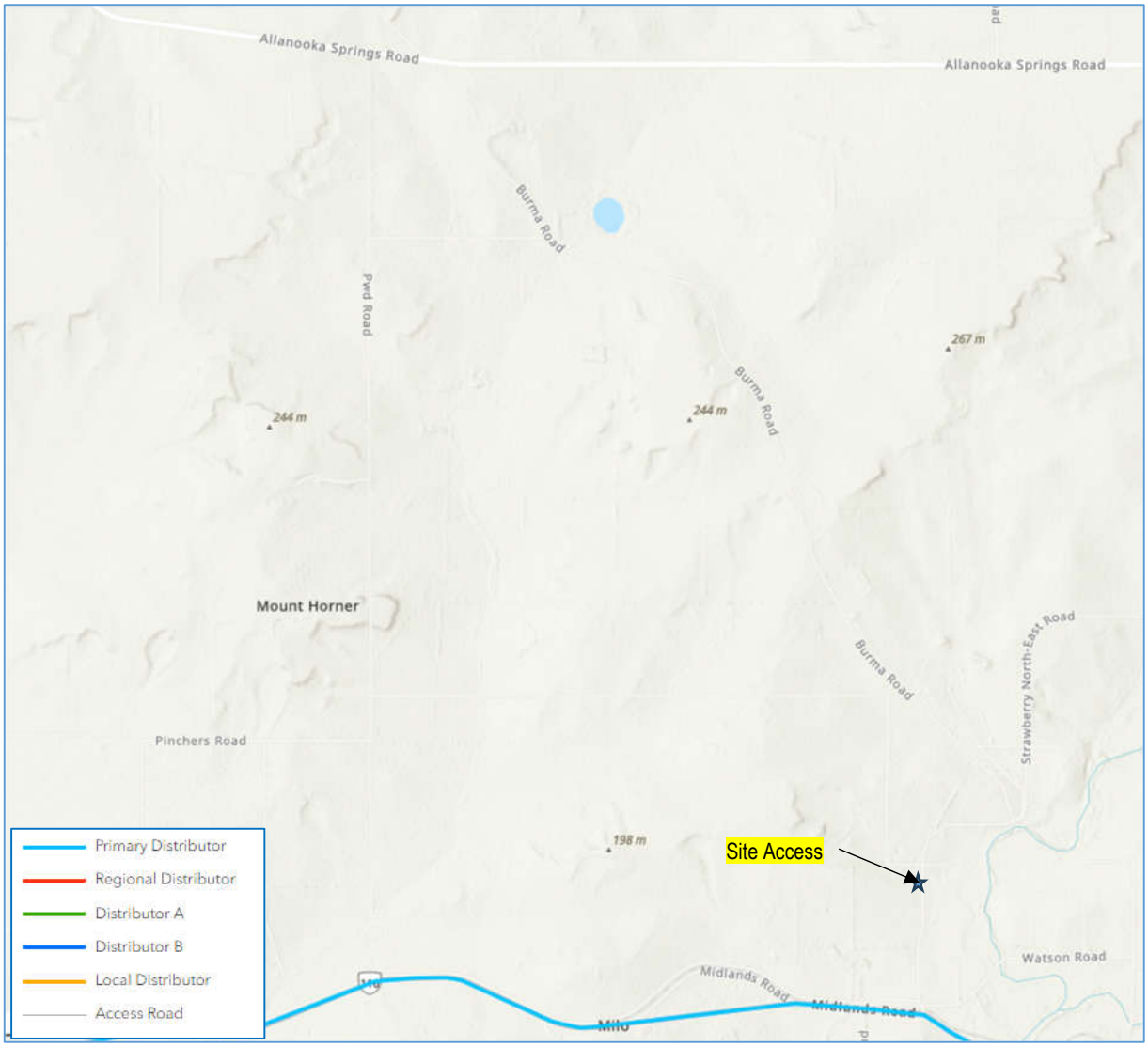


Figure 2: Adjacent Road Network

2.2. Carriageway Width and Cross Section

The carriageway and configuration of relevant roads are summarised in **Table 1**.

Table 1: Road Configuration

Road and Location	Road Type	Cross Section	Carriageway Width (Approx.)	Sealed Pavement Width (Approx.)
Strawberry North-East Road (between site Access and Burma Road Intersection)	Access Road	Two-lane single carriageway	10m	NA
Burma Road	Access Road	Two-lane single carriageway	10m	NA
Midlands Road	Primary Distributor	Two-lane single carriageway	9.0m	7.0m

2.3. Traffic Volumes

The proposed site access is at SLK 2.03 (approx.) of Strawberry North-East Road.

The Shire of Mingenew provided traffic counts for Strawberry North-East Road (between 2018 to 2022), Burma Road (2018) and Allanooka Springs Road (between 2018 to 2022).

The Strawberry North East Road and Midlands Road intersection is at SLK 236.43 of Midlands Road. According to MRWA Traffic map, the nearest traffic count data for Midlands Road is at the 2022/23 count site East of Tabletop Rd (SLK 251.00). Data from the Network Performance Site (NPS) traffic count at SLK 223.06 on Midlands Road, shows an average 6% growth from 20/21 period to 23/24 period. Monday to Friday traffic volumes have been adopted for conservatism as the volumes were greater than the Monday to Sunday traffic volumes. In addition, and as requested by the Shire of Mingenew, an additional 56 RAV7 movements each way per day for the Iron Ore Haulage project has been included.

As the project mine design life is 15 years, a 10-year growth scenario (2033/34) has been allowed for in accordance with WAPC Transport Impact Assessment Guidelines for Developments. For Midlands Road, a 2% annual compound growth has been adopted for conservatism to estimate the 2023/24 traffic volumes as well as the future 10-year traffic volumes (2033/34). For Strawberry North-East Road, Burma Road and Allanooka Springs Road, only a 1% growth has been assumed due to the lower traffic and connectivity.

A summary of this information is provided in **Table 2** and **Table 3**. Detailed traffic count data is attached in **Appendix A – Traffic**. It is noted that due to rounding up of traffic count estimates, some of the peak hour estimates do not change.

Table 2: Daily Traffic Volumes

Road	Location	Existing Estimated Daily Volume (2024/25)		2034/35 Daily Volume		% HV	Data Source
		EB/NB	WB/SB	EB/NB	WB/SB		
Strawberry NE Road	SLK 0.5-1.0	5	7	8	8	35%	Shire of Mingenew
Burma Road	SLK 1.0	5	5	6	6	25%	Shire of Mingenew
Allanooka Springs Road	NA	185	185	205	205	25%	Shire of Mingenew
Midlands Road	SLK 251.00	305 +56 = 361	363 + 56 = 419	372 +56 = 428	443 +56 = 499	41.5%	MRWA 22/23 Shire of Mingenew

Table 3: Peak Hour Traffic Volumes

Road	Location	Existing Estimated Peak Volume (2023/24)				2033/34 Estimated Peak Volume			
		EB/NB		WB/SB		EB/NB		WB/SB	
		AM	PM	AM	PM	AM	PM	AM	PM
Strawberry NE Road	SLK 0.5-1.0	1	1	1	1	1	1	1	1
Burma Road	SLK 1.0	1	1	1	1	1	1	1	1
Allanooka Springs Road	0-33.2	19	19	19	19	21	21	21	21
Midlands Road	SLK 251.00	47	30	37	49	56	36	43	58

2.4. RAV Status

As per MRWA HVS network mapping tool:

- Strawberry North-East Road is categorised under Tandem Drive RAV 7.1 network and Tri Drive 1.1 with the following conditions:
    - All operators must carry written support from the road manager acknowledging the operator's use of the road.
    - No operation on unsealed road segment when visibly wet, without road owner's approval.
    - Maximum speed 80 km/h.
- Burma Road is categorised under Tandem Drive RAV 7.1 network and Tri Drive 1.1 without conditions.
- Allanooka Springs Road is categorised under Tandem Drive RAV 7.1 network and Tri Drive 1.1 with the following conditions:

- Maximum speed 80 km/h.

- Midlands Road is categorised under Tandem Drive RAV 7.3 network and Tri Drive 4.1 network with the following conditions:
  - Maximum speed 80 km/h (condition for Tri Drive only / no condition for Tandem Drive)

Figure 3 shows the Tandem Drive and **Figure 4** shows the Tri Drive network for the road network in the local vicinity.

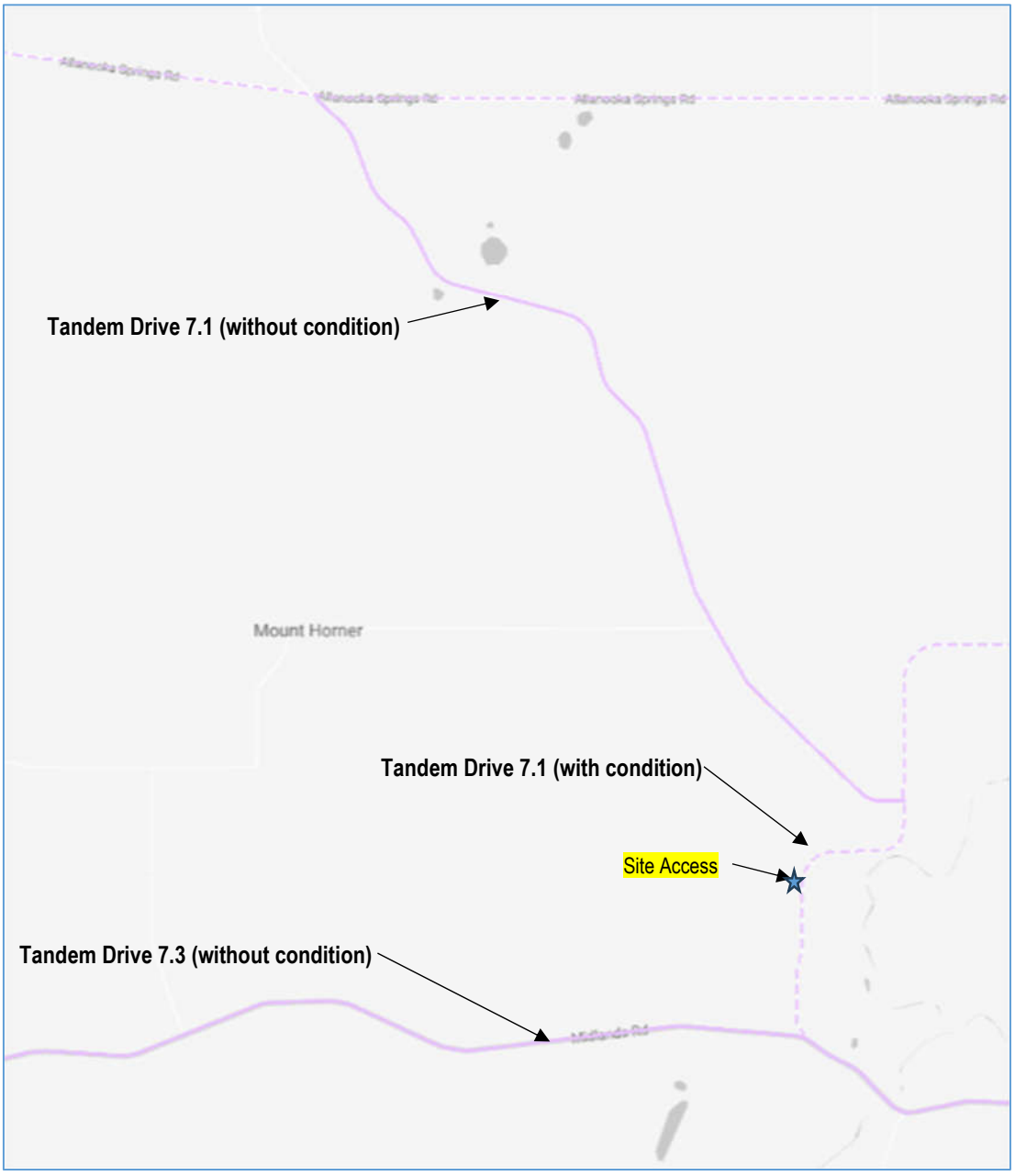


Figure 3: Tandem Drive 7 Network

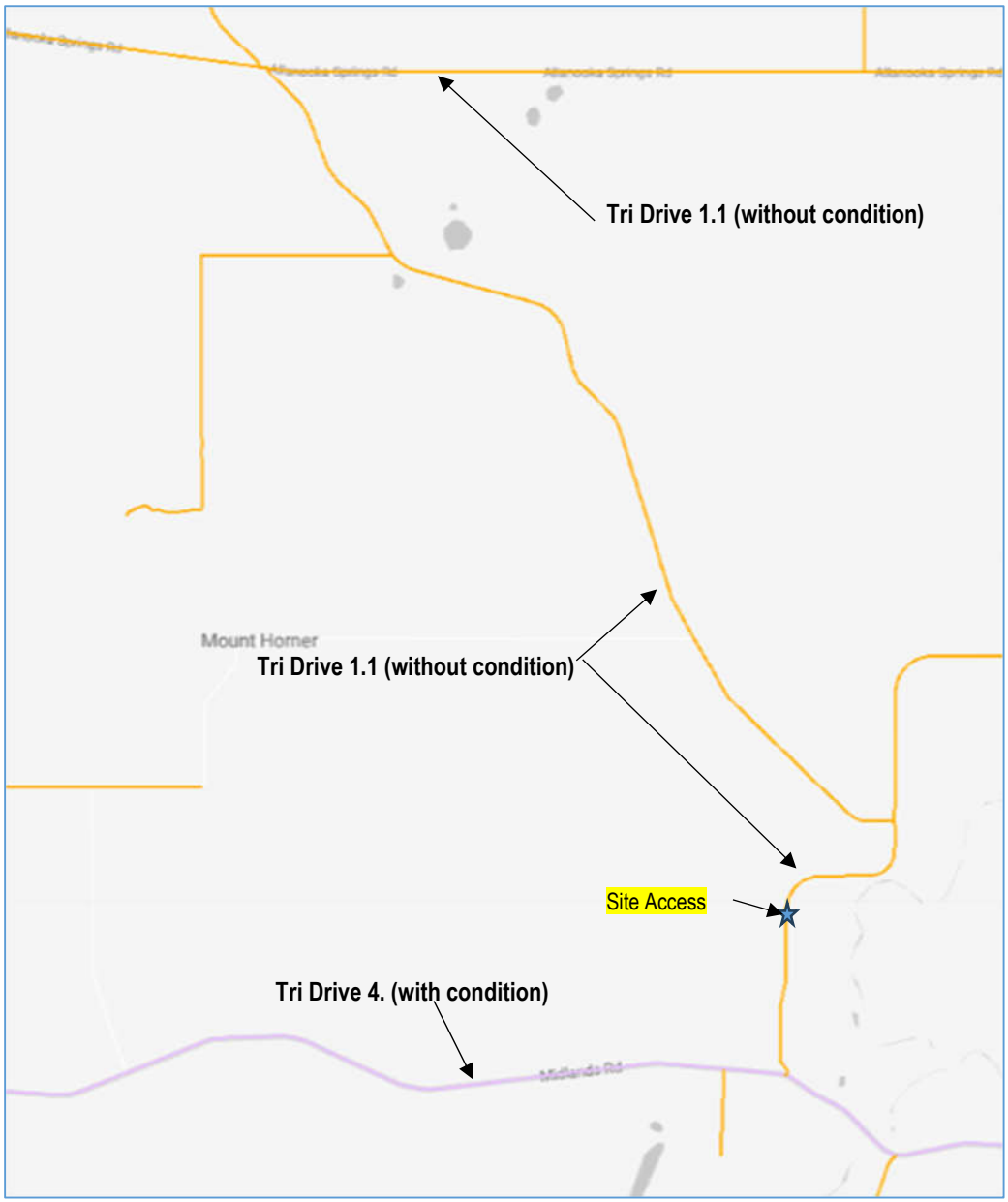


Figure 4: Tri Drive Network

2.5. Speed Limit

The speed limit of the adjacent road network is shown below in **Figure 5.**

As per MRWA HVS network mapping tool, RAV vehicles along Allanooka Springs Road and Strawberry North-East Road are restricted to 80km/hr.

