

12 August 2022

Andrew McIntyre
Manager Development Services
Transport for NSW
Level 1, 51-55 Currajong Street
Parkes NSW 2870

Re: SSD-5285-Mod-1: Balranald Mineral Sands Mine Extension of underground mining trial

Dear Andrew,

This letter responds to the traffic related matters raised by Transport for NSW's (TfNSW) agency ¹submission on Iluka Resources Limited (Iluka) proposed modification to State Significant Development (SSD) 5285 for the Balranald Mineral Sands Mine Extension of underground mining trial.

Specifically, TfNSW requested clarification on the following transport matters:

- TIA conclusions are based on traffic volumes only and does not consider vehicle types.
- TfNSW does not support the proposed changes to the approved conditions due to consideration of traffic volume composition (ie high proportion of laden heavy vehicles generated by the development and existing traffic on an approved road-train route), and the signposted speed environment (eg 100 km/h on the highway and major roads).
- It is unclear as to whether haulage of any material off-site has occurred since the SSD-5285 consent was granted.

1 Background

Iluka Resources Limited (Iluka) have approval to develop a mineral sand mine in south-western New South Wales (NSW), known as the Balranald Mineral Sands Project (the Balranald Project).

The Balranald Project includes construction, open-cut mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald (Balranald town), respectively. It also included undertaking an approved bulk sampling activity at the West Balranald deposit with the removal of up to 100,000 tonnes (t) of mineral ore to trial the use of underground mining methods. The consent however did not approve Iluka to transport mineral ore offsite during the bulk sampling activity.

¹ TfNSW letter dated 4 August 2022

Development Consent No. SSD-5285 was granted for the Balranald Project by a delegate of the NSW Minister for Planning under the NSW *Environmental Planning and Assessment Act 1979* (EP&A) on 5 April 2016 (herein referred to as the consent).

Since the consent was granted:

- no mineral ore has been transported off-site; and
- no open-cut mining activities, associated surface infrastructure or public road upgrades were required to be established.

Iluka has however undertaken the approved bulk sampling activity involving the extraction of the mineral ore from depth, using trial underground mining methods within the approved disturbance area of the West Balranald deposit.

2 MOD1 application

Iluka is seeking to modify the consent (MOD1) under Section 4.55(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to extend the approved underground mining trial for up to six years. Iluka propose no change to the open cut mining method for the West Balranald and Nepean mines approved under the consent.

The proposed MOD1 involves:

- continuing underground mining within a portion of the approved disturbance footprint of the West Balranald deposit pursuant to the consent (ie mining area);
- development of approved mineral processing infrastructure within a proposed new area of disturbance (ie surface infrastructure); and
- intersection upgrades commensurate with traffic impacts. For the purpose of MOD1, Iluka propose the existing SSD-5285 traffic and transport conditions of consent remain as approved, with new conditions.

2.1 Type of trucks

The MOD1 application was accompanied by an updated Traffic Impact Assessment (TIA)² which outlined the longest size of trucks to use public roads for MOD1 are 26 m long B-double trucks.

2.2 Traffic impact assessment

The TIA provided a comparison of predicted traffic impacts of the proposed modification against the traffic impacts estimated for the approved Balranald Project.

The TIA highlighted that for MOD1 there will be significantly reduced daily and peak hourly traffic volumes travelling through the three affected intersections requiring upgrades. The reduced daily traffic volumes are extracted from Tables 3.5 and 3.9 of the TIA and are presented in Table 2.1.

² EMM traffic impact assessment dated 28 April 2022

Table 2.1 Comparison of EIS and MOD1 traffic movements at the subject three affected intersections

Road	Assessment	EIS cumulative daily traffic volumes		MOD1 cumulative daily traffic volumes		Change in traffic volumes	
		All traffic	Heavy vehicles	All traffic	Heavy vehicles	All traffic %	
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	Construction	755	264	481	102	-274	-36%
McCabe Street (southern end)		309	193	216	110	-93	-30
Balranald-Tooleybuc Road (northern section)		751	272	711	198	-40	-5%
Balranald-Ivanhoe Road (5 km north of Sturt Highway)	Operation	798	298	600	197	-198	-25%
McCabe Street (southern end)		354	226	266	149	-88	-25
Balranald-Tooleybuc Road (northern section)		813	310	775	239	-38	-5%

The estimated traffic volumes for MOD1 shows that in all three intersections, traffic volumes would be less compared to approved EIS estimated volumes.