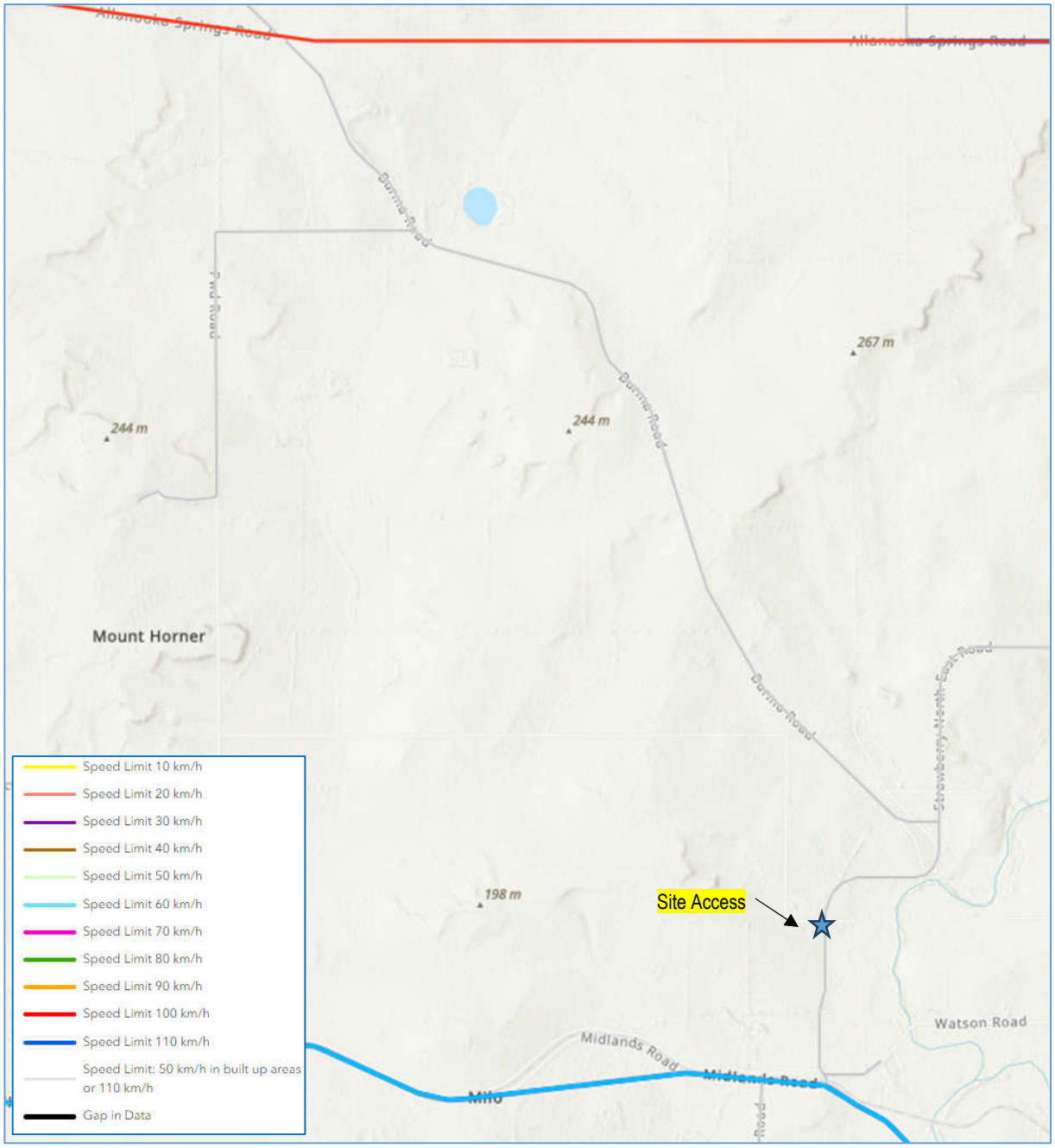


Figure 5: Speed Zoning

2.6. Crash History

Crash data in the vicinity of the assessment area was sourced from MRWA Crash Analysis Reporting System (CARS) for the 5-year period ending 31/12/2023.

There were no crashes reported.

2.7. Changes to Surrounding Transport Networks

There are no known changes to the adjacent road network that have potential to affect this assessment.

3. Transport Logistics

3.1. Proposed Development and Traffic Generation

Table 4 and **Table 5** show the traffic generation during construction and operations phase, as provided by MRL, respectively.

Table 4:Construction Phase Traffic Generation

Item	Daily HVs	Daily LVs
Bulk Earthworks	5 nos. In and out	12 nos. In and out
Pipeline construction	15 nos. In and out	10 nos. In and out

Table 5:Operations Phase Traffic Generation

Item	Daily HVs	Daily LVs
Condensate Loadout and Deliveries	3 nos. In and out	NA
Chemical Top Up	0.04 nos. (1no In and out per month)	NA
Personnel access to CCR/Admin Building	NA	10 nos. In and out

3.2. Operating Hours

Loadout and deliveries operations will occur 12 hrs a day. There is no defined peak period for the loadout and delivery activity and the movements are expected to be evenly distributed throughout the operating hours.

3.3. Proposed Design Vehicle

It is proposed to use maximum RAV 7.1/TD 1.1 trucks up to 36.5m long for construction heavy vehicles. It is proposed to use RAV 2 B-Double up to 27.5m for deliveries/loadout during the operational phase. Refer **Figure 6** for typical configurations of proposed design vehicles.

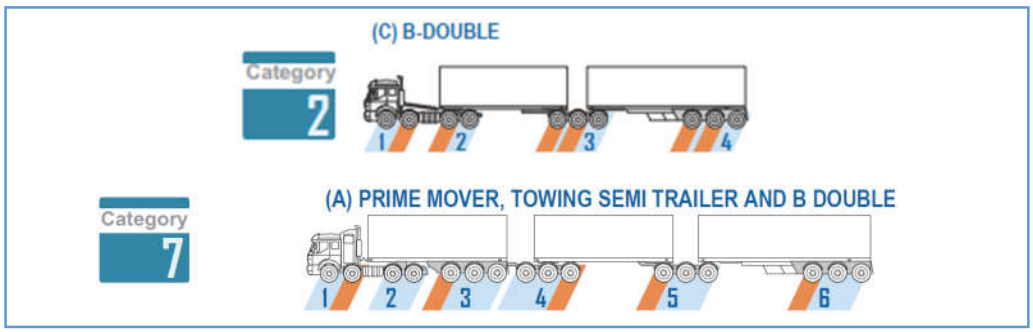


Figure 6: Typical Tandem Drive RAV 2 & 7 Trucks

3.4. Proposed Route and Truck Movements

3.4.1. Construction Phase

During the construction phase, construction traffic is to be distributed to/from the south.

As per traffic data provided by MRL, 80% of traffic comes to/from West and 20% comes from east. Also, MRL has advised that majority of LV and bus traffic would occur during shift change where most vehicles would be entering during 5-7am and exiting during 5-7pm.

For the purposes of assessing the peak period impacts, the following assumptions have been made:

- Truck deliveries occur over a 12-hour period, and 10% of all daily truck volumes are received within a peak hour.

Figure 7 and **Figure 8** shows the daily and peak hour traffic volumes during construction as provided by MRL.

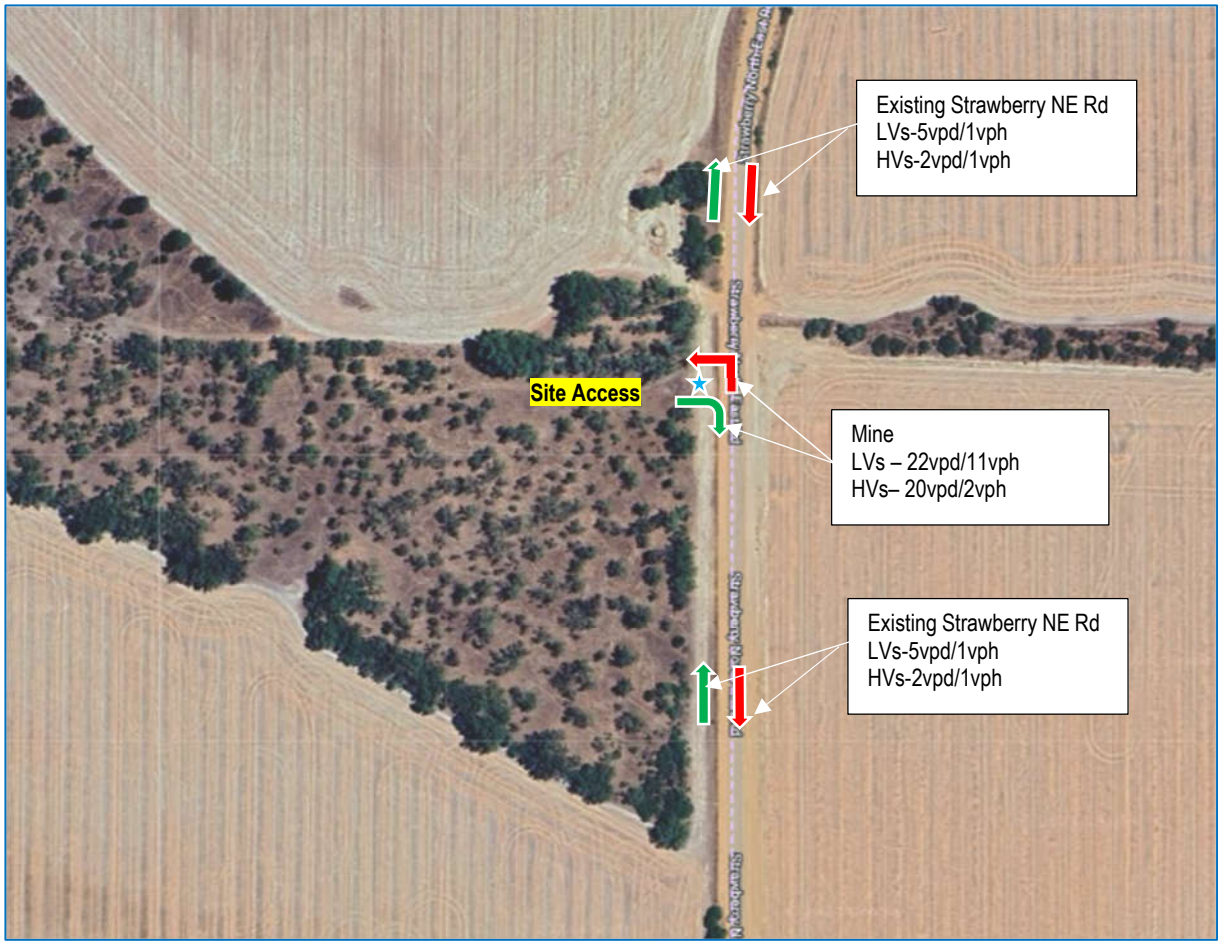


Figure 7:Traffic Distribution AADT/AM Peak Hour Volumes-Construction Phase

Figure 8:Traffic Distribution AADT/AM Peak Hour Volumes-Construction Phase

3.4.2. Operational Phase

As per the traffic data provided by MRL, all HVs will be distributed to/from North, then to Geraldton. All LVs will be distributed to/from the south towards Midlands Road, with 80% heading west to Irwin and 20% heading east to Mingenew. MRL has advised that majority of LV and bus traffic would occur during shift change where most vehicles would be entering during 5-7am and exiting during 5-7pm.

For the purposes of assessing the peak period impacts, the following assumptions have been made:

- Truck deliveries occur over a 12-hour period, and 10% of all daily truck volumes are received within a peak hour.
- Chemicals top up traffic is not included in the assessment as it is only 1 per month.

Figure 9 to **Figure 12** shows the daily and peak hour traffic volumes during operations phase for the north and south route as provided by MRL.

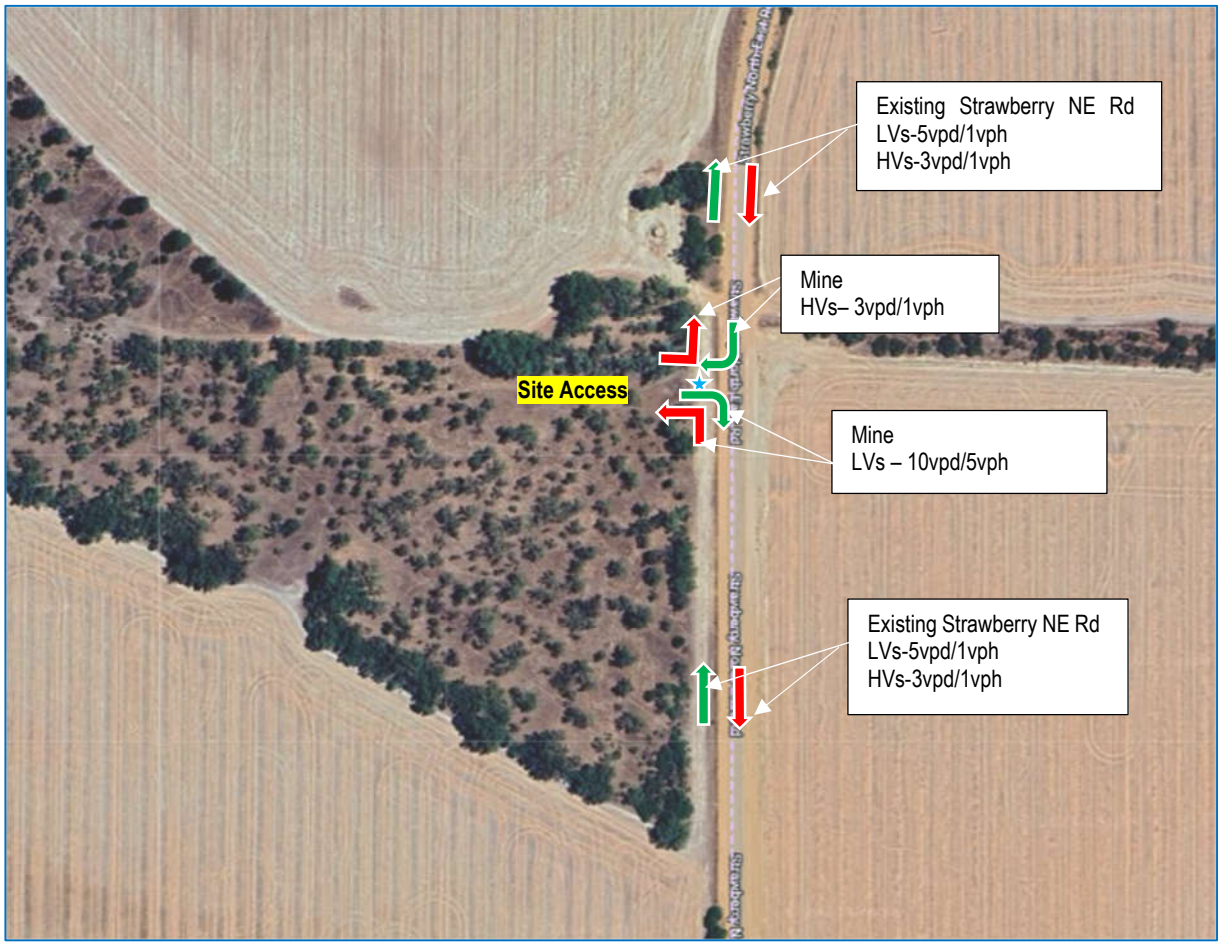


Figure 9: Traffic Distribution AADT/ Peak Hour (2034) Volumes-Operations Phase

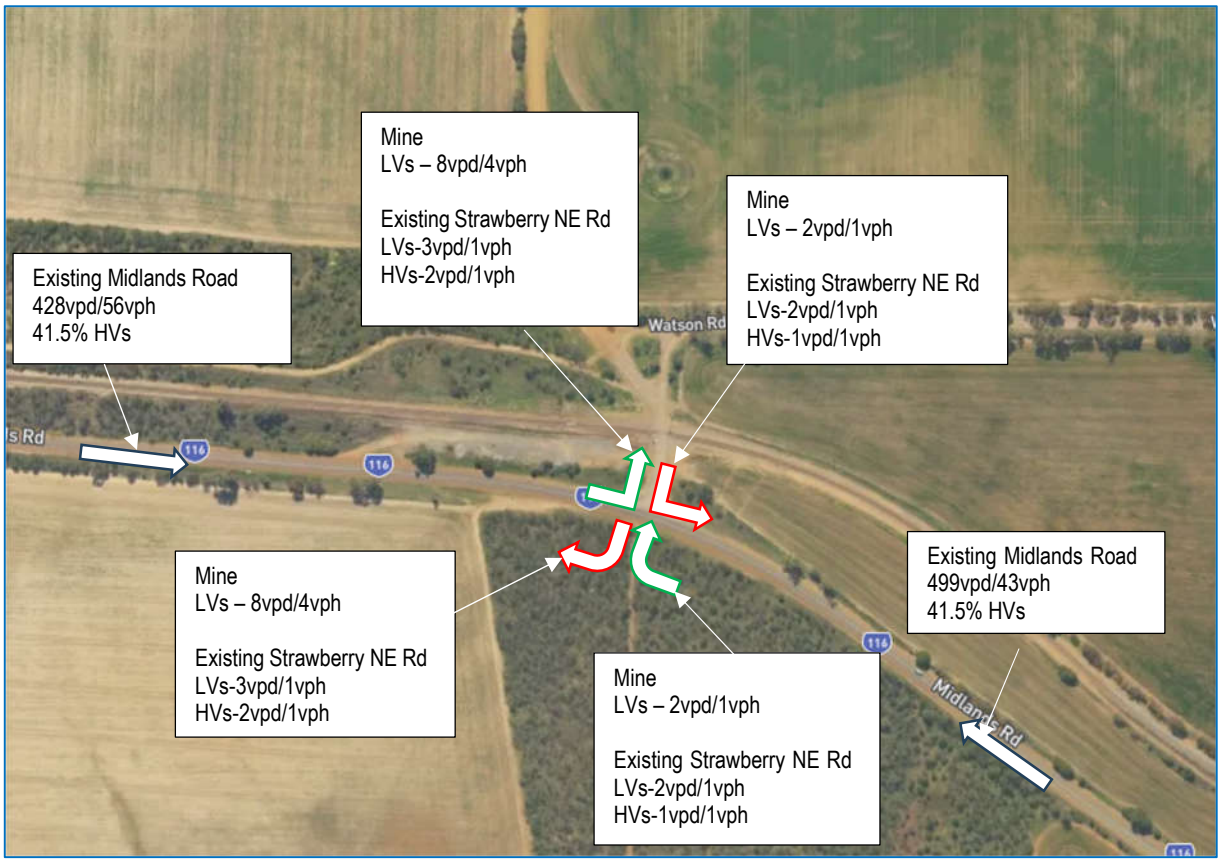


Figure 10: Traffic Distribution AADT/ Peak Hour (2034) Volumes-Operations Phase Midlands Intersection

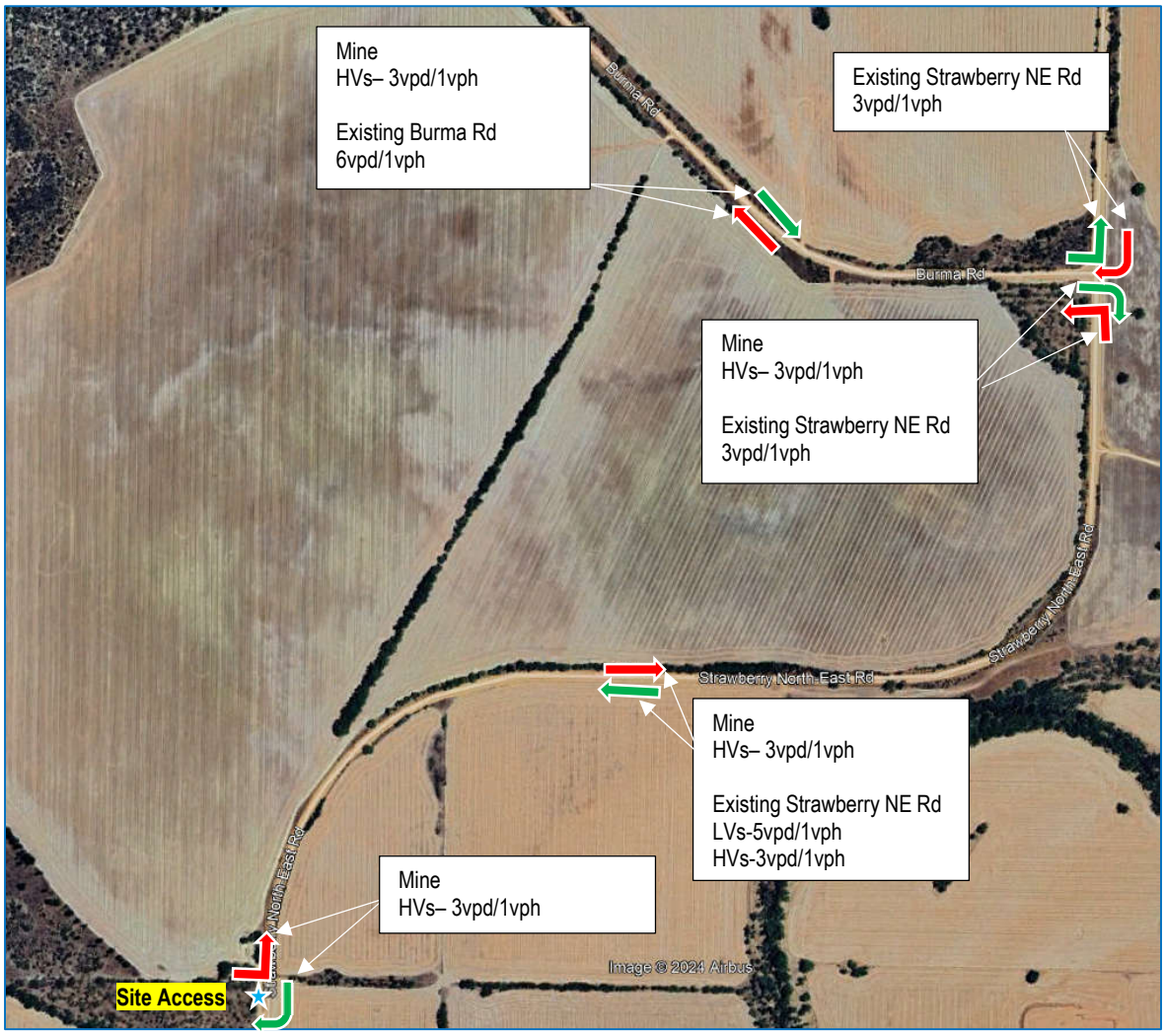


Figure 11:Traffic Distribution AADT/ Peak Hour (2034) Volumes-Operations Phase Burma Road Intersection

Figure 12 : Traffic Distribution AADT/ Peak Hour (2034) Volumes-Operations Phase Allanooka Springs Road Intersection

4. Traffic Impact Assessment

4.1. Assessment Years

The development is assessed based on current network condition (2024) and 10-year scenario (2034) in accordance with WAPC Transport Impact Assessment Guidelines for Developments.

4.2. Impact on Roads

4.2.1. Road Minimum Widths

The sealed and carriageway widths of adjacent roads were checked against the rural road minimum widths in accordance with Appendix A of the MRWA RAV assessment guideline. The comparison is shown below in **Table 6**.

Table 6: Rural Road Minimum Width

Road	Background / Proposed AADT 2024	Background / Proposed AADT 2034	Speed (RAV) (km/hr)	RAV Status	Existing / Required Min Seal Width (m)	Existing / Required Min Carriageway Width (m)
Strawberry NE Road North of Site Access	14/14	16/22	80*	RAV 7.1	NA	10 / 8.0
Strawberry NE Road South of Site Access	14/98	16/36	80*	RAV 7.1	NA	10 / 8.0
Burma Road	28/28	32/38	110	RAV 7.1	NA	10 / 8.0
Midlands Road	668/ 752	814/ 834	100	RAV 7.3	7.0 / 6.5	9.0 / 8.3

* As per the MRWA HVS network mapping tool, RAV vehicles approaching Midlands Road from Strawberry NE Road are restricted to 80km/hr.

As shown above, the existing road widths comply with the minimum requirements.

As per MRWA RAV Guidelines, a road should be sealed if the AADT is over 150. Therefore, Strawberry NE Road and Burma Road can remain unsealed as AADT is less than 150.

4.2.2. Road Safety

The crash history of the adjacent road network (as previously outlined in **Section 2.6**) does not suggest any particular safety issues in the existing road network.

4.3. Safe Intersection Sight Distance

4.3.1. Proposed Site Access

The Safe Intersection Sight Distance (SISD) is the minimum distance which should be provided on the major road at any intersection. SISD provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (e.g., in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point.

The SISD is assessed based on the following parameters:

- Design Speed:
  - 110km/hr light vehicles
  - 90km/hr heavy vehicles (Strawberry NE Road restricted to 80km/hr as per **Section 2.4**)
- An observation time of 3 seconds as per Austroads Part 3;
- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of SISD calculations are:
  - Light Vehicles:
    - Unsealed: 0.22 (110km/hr)
  - Heavy Vehicles (Road Train Type 1/ RAV 7 equivalent):
    - Unsealed: 0.17 (110km/hr)
    - Unsealed: 0.19 (90km/hr)
- Driver eye height is 2.4m for trucks and 1.1m for cars;
- Object height of 1.25m; and
- Sight distance offset 3-5m from edge of proposed holding line.

The measurement of the SISD is shown in **Figure 13** and **Figure 14.** The line-of-sight at the intersection location are shown in **Figure 16** to **Figure 18**.

The results are summarised in **Table 7.**

Table 7: SISD at Site Access

Direction	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration	Decision Time (s)	Longitudinal Grade*	Required SISD (m)	Available SISD (m)
Northbound	Trucks	90	0.19 (unsealed)	3.0+2.5	+6%	267	+400
	Cars	110	0.22 (unsealed)	3.0+2.5	+6%	338	+400
Southbound	Trucks	90	0.19 (unsealed)	3.0+2.5	-1%	318	544 / 208
	Cars	110	0.22 (unsealed)	3.0+2.5	-1%	395	544 / 208
Southbound	Trucks	70	0.20 (unsealed)	3.0+2.5	-1%	207	208
	Cars	70	0.26 (unsealed)	3.0+2.5	-1%	184	208

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on feature survey.

Figure 13: Sight Distance Measurement at Site Access – North

Figure 14: Sight Distance Measurement at Site Access – South

Figure 15: Strawberry NE Road / Site Access Intersection Looking South

Figure 16: Strawberry NE Road / Site Access Intersection Looking North

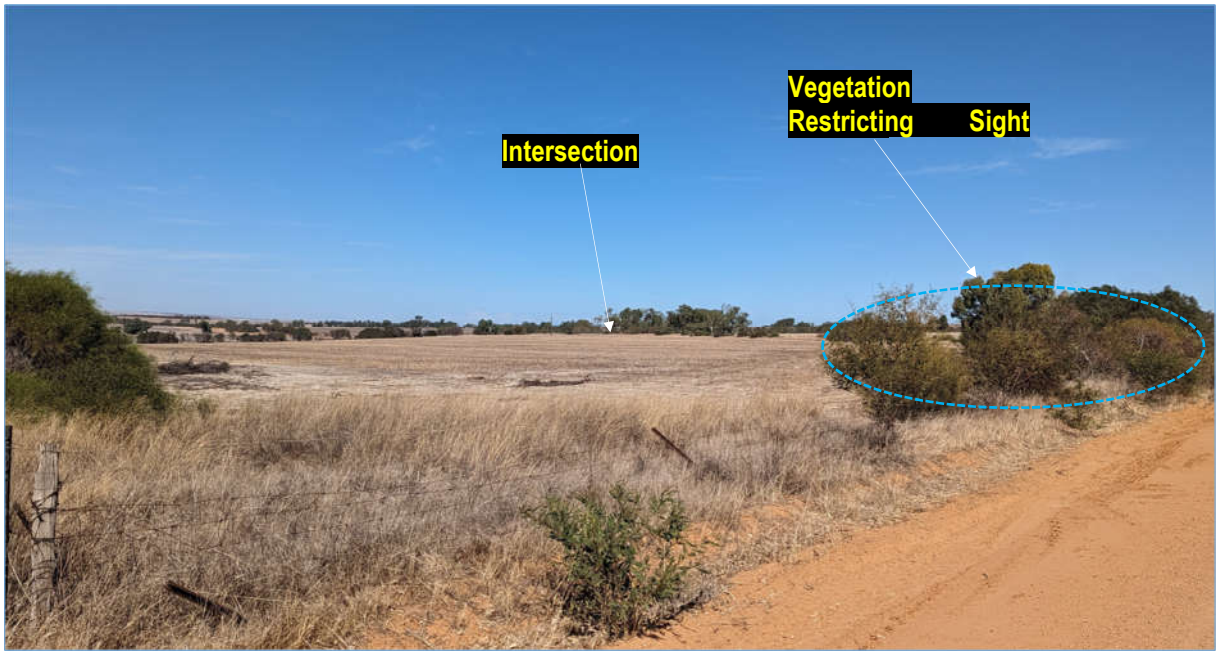


Figure 17: Strawberry NE Road Looking South to Site Access Intersection from 544m

Figure 18: Strawberry NE Road / New Intersection Looking South to Site Access Intersection from 208m

As shown, the SISD is sufficient to the south to achieve the minimum requirements in accordance with the Austroads Guide to Road Design Part 4A. However, it is noted that the southbound sight distance (north) is restricted due to existing vegetation on the inside of the existing curve. If sight visibility is required within the road reserve, then the available SISD is reduced to 208m due to the existing vegetation.

It is noted that the existing horizontal curve on the southbound approach has an approximate 430m radius. Based on a 4% or a 3% superelevation, and for an unsealed road, this radius would be adequate for an 80km/hr or 70km/hr design speed, respectively. As shown in the previous **Table 7**, the SISD is adequate for a 70m/hr design speed.

In addition, the minimum stopping sight distance (SSD) has also been checked for various speeds to confirm if a vehicle can safely stop if the SISD is restricted and a vehicle does pull out on Strawberry North East Road (refer **Table 8**).

Table 8: SSD at Site Access - Southbound

Location	Direction	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration	Reaction Time (s)	Longitudinal Grade (%)*	Required SISD (m)	Available SISD
Site Access / Strawberry NE Rd Intersection	Southbound	Trucks	90	0.19	2.5	-1	215	208
		Cars	110	0.22	2.5	-1	273	208
	Southbound	Trucks	80	0.19	2.5	-1	172	208
		Cars	100	0.23	2.5	-1	226	208
	Southbound	Trucks	70	0.20	2.5	-1	135	208
		Cars	90	0.24	2.5	-1	184	208

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on feature survey.

Based on the above, the following is recommended:

- Clearing/trimming/pruning of trees to improve sight distances.
- Install curve warning/chevron signage for the horizontal curve.

4.3.2. Strawberry North-East Road and Burma Road Intersection

Consistent with the parameters mentioned in **Section 4.3.1**, a comparison of available and required SISD in accordance with the Austroads Guide to Road Design Part 4A are summarised in **Table 9**.

Table 9: SISD at Strawberry North-East Road and Burma Road Intersection

Direction	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration	Decision Time (s)	Longitudinal Grade*	Required SISD (m)	Available SISD (m)
Northbound	Trucks	90	0.19 (unsealed)	3.0+2.5	+0.3%	306	390
	Cars	110	0.22 (unsealed)	3.0+2.5	+0.3%	382	390
Southbound	Trucks	90	0.19 (unsealed)	3.0+2.5	-2.4%	334	+420
	Cars	110	0.22 (unsealed)	3.0+2.5	-2.4%	411	+420

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on the google earth only.

As shown, the SISD is sufficient to achieve the minimum requirements in accordance with the Austroads Guide to Road Design Part 4A.

The measurement of the SISD are shown in **Figure 19** and **Figure 20**. The line-of-sight street view at the intersection location are shown in **Figure 21** and **Figure 22.**

Figure 19: SISD Measurement at Strawberry North-East Road and Burma Road Intersection - South Bound

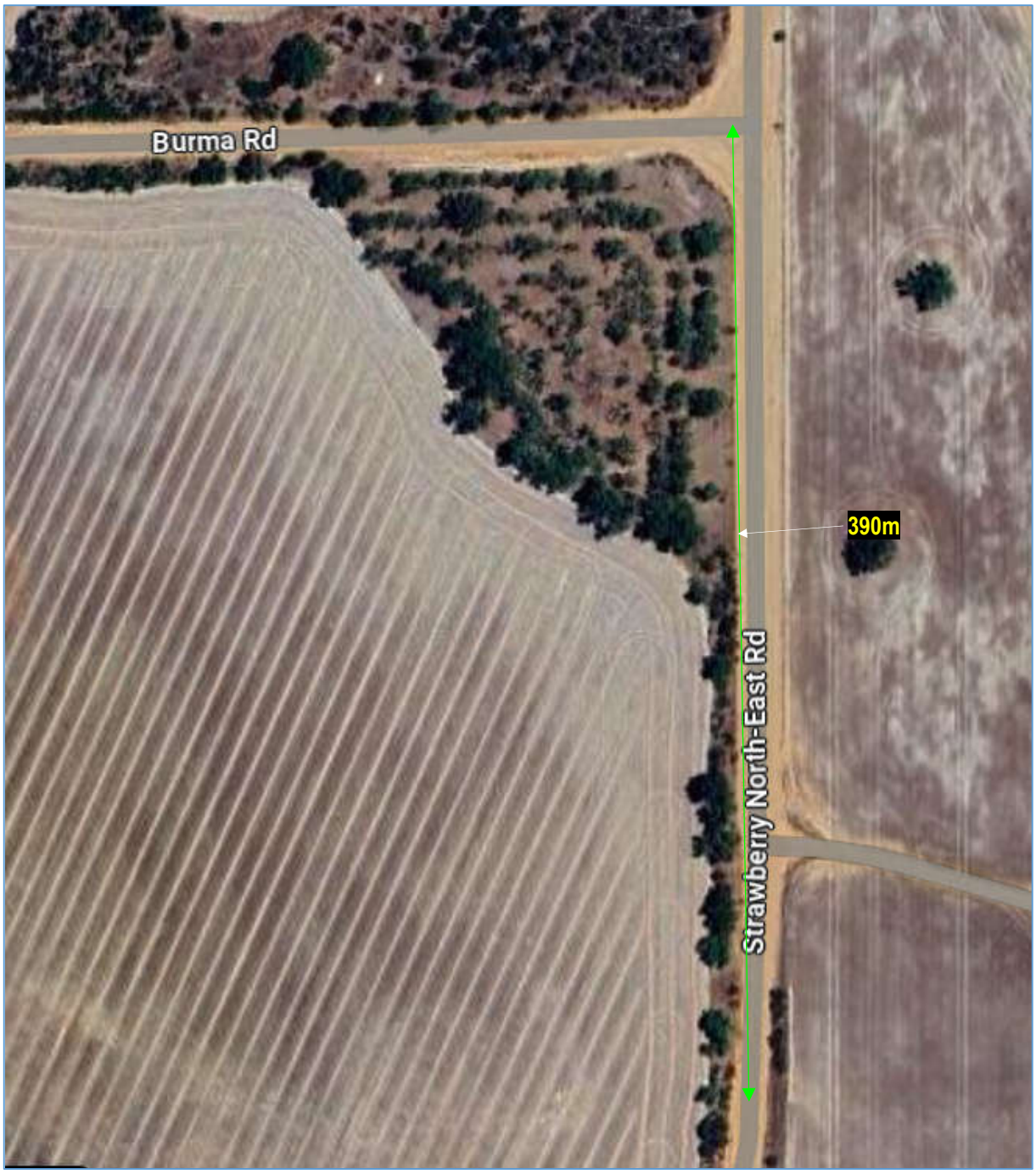


Figure 20: SISD Measurement at Strawberry North-East Road and Burma Road Intersection - North Bound

Figure 21:Strawberry North-East Road and Burma Road Intersection Looking North

Figure 22: Strawberry North-East Road and Burma Road Intersection Looking South

4.3.3. Allanooka Springs Road and Burma Road Intersection

The SISD is assessed based on the following parameters:

- Design Speed:
    - 110km/hr light vehicles
    - 90km/hr heavy vehicles (restricted to 80km/hr as per **Section 2.4**).
- An observation time of 3 seconds as per Austroads Part 3;
- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of SISD calculations are 0.36 for light vehicles and 0.28 for heavy vehicles (Road Train Type 1/ RAV 7 equivalent);
- Driver eye height is 2.4m for trucks and 1.1m for cars;
- Object height of 1.25m; and
- Sight distance offset 3-5m from edge of proposed holding line.

The measurement of the SISD is shown in **Figure 23.** The line-of-sight at the intersection location are shown in **Figure 24** and **Figure 25.**

The results are summarised in **Table 7**.

Table 10: SISD at Burma Road/Allanooka Springs Road Intersection

Direction	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration	Decision Time (s)	Longitudinal Grade*	Required SISD (m)	Available SISD (m)
Eastbound	Trucks	90	0.28	3.0+2.5	-1.5	258	+320
	Cars	110	0.36	3.0+2.5	-1.5	306	+320
Westbound	Trucks	90	0.28	3.0+2.5	-2.5	263	+320
	Cars	110	0.36	3.0+2.5	-2.5	310	+320

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on Google Earth only.

Figure 23:SISD Measurement at Burma Road/Allanooka Springs Road intersection

Figure 24: Burma Road/Allanooka Springs Road Intersection Looking West

Figure 25:Burma Road/Allanooka Springs Road Intersection Looking East

As shown, the SISD is sufficient to achieve the minimum requirements in accordance with the Austroads Guide to Road Design Part 4A.

4.3.4. Strawberry North East Road and Midlands Road Intersection

The SISD is assessed based on the following parameters:

- An observation time of 3 seconds as per Austroads Part 3;
- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of SISD calculations are 0.36 for light vehicles and 0.28 for heavy vehicles (Road Train Type 1/ RAV 7 equivalent);
- Driver eye height is 2.4m for trucks and 1.1m for cars;
- Object height of 1.25m; and
- Sight distance offset 3-5m from edge of proposed holding line.

The results are summarised in **Table 7**.

Table 11: SISD at Midlands Road/Strawberry North-East Road Intersection

Location	Vehicle Type	Design Speed (km/h) (EB / WB)	Coefficient of Deceleration	Decision Time (s)	Longitudinal Grade (EB / WB) *	Required SISD for EB / WB Traffic (m)	Available SISD (m)	
							EB	WB
Midlands / Strawberry NE Intersection	Trucks	110 / 110	0.28	3.0+2.5	+0.5% / +2.2%	335 / 326	+500	480
	Cars	110 / 110	0.36	3.0+2.5	+0.5% / +2.2%	299 / 293	+500	480

*Positive for through traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on feature survey.

As shown, the SISD is sufficient to achieve the minimum requirements in accordance with the Austroads Guide to Road Design Part 4A.

The measurement of the SISD is shown in **Figure 13.** The line-of-sight street view at the intersection location, at a 5m offset from the proposed hold line location, are shown in **Figure 16** and **Figure 15**.

Figure 26: Sight Distance Measurement at Midlands Road/Strawberry North-East Road Intersection

Figure 27: Midlands Road Looking East – 5m Offset

Figure 28: Midlands Road Looking West – 5m Offset

4.4. Approach Sight Distance

4.4.1. Approach Sight Distance – Strawberry North-East Road/Burma Road Intersection

The Approach Sight Distance (ASD) is required to ensure that drivers of trucks and light vehicles approaching the intersection from the minor road at the 85th percentile operating speed are able to see the intersection and stop at the holding line.

The ASD is assessed based on the following parameters:

- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of ASD calculations are 0.22 for light vehicles and 0.17 for RAV trucks;
- Driver eye height is 2.4m for trucks and 1.1m for cars; and
- Object height of 0.0m at the holding line.

The required and available ASD at the intersection has been determined from Austroads Part 4A Equation 2 as summarised in **Table 12**.

Table 12: Approach Sight Distance Assessment - Strawberry North-East Road/Burma Road Intersection

Location	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration (unsealed)	Reaction Time (s)	Longitudinal Grade*	Required ASD (m)	Available ASD (m)
Strawberry NE Rd/Burma Rd Intersection	Trucks	110	0.17	2.5	-0.1	356	370
	Cars	110	0.22	2.5	-0.1	294	370

*Positive for traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on google earth only.

The measurement of ASD is shown in **Figure 29** and line of sight from Burma Road is shown in **Figure 30**.

As shown, the ASD is sufficient to achieve the minimum requirement as per Austroads Part 4A Equation 2.

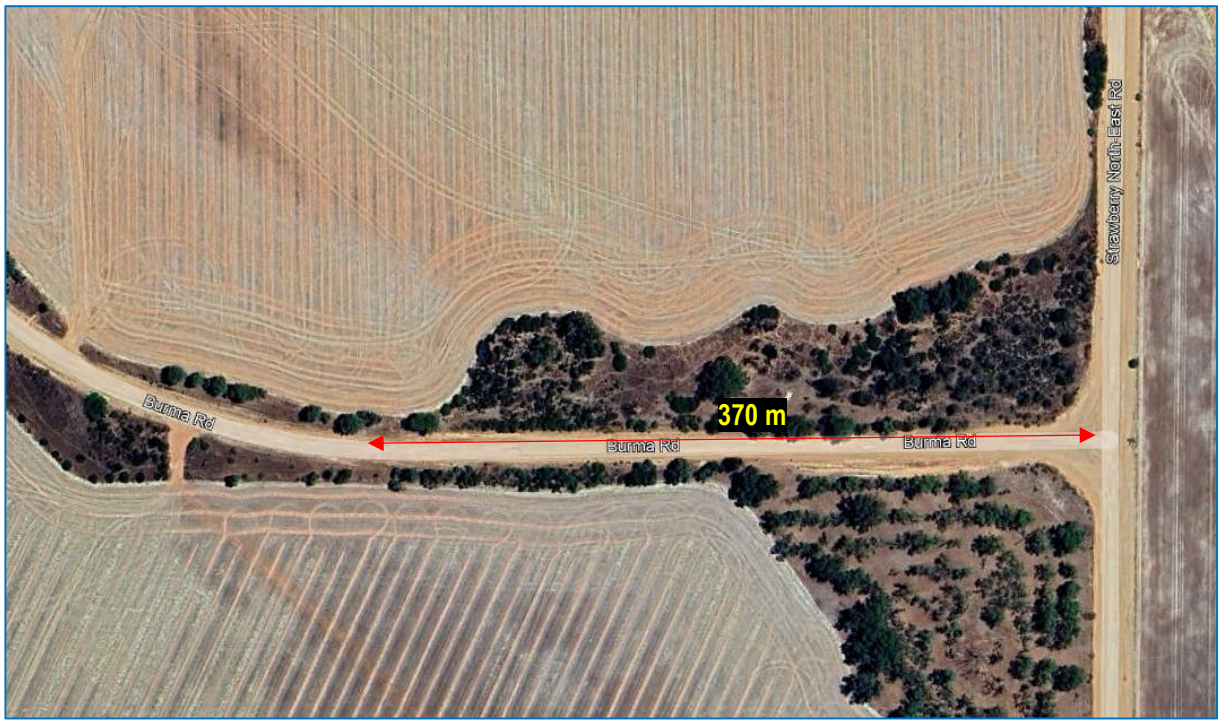


Figure 29:Approach Sight Distance Measurement - Strawberry North-East Road/Burma Road Intersection

Figure 30:Approach Line of Sight from Burma Road

4.4.2. Approach Sight Distance – Allanooka Springs Road and Burma Road Intersection

The Approach Sight Distance (ASD) is required to ensure that drivers of trucks and light vehicles approaching the intersection from the minor road at the 85th percentile operating speed are able to see the intersection and stop at the holding line.

The ASD is assessed based on the following parameters:

- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of ASD calculations are 0.22 for light vehicles and 0.17 for RAV trucks (unsealed);
- Driver eye height is 2.4m for trucks and 1.1m for cars; and
- Object height of 0.0m at the holding line.

The required and available ASD at the intersection has been determined from Austroads Part 4A Equation 2 as summarised in **Table 12**.

Table 13: Approach Sight Distance Assessment – Allanooka Springs Road/Burma Road Intersection

Location	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration (unsealed)	Reaction Time (s)	Longitudinal Grade*	Required ASD (m)	Available ASD (m)
Burma Rd/Allanooka Springs Road Intersection	Trucks	110	0.17	2.5	-0.1	360	360
	Cars	110	0.22	2.5	-0.1	296	360

*Positive for traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on google earth only.

The measurement of ASD is shown in **Figure 31** and line of sight from Burma Road is shown in **Figure 32**.

As shown, the ASD is restricted by the vegetation along the sides of the Burma Road. Therefore, it is recommended that the vegetation be cleared/trimmed and/or install adequate intersection approach signage to ensure adequate sight distance is achieved.

Figure 31:Approach Sight Distance Measurement – Allanooka Springs Road/Burma Road Intersection

Figure 32: Approach Line of Sight from Burma Road

4.4.3. Approach Sight Distance – Midlands Road and Strawberry North-East Road Intersection

The Approach Sight Distance (ASD) is required to ensure that drivers of trucks and light vehicles approaching the intersection from the minor road at the 85th percentile operating speed are able to see the intersection and stop at the holding line.

The ASD is assessed based on the following parameters:

- A reaction time of 2.5 seconds;
- Deceleration coefficients for the purpose of ASD calculations are 0.36 for light vehicles and 0.28 for heavy vehicles (Road Train Type 1/ RAV 7 equivalent);
- Driver eye height is 2.4m for trucks and 1.1m for cars; and
- Object height of 0.0m at the holding line.

The required and available ASD at the intersection has been determined from Austroads Part 4A Equation 2 as summarised in **Table 12**.

Table 14: Approach Sight Distance Assessment – Midlands Road/Strawberry North-East Road Intersection

Location	Vehicle Type	Design Speed (km/h)	Coefficient of Deceleration (unsealed)	Reaction Time (s)	Longitudinal Grade*	Required ASD (m)	Available ASD (m)
Midlands / Strawberry NE Intersection	Trucks	40**	0.28	2.5	+3	48	77
	Cars	40**	0.36	2.5	+3	44	77

*Positive for traffic travelling uphill and negative for through traffic travelling downhill. Grades are estimated based on design grades.
** The speed along Strawberry NE Road is assumed as 40km/hr as vehicles have to stop at railway line.

The measurement of ASD is shown in **Figure 29** and line of sight from Midlands Road is shown in **Figure 30**.

As shown, the ASD is sufficient to achieve the minimum requirement as per Austroads Part 4A Equation 2.

Figure 33:Approach Sight Distance Measurement – Midlands Road/Strawberry North-East Road Intersection

Figure 34:Approach Line of Sight to Midlands Road

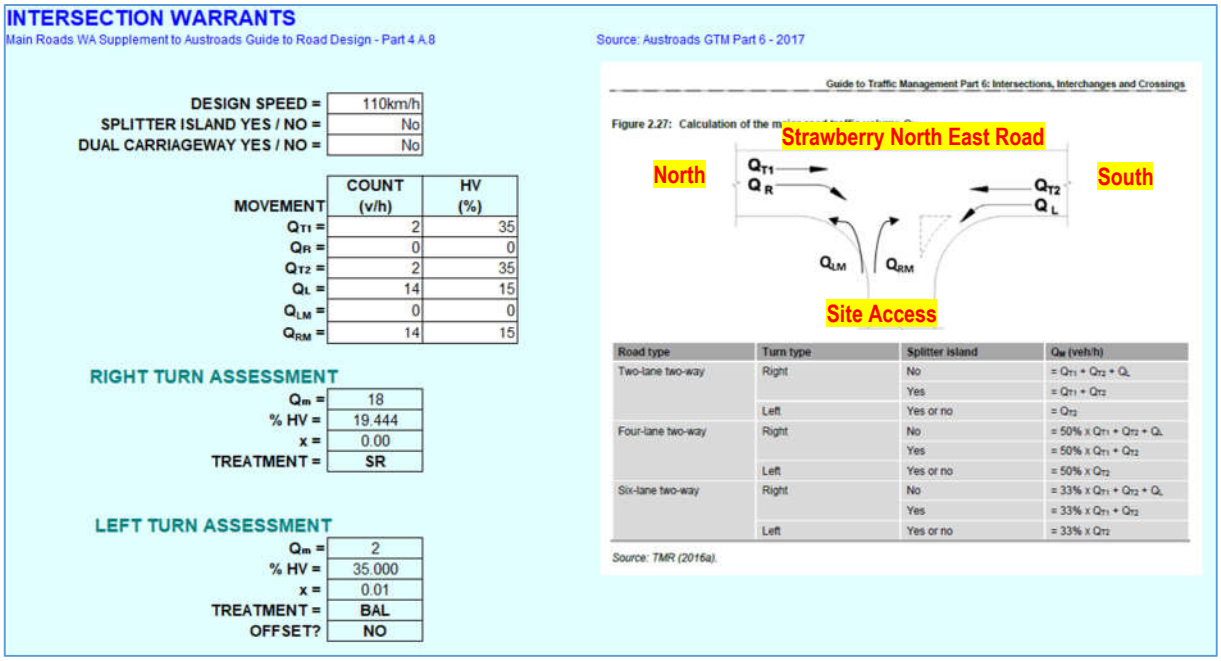
4.5. Intersection Volumes

For the purpose of auxiliary lane assessment, the development peak hour estimates are as per **Section 3.4**.

4.6. Auxiliary Lanes

The requirement for turning treatments was calculated using the Intersection Warrants calculator provided in Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8.

The results of the assessment for both construction and operations phase are shown from **Figure 35** to **Figure 40**.



INTERSECTION WARRANTS

Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8

DESIGN SPEED =	110km/h
SPLITTER ISLAND YES / NO =	No
DUAL CARRIAGEWAY YES / NO =	No

MOVEMENT	COUNT (v/h)	HV (%)
Q_{T1} =	2	35
Q_R =	0	0
Q_{T2} =	2	35
Q_L =	14	15
Q_{LM} =	0	0
Q_{RM} =	14	15

RIGHT TURN ASSESSMENT

Q_m =	18
% HV =	19.444
x =	0.00
TREATMENT =	SR

LEFT TURN ASSESSMENT

Q_m =	2
% HV =	35.000
x =	0.01
TREATMENT =	BAL
OFFSET?	NO

Source: Austroads GTM Part 6 - 2017

Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 2.27: Calculation of the m

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}

Source: TMR (2016a).

Figure 35: Site Access/Strawberry NE Rd Intersection Construction Phase Warrants– 2024

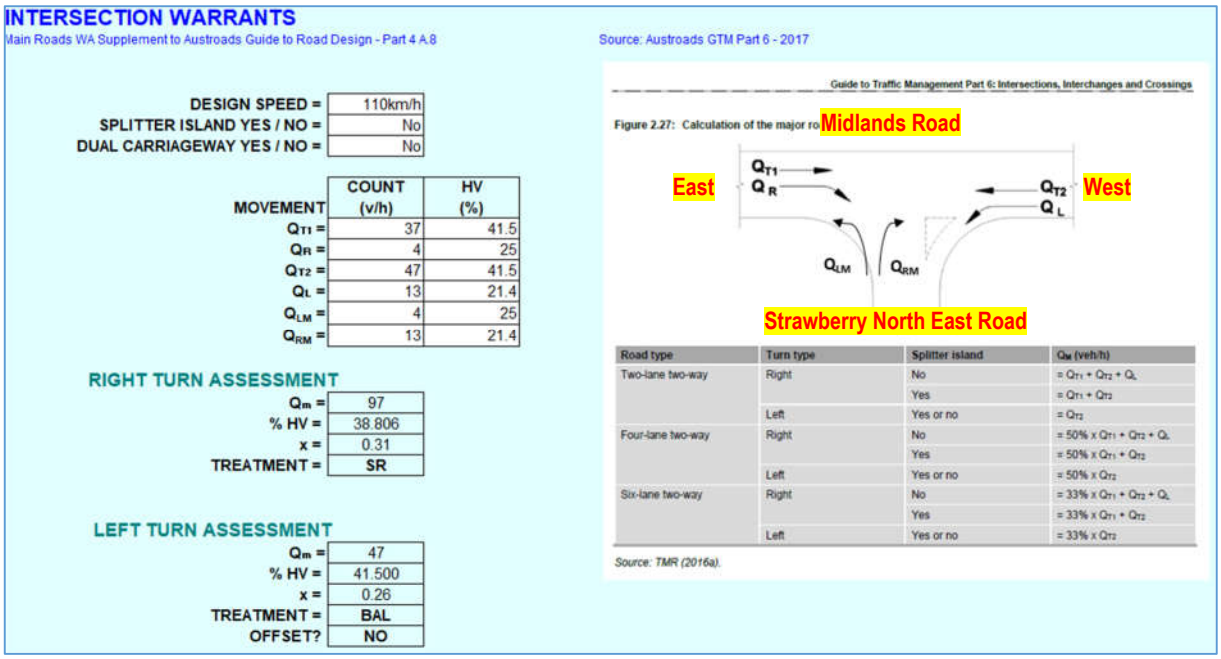


Figure 36:Strawberry NE Rd/Midlands Rd Intersection Construction Phase Warrants– 2024

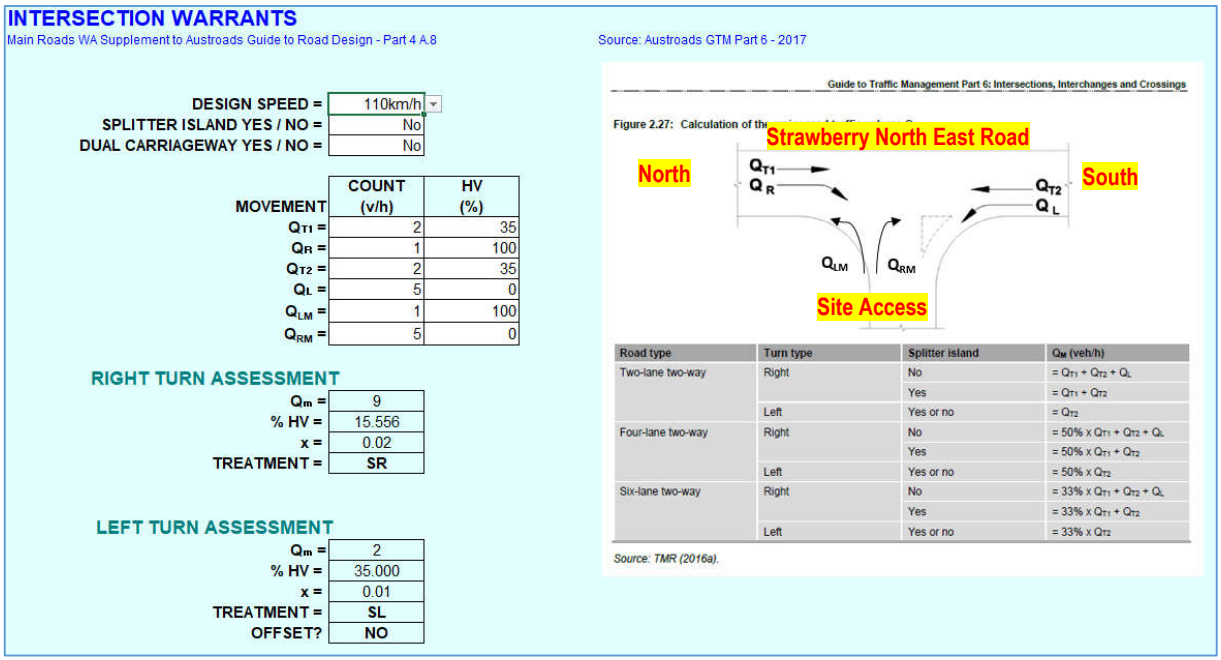
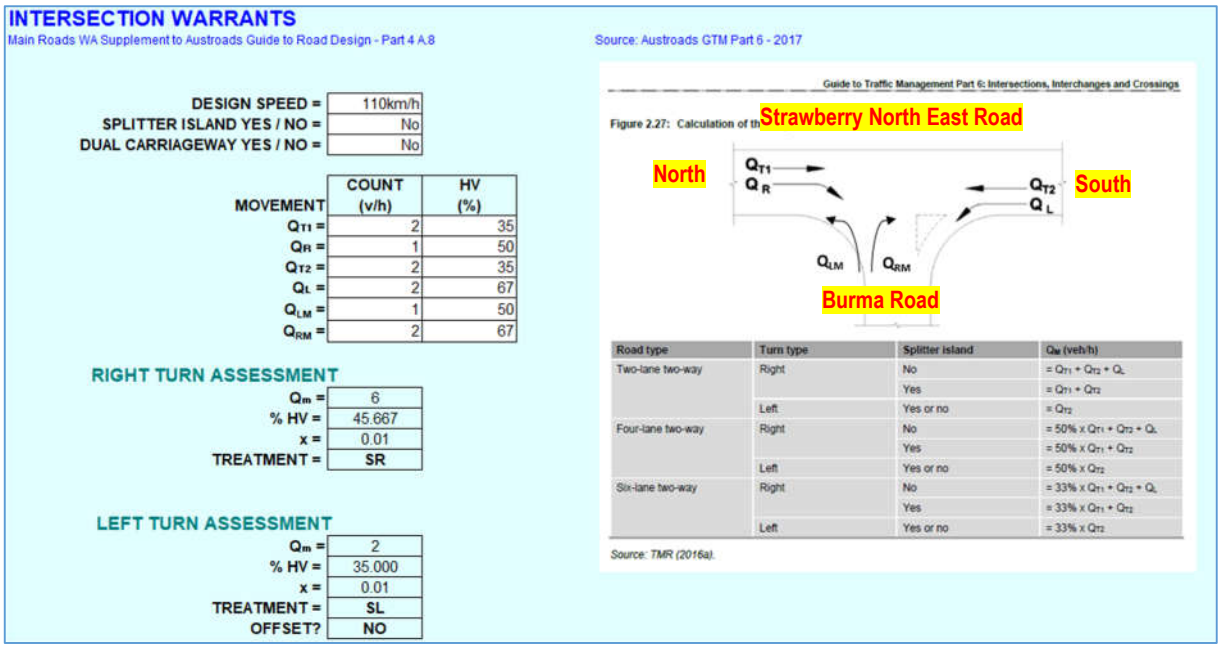


Figure 37: Site Access/Strawberry NE Rd Intersection Operations Phase Warrants– 2034



INTERSECTION WARRANTS

Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8

Source: Austroads GTM Part 6 - 2017

DESIGN SPEED =	110km/h
SPLITTER ISLAND YES / NO =	No
DUAL CARRIAGEWAY YES / NO =	No

MOVEMENT	COUNT (v/h)	HV (%)
Q_{T1} =	2	35
Q_R =	1	50
Q_{T2} =	2	35
Q_L =	2	67
Q_{LM} =	1	50
Q_{RM} =	2	67

RIGHT TURN ASSESSMENT

Q_m =	6
% HV =	45.667
x =	0.01
TREATMENT =	SR

LEFT TURN ASSESSMENT

Q_m =	2
% HV =	35.000
x =	0.01
TREATMENT =	SL
OFFSET?	NO

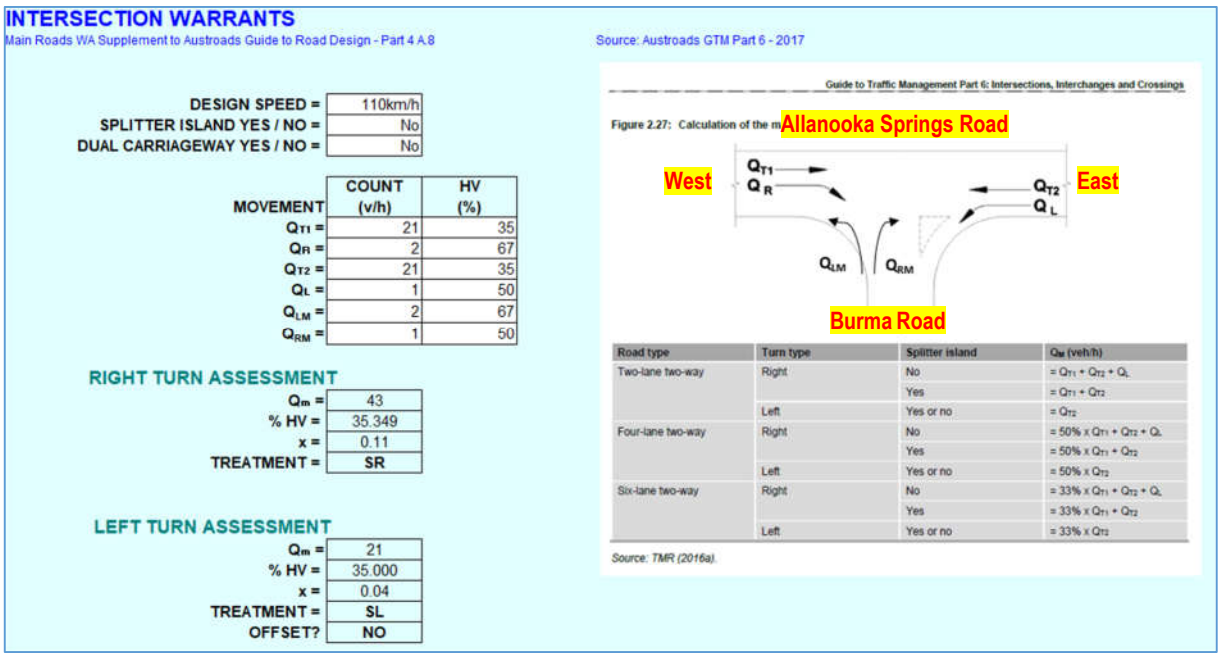
Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 2.27: Calculation of th Strawberry North East Road

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}

Source: TMR (2016a).

Figure 38: Strawberry NE Rd/Burma Rd Intersection Operations Phase Warrants– 2034



INTERSECTION WARRANTS

Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8

Source: Austroads GTM Part 6 - 2017

DESIGN SPEED =	110km/h
SPLITTER ISLAND YES / NO =	No
DUAL CARRIAGEWAY YES / NO =	No

MOVEMENT	COUNT (v/h)	HV (%)
Q_{T1} =	21	35
Q_R =	2	67
Q_{T2} =	21	35
Q_L =	1	50
Q_{LM} =	2	67
Q_{RM} =	1	50

RIGHT TURN ASSESSMENT

Q_m =	43
% HV =	35.349
x =	0.11
TREATMENT =	SR

LEFT TURN ASSESSMENT

Q_m =	21
% HV =	35.000
x =	0.04
TREATMENT =	SL
OFFSET?	NO

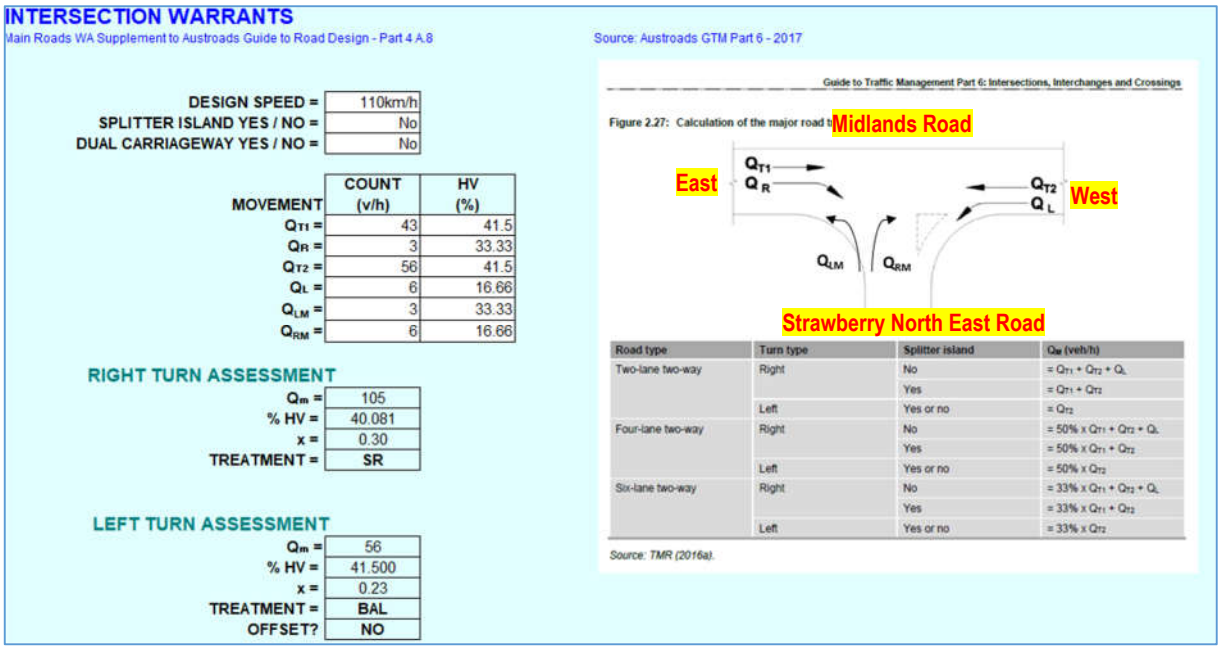
Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 2.27: Calculation of the m Allanooka Springs Road

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}

Source: TMR (2016a).

Figure 39: Burma Road/Allanooka Springs Road Operations Phase Warrants-2034



INTERSECTION WARRANTS

Main Roads WA Supplement to Austroads Guide to Road Design - Part 4 A.8

Source: Austroads GTM Part 6 - 2017

DESIGN SPEED =	110km/h
SPLITTER ISLAND YES / NO =	No
DUAL CARRIAGEWAY YES / NO =	No

MOVEMENT	COUNT (v/h)	HV (%)
Q_{T1} =	43	41.5
Q_R =	3	33.33
Q_{T2} =	56	41.5
Q_L =	6	16.66
Q_{LM} =	3	33.33
Q_{RM} =	6	16.66

RIGHT TURN ASSESSMENT

Q_m =	105
% HV =	40.081
x =	0.30
TREATMENT =	SR

LEFT TURN ASSESSMENT

Q_m =	56
% HV =	41.500
x =	0.23
TREATMENT =	BAL
OFFSET?	NO

Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings

Figure 2.27: Calculation of the major road t

Midlands Road

East

Q_{T1} Q_R Q_{T2} Q_L West

Q_{LM} Q_{RM}

Strawberry North East Road

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}

Source: TMR (2016a).

Figure 40: Strawberry NE Rd/Midlands Rd Intersection Operations phase Warrants-2034

In summary:

- Site Access:
  - Construction Phase: BAL/SR
  - Operations Phase: SR/SL
- Midlands Intersection:
  - Construction Phase: BAL/SR
  - Operations Phase: BAL/SR
- Burma Road / Strawberry North-East Road Intersection:
  - Construction Phase: Not Required
  - Operations Phase: SL/SR
- Burma Road / Allanooka Springs Road Intersection:
  - Construction Phase: Not Required
  - Operations Phase: SR/SL

As per MRWA Guideline drawing 202231-0008, a SL/SR does not need require any upgrades or sealed shoulders at the proposed intersection (refer **Figure 41** for extract).

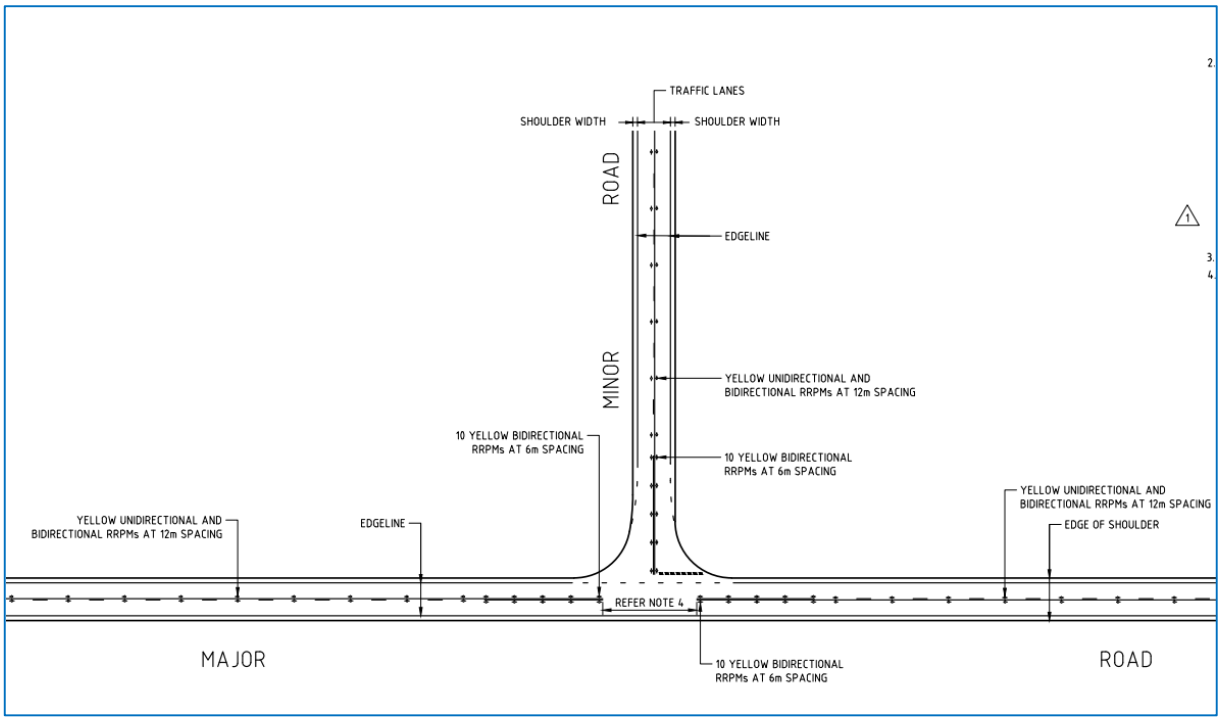


Figure 41: MRWA Guideline Drawing 202231-0008 Extract – SR/SL

As per MRWA Guideline drawing 202231-0007, a BAL treatment will require widening sealed shoulder turn treatments to be installed at the existing intersection (refer **Figure 42** for extract).

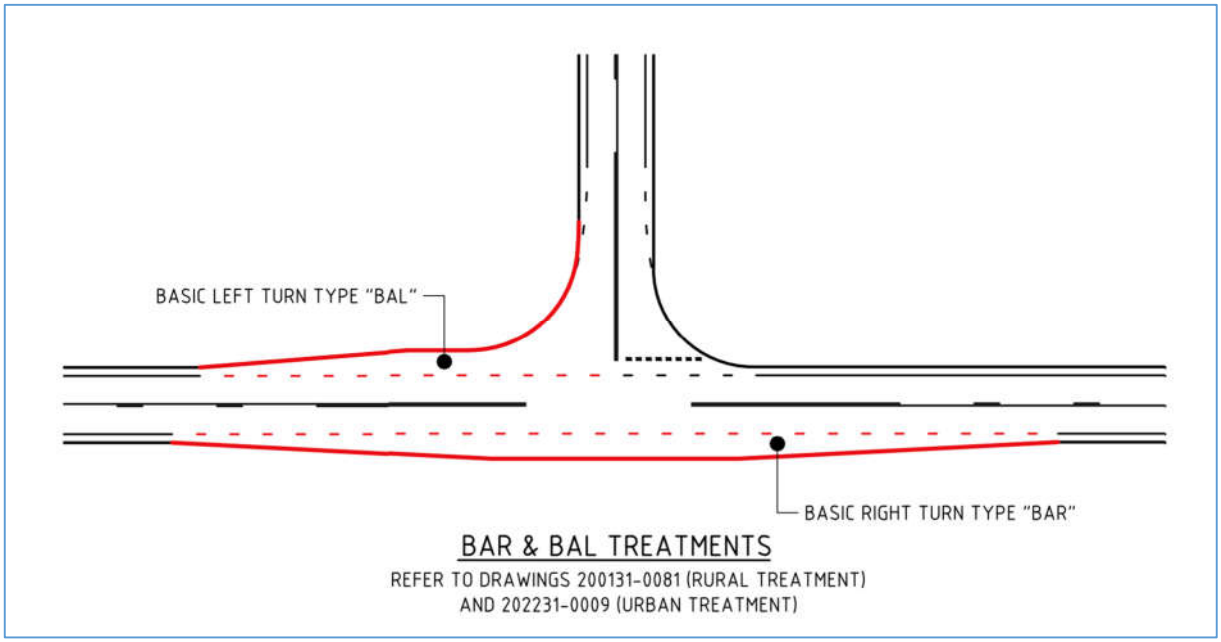


Figure 42: MRWA Guideline Drawing 202231-0007 Extract – BAR/BAL

4.7. Acceleration Lane

4.7.1. Site Access, Burma Road and Allanooka Springs Road

For the operational phase all traffic is generated to/from the north.

Since the traffic volume along Strawberry North-East Road, Burma Road and Allanooka Road are considerably low, and as only a maximum 27.5m RAV 2 truck is proposed, an acceleration lane assessment has been deemed not be required.

4.7.2. Midlands Road Intersection

The RAV guideline provides the following advice with regards to acceleration lanes:

> *To assist in ensuring network performance levels are maintained, the assessor needs to identify if the acceleration lanes and turn pockets are present at intersections and the length of these treatments. Capturing this information in the assessment will assist in determining if network improvements are necessary, in consultation with the road manager.*

Note 11 on the MRWA T-Intersection guideline drawing (201431-0001) provides the following advice with regards to acceleration lanes:

> *Provide 600m long acceleration lane (or lanes) when the AADT on the through road exceeds 600 with at least 2 road trains per hour on the terminating leg.*
>
> *Consideration could be given to extending the acceleration lane length to 1500m (min) and line marking as an overtaking opportunity.*

AGRD04 notes that:

> *There are no simple numerical warrants for the provision of acceleration lanes. However, an auxiliary lane may be added on the departure side of a left turn or right turn if traffic is unable to join safely and/or efficiently with the adjacent through traffic flow by selecting a gap in the traffic stream.*
>
> *Acceleration lanes may be provided at major intersections depending on traffic analysis. However, they are usually provided only where:*
>
> - *insufficient gaps exist for vehicles to enter a traffic stream.*
> - *turning volumes are high (e.g. > 300 vph).*
> - *the observation angle falls below the requirements of the minimum gap sight distance model (for example, inside of horizontal curves).*
> - *heavy vehicles pulling into the traffic stream would cause excessive slowing of major road vehicles.*

The requirement for acceleration lanes has been assessed against the Austroads and Main Roads WA guidelines as detailed in **Table 15**.

Table 15: Acceleration Lane Warrants - Northbound

Note	Assessment
MRWA – To assist in ensuring network performance levels are maintained, the assessor needs to identify if the acceleration lanes and turn pockets are present at intersections and the length of these treatments. Capturing this information in the assessment will assist in determining if network improvements are necessary, in consultation with the road manager.	Due to the low volumes of traffic turning into and out of Strawberry NE Road, the level of service of the access is expected to be acceptable.
MRWA - Provide 600m long acceleration lane (or lanes) when the AADT on the through road exceeds 600 with at least 2 road trains (36.5m long) per hour on the terminating leg.	The AADT on the through road (Midlands Road) exceeds 600. Even though peak hour traffic during construction phase is 2 road trains per hour, it is expected that there will be only less than 1 road train per hour during the operations phase on the terminating leg entering Midlands Road during peak hour. In addition, it is expected that construction phase trucks would be empty when entering Midlands Road. Since construction phase will only last for 12 months, and as construction delivery trucks would be empty when entering Midlands Road, the requirements to provide for a 600m acceleration lane have not been met. NOTE: As this drawing is a guideline only, the requirement of an acceleration lane is to be considered (when considering all other aspects) and is technically not mandatory).
Austroads - Acceleration lanes may be provided at major intersections depending on traffic analysis. However, they are usually provided only where: • *Insufficient gaps exist for vehicles to enter a traffic stream.*	The background traffic during AM peak hour in eastbound direction is 41 vehicles per hour which equates to about 0.68 vehicles per minute and in westbound direction is 31 vehicles per hour which equates to about 0.51 vehicles per minute (1 vehicle every 50 seconds in either direction). Therefore, it is considered that there are sufficient gaps for trucks to enter a traffic stream.
Austroads continued: • *Turning volumes are high (e.g. > 300 vph).*	Turning volumes at the intersection during the peak hour is expected to be <300 vph.
Austroads continued: • *The observation angle falls below the requirements of the minimum gap sight distance model (for example, inside of horizontal curves).*	The intersection has good sight distances and observation angle.
Austroads continued: • *Heavy vehicles pulling into the traffic stream would cause excessive slowing of major road vehicles.*	The background traffic during AM peak hour in eastbound direction is 41 vehicles per hour which equates to about 0.68 vehicles per minute and in westbound direction is 31 vehicles per hour which equates to about 0.51 vehicles per minute (1 vehicle every 50 seconds in either direction), which is considered frequently having gaps for RAV 7 trucks turning out of intersection. Trucks departing from the intersection have good sight distance towards both direction and therefore be able to pull into through traffic without causing excessive slowing.

Based on the above assessment an acceleration lane is not considered to be warranted by the proposed traffic.

4.8. Swept Path Assessment

4.8.1. Site Access

It is recommended that the proposed site access intersection should be designed to allow RAV 2 and 7 movements in accordance with MRWA's standard vehicle turning templates.

4.8.2. Construction Phase

A swept path analysis on aerial photos for a Tandem-Drive 36.5m MRWA RAV 5-7 vehicle template (20m turning radius) was completed to determine if the existing intersection geometry is sufficient to accommodate the proposed RAV vehicle movements.

Refer **Figure 43** for swept path analysis.

The analysis indicates that the existing intersection is not wide enough to cater for lane correct RAV7 (20m) vehicles for the left in movements.

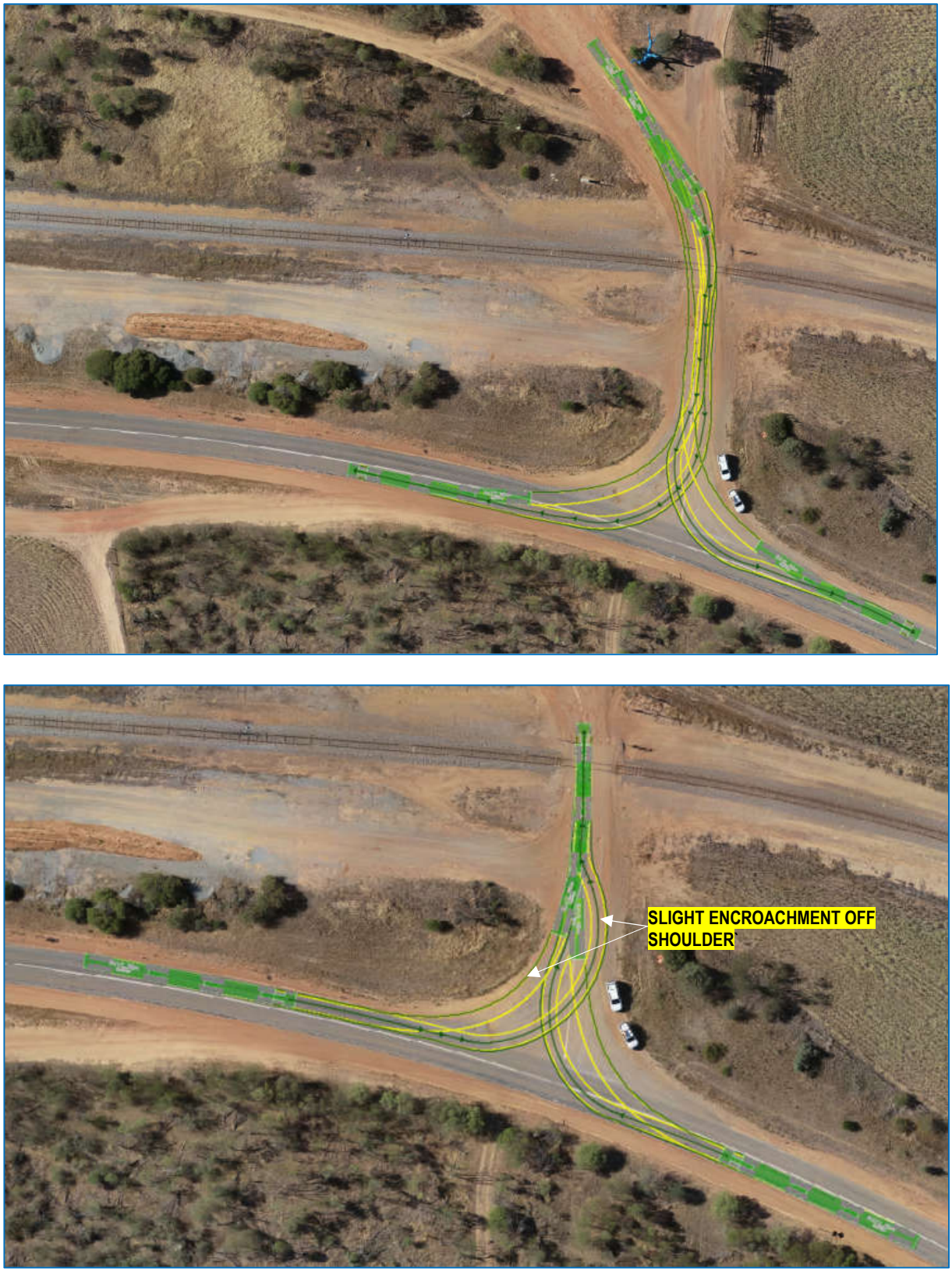


Figure 43:Midlands Road/Strawberry North East Road RAV 7 Swept path Analysis

4.8.3. Operational Phase

A swept path analysis on aerial photos for a Tandem-Drive 27.5m MRWA RAV 2-4 vehicle template (18m turning radius) was completed to determine if the existing Burma Road / Allanooka Springs Road intersection and Burma / Strawberry North East Road geometry is sufficient to accommodate the proposed RAV vehicle movements.

Refer **Figure 44** and **Figure 45** for swept path analysis.

The analysis indicates that the existing intersection is wide enough to cater for RAV2 vehicles for the required movements.

Figure 44:Strawberry NE Rd/ Burma Rd Intersection RAV 2 Movements

Figure 45: Burma Road / Allanooka Springs Road intersection RAV 2 Movements

4.9. Railway Crossings

4.9.1. Railway Approach Sight Distance

As per MRWA's RAV Route Assessment Guidelines, the driver of a RAV approaching a give way or stop sign-controlled rail crossing must be able to see the crossing from a distance conforming to Appendix D of the guidelines. In this situation, the required sight distance is 170m on approach from Strawberry North-East Road, 46m on approach from Midlands Road (assuming maximum 80km/hr operating speed and 2% grade for Strawberry North-East Road and 30 km/hr turning speed from Midlands Road into Intersection 2).

Figure 46 and **Figure 47** show the sight lines and street view for the rail crossing. As shown, adequate sight distance is available.

Figure 46:Approach Sight Distance Measurement

Figure 47: Rail Crossing Looking from Midlands Road

4.9.2. Railway Sight Distance

The Main Roads WA *Standard Restricted Access Vehicle Route Assessment Guidelines* (RAV Guidelines) outlines the sight distance requirements for the driver of a RAV, after having stopped at a railway crossing with a Give way or Stop sign. It is outlined in Australian Standard AS1742.7 (2016) – Manual of Uniform Traffic Control Device = Part 7: Railway Crossing formula S3.

The S3 formula determines the minimum distance required for the driver of a vehicle stopped at the railway crossing to be able to see an oncoming train to safely cross. Confirmation of the train speed along the railway has not yet been obtained.

Train speeds have been estimated from the ARC Infrastructure: General Operational Instructions v1.7 website which confirms an empty train speed of 80km/hr for the Mingenew to Strawberry rail line and Strawberry to Irwin rail line (refer **Figure 48** for extract).

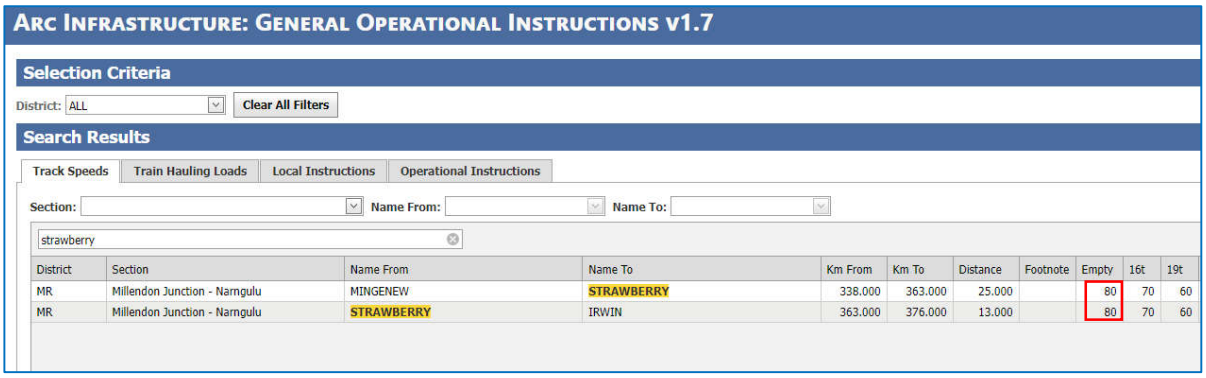


Figure 48:Rail Speed

Below are the following assumptions to determine S3.

- Railway speed (Vt) (Empty) - 80km/h
- RAV 7Truck (L) – 36.5m Length
- Driver eye height is 2.4m for Trucks.
- Sum of the perception time and time to depress clutch (J) – 2.5 s
- Width of Road Carriage way (Wr) – 8.0m
- Width of outer railway track (Wt) – 1.3m
- Angle between railed track and road (Z) – 90 degrees
- Clearance from the stop line to the nearest rail (Cv) – 3.5m
- Clearance from the stop line on the departure side of the crossing (Ct) – 5m
- Average acceleration of RAV 7– 0.29m/s^2

Based on the sight distance parameters above, **Table 16** shows the required minimum sight distance.

Table 16: Railway Sight Distance

Location	Design Speed Vt	J (s)	Gs	Wr/Wt (m)	Angle	Cv / Ct (m)	Length of design vehicle (RAV 5/6)	Average acceleration of RAV 5/6 m.s^{-2}	Required SD (m)	Available SD (m)	
										West	East
Intersecti on 2	80	2.5	1	9.0/1.3	90	3.5 / 5	36.5m	0.29	466m	+470m	466m

As shown, the available sight distance exceeds the minimum requirement. However, although the sight distance is assessed as conforming in the east direction, it is recommended that the sight lines are checked on site as sight distances could potentially be restricted by vegetation and/or existing terrain.

Figure 49 shows the available sight distance along the railway line.

Figure 49:Railway Sight Distance measurement

4.9.3. Stacking Distance

As per MRWA's RAV Route Assessment Guideline the following stacking distance is required:

- **Approach** to the rail: at least the length of the vehicle plus 3m is required between the rail holding line and the through traffic edge line i.e., 36.5m + 3m = 39.5m(based on RAV 7)
- **Departure** from the rail: at least the length of the vehicle between the rail holding line and the intersection holding line i.e., 36.5m (based on a RAV 7).

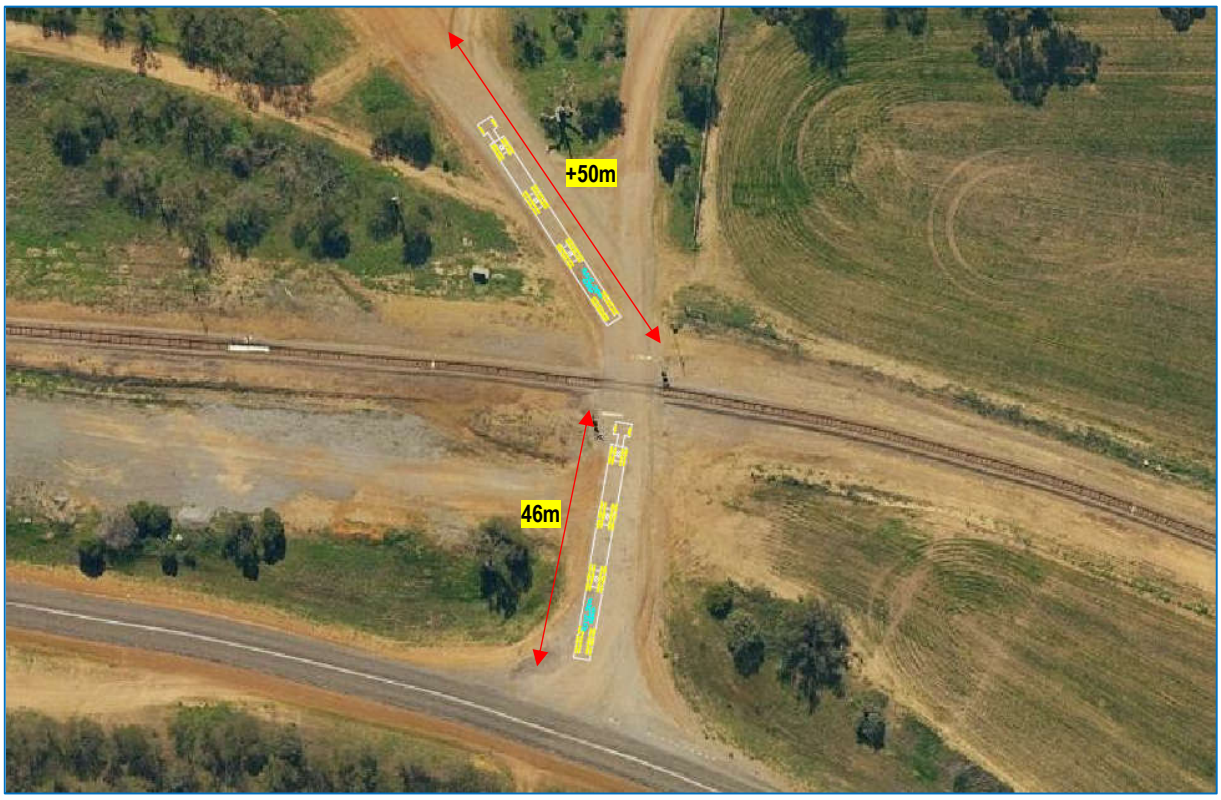


Figure 50: Stacking Distance

As shown in **Figure 50** there is more than minimum stacking distance available on the approach side and departure side for the intersection 2.

5. Conclusions

This Transport Impact Statement has concluded the following:

- The estimated traffic generation can be accommodated within the predicted capacity of road network.
- The additional traffic generated by the proposed development is not considered likely to increase the likelihood of crashes to unacceptable levels.
- The existing road network has the appropriate RAV network for proposed construction and operation at present to allow the proposed design vehicle access onto the roads.
- For the site access, the southbound SISD and minimum SSD are restricted due to existing vegetation on the inside of the curve. Therefore, the following is recommended:
    - Clearing/trimming/pruning of trees to improve sight distances.
    - Install curve warning/chevron signage for the horizontal curve.
- There are sufficient SISD and ASD at the Strawberry NE Road/Burma Road Intersection.
- There is sufficient SISD at the Burma Road/Allanooka Springs Road Intersection.
- There are sufficient SISD and ASD at the Strawberry NE Road exit onto Midlands Road.
- The ASD is restricted by the vegetation along the sides of the Burma Road. Therefore, it is recommended that the vegetation be cleared/trimmed and/or install adequate intersection approach signage to ensure adequate sight distance is achieved.
- Based on the predicted traffic volume, the required left-turn and right turn treatments to be considered ar as follows:
    - Site Access:
        - Construction Phase: BAL/SR
        - Operations Phase: SR/SL
    - Midlands Intersection:
        - Construction Phase: BAL/SR
        - Operations Phase: BAL/SR
    - Burma Road / Strawberry North-East Road Intersection:
        - Construction Phase: Not Required
        - Operations Phase: SL/SR

- Burma Road / Allanooka Springs Road Intersection:
  - Construction Phase: Not Required
  - Operations Phase: SR/SL

- Acceleration lanes are not considered warranted.
- The swept path analysis indicates the following:
  - Midlands Intersection: not wide enough to cater for lane correct RAV7 (20m) vehicles for all in and out movements
  - Strawberry North-East Road/Burma Road intersection is wide enough to cater for lane correct RAV2 (18m) vehicles for all in and out movements.
  - Burma Road / Allanooka Springs Road intersection is wide enough to cater for RAV2 (18m) vehicles for all in and out movements. Left out movement encroaches over opposing lane however considered acceptable due to minimum sight distances achieved.
- It is recommended that the proposed site access intersection be designed to allow appropriate design vehicle movements.
- The Strawberry NE Road Railway Crossing has appropriate sight and stacking distances. However, the sight distance is assessed as confirming in the east direction, it is recommended that the sight lines are checked on site as sight distances could potentially be restricted by vegetation and/or existing terrain.

Appendix A – Traffic Counts

mainroads WESTERN AUSTRALIA

SITE 18337

Hourly Volume

Midlands Rd (M028)

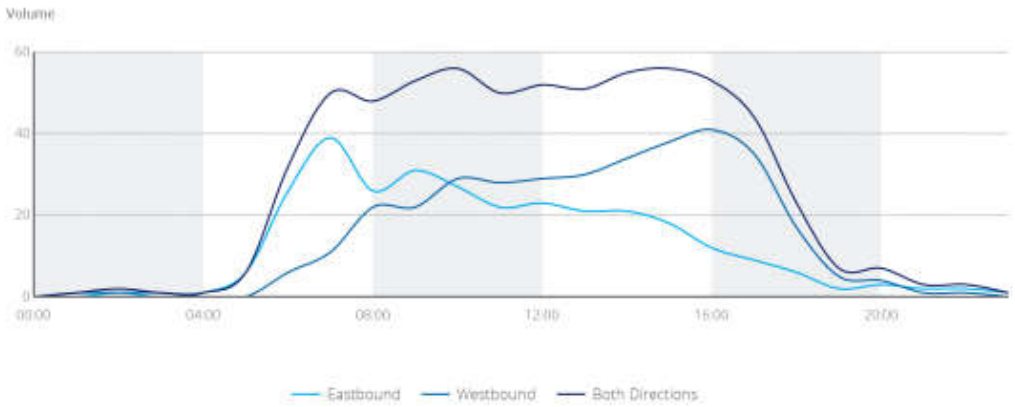
East of Tabletop Rd (SLK 251.00)

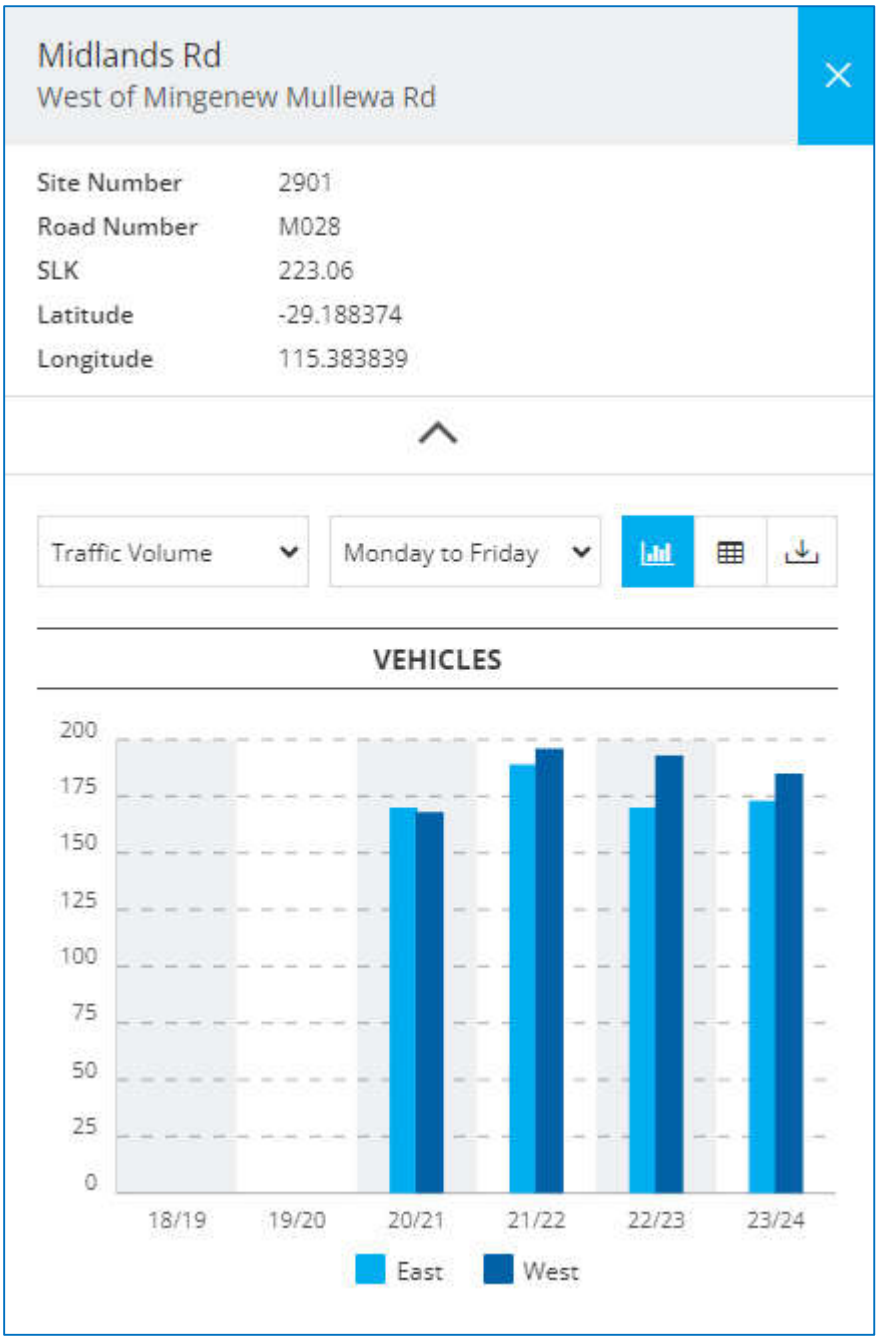
2022/23
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	0	0	0	0	0	0	0.0
01:00	0	1	1	0	1	1	100.0
02:00	1	1	2	1	1	2	100.0
03:00	0	1	1	0	0	0	0.0
04:00	1	0	1	1	0	1	100.0
05:00	6	0	6	4	0	4	66.7
06:00	26	6	32	21	2	23	71.9
07:00	39	11	50	28	4	32	64.0
08:00	26	22	48	14	10	24	50.0
09:00	31	22	53	15	10	25	47.2
10:00	27	29	56	12	12	24	42.9
11:00	22	28	50	13	12	25	50.0
12:00	23	29	52	13	11	24	46.2
13:00	21	30	51	11	14	25	49.0
14:00	21	34	55	10	12	22	40.0
15:00	18	38	56	11	10	21	37.5
16:00	12	41	53	6	10	16	30.2
17:00	9	35	44	5	9	14	31.8
18:00	6	17	23	3	4	7	30.4
19:00	2	5	7	1	2	3	42.9
20:00	3	4	7	1	2	3	42.9
21:00	2	1	3	1	0	1	33.3
22:00	2	1	3	2	0	2	66.7
23:00	1	0	1	1	0	1	100.0
TOTAL	299	356	655	174	126	300	45.8

Peak Statistics

AM	TIME	07:15	09:45	09:30	06:30	09:15	07:15
	VOL	40	30	61	29	13	33
PM	TIME	12:30	15:45	15:15	12:45	12:45	12:45
	VOL	24	42	60	14	15	29




Midlands Rd
West of Mingenew Mullewa Rd
Site Number 2901
Road Number M028
SLK 223.06
Latitude -29.188374
Longitude 115.383839
Traffic Volume
Monday to Friday
VEHICLES
200
175
150
125
100
75
50
25
0
18/19
19/20
20/21
21/22
22/23
23/24
East
West

Road:	18	5090018 STRAWBERRY NORTH EAST ROAD															
COUNT#	SLK	DATES		Number of vehicles by Class												TOTALS		
		Start	Finish	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	ESA	EQ ADV
1	1.0	24-12-18	07-01-19	84	1	35	4	0	0	0	0	2	0	0	0	126	33.2	273
2	1.0	29-11-18	23-12-18	268	18	103	17	2	0	4	0	2	3	25	2	444	287.5	1372
3	0.5	07-05-21	10-09-21	1265	117	108	31	20	3	12	7	28	3	21	0	1615	448.2	3064
4	0.5	21-10-21	11-11-21	141	16	16	3	0	0	1	0	2	3	8	0	190	83.5	447
5	0.5	23-11-21	19-12-21	213	21	81	5	1	5	7	7	11	3	48	0	402	419.9	1700
6	0.5	22-12-21	08-02-22	238	20	71	2	7	3	6	2	4	2	12	0	367	181.5	968
7	0.5	23-02-22	04-04-22	213	17	67	13	3	2	11	0	4	1	19	0	350	217.8	1068
8	0.5	22-04-08	22-05-25	246	16	114	7	1	1	17	5	6	4	2	0	419	176.9	1128
Total				**2668**	**226**	**595**	**82**	**34**	**14**	**58**	**21**	**59**	**19**	**135**	**2**	**3913**	**1848.5**	**10020.0**
Multiplier - ESA				*0*	*0*	*0.6*	*1.5*	*3.6*	*1.3*	*1.7*	*2.6*	*3.1*	*5.3*	*5.7*	*10.8*			
Multiplier - EQ ADV				*1*	*1*	*4*	*6*	*8*	*6*	*8*	*10*	*12*	*16*	*16*	*26*			
ESAs				**0.00**	**0.00**	**357.00**	**123.00**	**122.40**	**18.20**	**98.60**	**54.60**	**182.90**	**100.70**	**769.50**	**21.60**			
EQ ADVs				**2668.00**	**226.00**	**2380.00**	**492.00**	**272.00**	**84.00**	**464.00**	**210.00**	**708.00**	**304.00**	**2160.00**	**52.00**			

Count #	Days	Avg Daily Veh	Avg Daily ESA	Avg EQ ADV
1	14	9.00	2.37	19.50
2	24	18.50	11.98	57.17
3	126	12.82	3.56	24.32
4	21	9.05	3.98	21.29
5	26	15.46	16.15	65.38
6	48	7.65	3.78	20.17
7	40	8.75	5.45	26.70
8				
TOTAL	299	13.09	6.18	33.51

Road: 8 **5090008 ALLANOOKA SPRINGS ROAD**

COUNT#	SLK	DATES		Number of vehicles by Class												TOTALS		
		Start	Finish	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	ESA	EQ ADV
1	33.2	31/08/2018	9/10/2018	9028	809	3614	446	59	298	331	84	247	65	213	1	15195	6553.4	40155
2	0.0	24/02/2019	25/03/2019	8310	672	1661	200	12	86	115	48	228	68	538	1	11939	5916.5	31296
3	7.0	11/01/2021	14/03/2021	16368	1117	863	363	93	70	90	64	355	100	665	1	20149	7239.3	42165
4	7.0	8/04/2022	25/05/2022	11959	1351	934	248	42	69	92	48	328	83	1709	5	16868	12706.5	53238
5																0	0.0	0
Total				**45665**	**3949**	**7072**	**1257**	**206**	**523**	**628**	**244**	**1158**	**316**	**3125**	**8**	**64151**	**32415.7**	**166854.0**
Multiplier - ESA				*0*	*0*	*0.6*	*1.5*	*3.6*	*1.3*	*1.7*	*2.6*	*3.1*	*5.3*	*5.7*	*10.8*			
Multiplier - EQ ADV				*1*	*1*	*4*	*6*	*8*	*6*	*8*	*10*	*12*	*16*	*16*	*26*			
ESAs				**0.00**	**0.00**	**4243.20**	**1885.50**	**741.60**	**679.90**	**1067.60**	**634.40**	**3589.80**	**1674.80**	**17812.50**	**86.40**			
EQ ADVs				**45665.00**	**3949.00**	**28288.00**	**7542.00**	**1648.00**	**3138.00**	**5024.00**	**2440.00**	**13896.00**	**5056.00**	**50000.00**	**208.00**			

Count #	Days	Avg Daily Veh	Avg Daily ESA	Avg EQ ADV
1	39	389.62	168.04	1029.62
2	29	411.69	204.02	1079.17
3	62	324.98	116.76	680.08
4	47	358.89	270.35	1132.72
5	0	0.00	0.00	0.00
TOTAL	**177**	**362.44**	**183.14**	**942.68**

Road: 7 5090007 BURMA ROAD

COUNT#	SLK	DATES		Number of vehicles by Class												TOTALS		
		Start	Finish	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	ESA	EQ ADV
1	1.0	31/08/2018	22/10/2018	336	27	94	5	1	0	10	3	5	2	3	0	486	135.5	1027
2																0	0.0	0
3																0	0.0	0
4																0	0.0	0
5																0	0.0	0
Total				336	27	94	5	1	0	10	3	5	2	3	0	486	135.5	1027.0
Multiplier - ESA				*0*	*0*	*0.6*	*1.5*	*3.6*	*1.3*	*1.7*	*2.6*	*3.1*	*5.3*	*5.7*	*10.8*			
Multiplier - EQ ADV				*1*	*1*	*4*	*6*	*8*	*6*	*8*	*10*	*12*	*16*	*16*	*26*			
ESAs				0.00	0.00	56.40	7.50	3.60	0.00	17.00	7.80	15.50	10.60	17.10	0.00			
EQ ADVs				336.00	27.00	376.00	30.00	8.00	0.00	80.00	30.00	60.00	32.00	48.00	0.00			

Count #	Days	Avg Daily Veh	Avg Daily ESA	Avg EQ ADV
1	52	9.35	2.61	19.75
2	0	0.00	0.00	0.00
3	0	0.00	0.00	0.00
4	0	0.00	0.00	0.00
5	0	0.00	0.00	0.00
TOTAL	52	9.35	2.61	19.75

Rodenticides | Australian Pesticides and Veterinary Medicines Authority (apvma.gov.au)

What are rodenticides?

Rodenticides are poisons that are manufactured into bait and used to control rodents, such as rats and mice. There are several types of rodenticides approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA), including anticoagulant rodenticides and the non-anticoagulant rodenticides zinc phosphide, cholecalciferol, bromethalin and strychnine.

Rodenticide products currently registered by the APVMA have varied uses approved based on the type of poison (i.e. active constituent) they contain and the specific risks these poisons present to humans and other non-target organisms. These uses may include in and around domestic, commercial, industrial and agricultural buildings and/or in crops. Label directions for rodenticide products can be accessed on our PubCRIS database, and include restraints to control how the products are used and mitigate the risks.

What is an anticoagulant rodenticide?

Anticoagulant rodenticides are a class of poisons used to kill rodents. In simple terms, anticoagulant rodenticides work by preventing blood from clotting, which results in death in rodents from internal or external bleeding typically 5 to 10 days after a lethal dose has been consumed.

Anticoagulant rodenticide baits are formulated in various ways, including blocks, pellets and treated grains, gels, powders and pastes, and are classified into 2 groups: first-generation and second-generation.

First-generation anticoagulant rodenticides

First-generation anticoagulant rodenticides (FGARs) are referred to as ‘multi-dose anticoagulants’, meaning that rodents must consume these baits for several consecutive feedings to consume a lethal dose. FGARs break down in rodents

quicker than second-generation anticoagulant rodenticides, so there is less chance of secondary poisoning occurring in non-target animals if they eat rodents poisoned with an FGAR.

There are 3 FGAR active constituents currently registered for use in Australia: warfarin, coumatetralyl and diphacinone. These FGARs are currently approved by the APVMA for use in and around domestic, commercial, industrial and agricultural buildings. Coumatetralyl is approved for use in crops, but only for use in covered bait stations as part of a comprehensive rodent control program.

Second-generation anticoagulant rodenticides

Second-generation anticoagulant rodenticides (SGARs) are referred to as 'single-dose anticoagulants'. A lethal dose can be ingested in a single feeding, making SGARs substantially more potent than FGARs. SGARs are slower to break down than FGARs and pose a higher risk of secondary poisoning to non-target animals.

There are 5 SGAR active constituents currently registered for use in Australia: brodifacoum, bromadiolone, difethialone, difenacoum and flocoumafen.

These SGARs have been approved by the APVMA for use in and around domestic, commercial, industrial and agricultural buildings. SGARs are not approved for use in crops, in the open, or in other areas accessible to non-target animals or children.

The APVMA's review of anticoagulant rodenticides

The APVMA has commenced a reconsideration of anticoagulant rodenticide approvals and registrations in accordance with Part 2, Division 4 of the Agvet Code, to reassess the potential risks associated with the use of these products and consider whether labels carry adequate instructions to protect the health and safety of people, animals, and the environment.

What is zinc phosphide?

Zinc phosphide is an inactive form of nerve toxin used in rodenticide baits. When it is eaten by a rodent it reacts with stomach acids and releases phosphine gas. The rodent then becomes sluggish and loses interest in food, which progresses to the rodent going into a coma and then dying, which typically happens quickly after consuming a fatal dose.

The phosphine gas in zinc phosphide baits can be released when the bait becomes wet. As a result, the use of products containing zinc phosphide is not approved by the APVMA for use in enclosed environments such as small buildings or houses.

If a zinc phosphide bait becomes wet in an outdoor environment, the phosphine gas will disperse quickly as the fresh air works to prevent a hazardous build-up of the toxic gas. Zinc phosphide products are currently approved by the APVMA for use outside of buildings (such as sheds, factories and food production facilities) and for use within crops, with controls in place to prevent the consumption of baits by non-target species. These include not applying the bait:

- in a trail
- to the outer 50 metres of a crop
- until mouse numbers are high enough to rapidly eat the bait.

A condition of using zinc phosphide baits outside of buildings and within crops is to conduct monitoring during a ‘pre-baiting period’. If non-target species are observed feeding in the area during this period then zinc phosphide baits should not be used. In addition, if vulnerable, threatened, endangered or critically endangered species are known to occur or feed in the area then the baits should not be used.

What is the difference between zinc phosphide and anticoagulant rodenticides?

A key difference between zinc phosphide and anticoagulant rodenticides is how long the chemical remains in the rodent's body after death, and how quickly the rodent dies after eating bait formulated with the chemical.

Rodents that have eaten bait formulated with zinc phosphide typically die quickly after consuming a fatal dose. Once the rodent has been killed there is very little residual poison left in the body, which reduces the risk of secondary poisoning to non-target animals.

In comparison, high levels of anticoagulant rodenticide residue can remain in a rodent's body after death, in particular for SGARs. In the case of SGARs, a rodent can continue to feed on the poison in the 5 to 10 days it may take for the rodent to die after consuming a lethal dose, which could result in even higher levels of poison remaining in the rodent's body. This also increases the risk of secondary poisoning to non-target animals that may consume a rodent already poisoned with SGARs.

What rodenticides have been approved for use in crop situations?

Several registered products containing zinc phosphide have been approved by the APVMA under emergency permit for use in crops under specific conditions. Copies of these approvals can be found on the APVMA's Permits database.

Coumatetralyl, an FGAR, is approved for use in a limited range of crops under specific conditions as part of a comprehensive rodent control program. Cholecalciferol, another chemical used in rodenticide baits, is registered for use in macadamia and orchards as part of a specific management strategy.

Why is the use of second-generation anticoagulant rodenticides in crop situations not approved?

SGARs pose a greater secondary poisoning risk than zinc phosphide, the FGAR coumatetralyl and cholecalciferol. Currently, they are only approved for use in certain situations in and around buildings. This use is considered, in general, to present a lower risk to non-target species due to a lack of direct access to the bait and more restricted access of predators to poisoned mice under the conditions of use set out on the product labels.

Recent applications for the use of SGARs in crop situations

On 13 May 2021, the APVMA received 2 applications from the New South Wales Department of Primary Industries (NSW DPI) seeking emergency use permits to use an unregistered bromadiolone-based product around the perimeter of crops. One application was subsequently withdrawn by NSW DPI on 9 June 2021.

On 23 June 2021, the APVMA issued NSW DPI with a proposed decision to refuse the emergency permit application for bromadiolone, as the APVMA could not be satisfied the use of the product met the statutory criteria, specifically in relation to:

- the environment, including the risks of secondary poisoning to non-target species including birds, fish and reptiles
- residues, including the toxicity of the chemical to people who may eat predatory freshwater fish (such as Murray cod) or reptiles (such as goannas or snakes) harvested from treated areas.

NSW DPI was provided 28 days to respond to the proposed decision. The APVMA did not receive a response to the proposed decision and on 22 July 2021, the APVMA issued a notice to NSW DPI refusing the application.

What are the statutory criteria?

Before a chemical product can be sold in Australia or a permit can be issued, it must first go through a scientific assessment by the APVMA so we can determine if it meets the statutory criteria for safety, efficacy, trade and labelling, to ensure the proposed use pattern(s):

- will not be harmful to human beings
- will not have an unintended effect that is harmful to animals, plants or things, or to the environment
- will be effective when used as directed
- will not unduly prejudice trade.

The label for the chemical product is also assessed to determine it meets the statutory criteria for labelling.

This process provides Australians with confidence that agricultural and veterinary (agvet) chemical products registered by the APVMA or approved under permit are safe and effective to use in accordance with label directions or permit conditions.

How does the APVMA determine if a product or permit meets the statutory criteria?

The APVMA uses a risk-based approach to determine the safety of the proposed use of a product or permit. The first step of this process is to assess the hazard of the product by reviewing the results of scientific tests, information available in published scientific literature, and the data provided by the applicant.

Once we've determined the potential hazard of the product, the next step is to assess the exposure resulting from its use by undertaking a risk assessment to consider whether the proposed use of the product would not be likely to have an effect that is harmful to human beings or have an unintended effect that is harmful to animals, plants or the environment.

In assessing the potential risks to people, we consider the possible effects of handling or using the product, from consuming food containing its residues and contact after the product has been used. For rodenticides, the effects of handling rodent carcasses are also considered.

As part of our environmental safety assessment, we consider the potential for off-target poisoning. This includes primary and secondary poisoning and poisoning through the food chain.

For rodenticides, primary poisoning can include the consumption of the bait by animals (such as birds) that are not the intended target. It can also include effects from the bait on species that live in soil that may come into contact with the bait, as well as potential effects in contaminated waterways.

Secondary poisoning occurs through the consumption of poisoned animals either before or after death. The possibility of accumulation in the food chain (when primary predators are not necessarily affected but higher predators may be poisoned due to higher levels of poison in the animals they prey on) is also considered as part of our environmental safety assessment.

What is a ‘risk-based approach’?

In determining whether a product or permit meets the statutory criteria, we use a risk-based approach that considers the full range of hazards and risks associated with the proposed use(s) of the product or permit, and how the risk to people, animals and the environment can be minimised through instructions for use and safety directions.

The hazard of a product is based on the inherent properties of an active constituent or formulated product to cause harm. This assessment sets out how poisonous a product may be.

An exposure assessment is carried out to determine the amount of the product or active a person, an animal, or the environment will be exposed to during and after use of the product in line with the label directions.

The risk assessment then considers the effects of the active or product, along with the exposure, to determine whether the overall risk is acceptable. Where a product is of very low toxicity, a larger exposure is possible before it is of concern. However, where a product is very toxic only a small amount of exposure would be acceptable.

The possibility to lower the risk of a product, usually through limiting the exposure to the product, is considered as part of the risk management strategy inherent in a risk-based approach. If the risk cannot be lowered to an acceptable level, the use is not considered to be acceptable.

How do I use rodenticide baits safely?

Rodenticide baits approved by the APVMA are safe to use according to label directions or permit conditions. To check whether a product has been approved by the APVMA, you should flip the pack and check the back for an APVMA approval number.

Rodenticide baits are toxic to humans and animals and may cause severe health issues if not used in accordance with the approved label directions or permit conditions. Users of rodenticide baits must always read and comply with these directions or conditions, including wearing the appropriate personal protective equipment (PPE) when handling rodenticides, checking on bait stations or handling rodent carcasses.

Who can I contact about the use of rodenticides?

The APVMA regulates agvet chemical products up to and including the point of retail sale. Queries about the use of rodenticide baits should be directed to your state or territory regulator.

Rodenticides | Australian Pesticides and Veterinary Medicines Authority (apvma.gov.au)

What are rodenticides?

Rodenticides are poisons that are manufactured into bait and used to control rodents, such as rats and mice. There are several types of rodenticides approved by the Australian Pesticides and Veterinary Medicines Authority (APVMA), including anticoagulant rodenticides and the non-anticoagulant rodenticides zinc phosphide, cholecalciferol, bromethalin and strychnine.

Rodenticide products currently registered by the APVMA have varied uses approved based on the type of poison (i.e. active constituent) they contain and the specific risks these poisons present to humans and other non-target organisms. These uses may include in and around domestic, commercial, industrial and agricultural buildings and/or in crops. Label directions for rodenticide products can be accessed on our PubCRIS database, and include restraints to control how the products are used and mitigate the risks.

What is an anticoagulant rodenticide?

Anticoagulant rodenticides are a class of poisons used to kill rodents. In simple terms, anticoagulant rodenticides work by preventing blood from clotting, which results in death in rodents from internal or external bleeding typically 5 to 10 days after a lethal dose has been consumed.

Anticoagulant rodenticide baits are formulated in various ways, including blocks, pellets and treated grains, gels, powders and pastes, and are classified into 2 groups: first-generation and second-generation.

First-generation anticoagulant rodenticides

First-generation anticoagulant rodenticides (FGARs) are referred to as ‘multi-dose anticoagulants’, meaning that rodents must consume these baits for several consecutive feedings to consume a lethal dose. FGARs break down in rodents

quicker than second-generation anticoagulant rodenticides, so there is less chance of secondary poisoning occurring in non-target animals if they eat rodents poisoned with an FGAR.

There are 3 FGAR active constituents currently registered for use in Australia: warfarin, coumatetralyl and diphacinone. These FGARs are currently approved by the APVMA for use in and around domestic, commercial, industrial and agricultural buildings. Coumatetralyl is approved for use in crops, but only for use in covered bait stations as part of a comprehensive rodent control program.

Second-generation anticoagulant rodenticides

Second-generation anticoagulant rodenticides (SGARs) are referred to as 'single-dose anticoagulants'. A lethal dose can be ingested in a single feeding, making SGARs substantially more potent than FGARs. SGARs are slower to break down than FGARs and pose a higher risk of secondary poisoning to non-target animals.

There are 5 SGAR active constituents currently registered for use in Australia: brodifacoum, bromadiolone, difethialone, difenacoum and flocoumafen.

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The APVMA's review of anticoagulant rodenticides

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The phosphine gas in zinc phosphide baits can be released when the bait becomes wet. As a result, the use of products containing zinc phosphide is not approved by the APVMA for use in enclosed environments such as small buildings or houses.

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