Based on the revised traffic volumes for MOD1, updated intersection warrant assessments were undertaken for the three affected intersections in accordance with Austroads Guide to Road Design Part 4, Intersections and Crossings General 2017b (Figure 2.1).

It should be noted that Austroads Guide to Road Design Part 4: Intersections and Crossings – General (Section A.8) states that:

“Traffic flows applicable to the warrants are peak hour flows, with each vehicle counted as one unit (i.e. do not use equivalent passenger car units [pcus])”

Therefore, Austroads turn warrant assessment is independent to vehicle type.

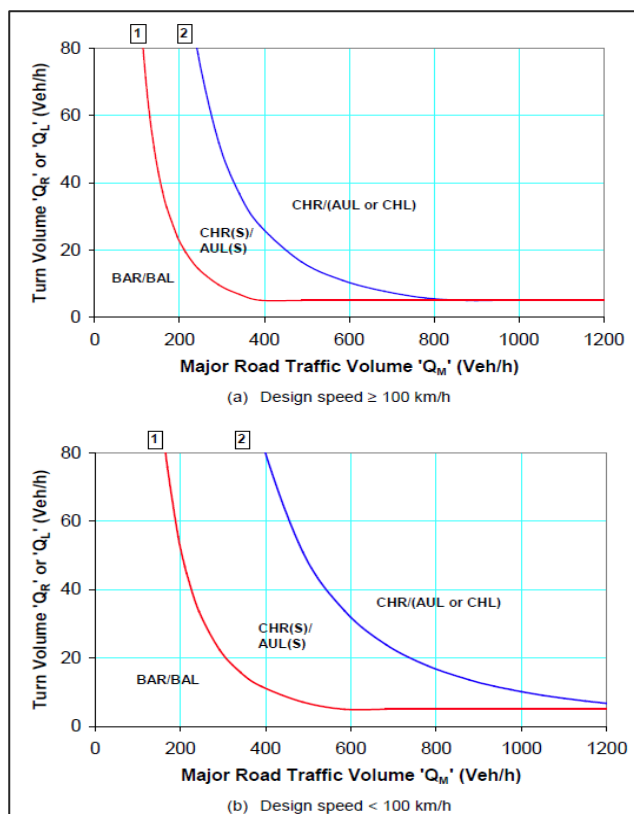


Figure 2.1 Austroads warrant design charts for rural intersection turning lanes

A comparison of the updated warrant assessment for MOD1 against the approved EIS is tabulated in Table 2.2.

Table 2.2 A comparison of Austroads EIS and MOD1 intersection upgrades

Intersection	EIS warrant	MOD1 warrant
Balranald-Ivanhoe Road/West-Balranald mine access road	Auxiliary Left Turn (AUL) and Basic Right Turn (BAR) treatment	A BAR and Basic Left Turn (BAL) treatment
McCabe Street/Balranald-Ivanhoe Road (MR67)	AUL and BAR treatment	BAR and BAL treatment
Sturt Highway (HW14)/Balranald-Tooleybuc Road	CHR (channelised right turn) bay on Sturt Highway	CHR (Short)

2.3 SIDRA modelling

SIDRA analysis³ has been undertaken for the above three intersections to determine the delay and queuing as part of the MOD1 traffic. The SIDRA results for MOD1 construction and operation are presented in Tables 2.3 to Table 2.5.

Table 2.3 SIDRA modelling result for Balranald Ivanhoe/West Balranald Mine Access intersection

Control/ Scenarios	AM peak					PM Peak				
Priority controlled	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)
Construction scenario	105	8.9	A	0.034	0.6 (west approach)	118	9.0	A	0.038	0.6 (west approach)
Operation scenario	126	9.7	A	0.045	0.9 (west approach)	126	9.7	A	0.044	0.9 (west approach)

Table 2.4 SIDRA modelling result for Balranald-Ivanhoe Road/McCabe Street intersection

Control/ Scenarios	AM peak					PM Peak				
Priority controlled	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)
Construction scenario	97	9.1	A	0.031	0.5 (east approach)	111	9.2	A	0.036	0.5 (east approach)
Operation scenario	154	9.5	A	0.053	1.1 (east approach)	154	9.6	A	0.052	1.0 (east approach)

Table 2.5 SIDRA modelling result for Sturt Highway/Tooleybuc Road intersection

Control/ Scenarios	AM peak					PM Peak				
Priority controlled	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)	Intersection volume	DEL(s)	LOS	DOS	Q95 in m (approach)
Construction scenario	153	10.2	A	0.033	1.2 (south- west approach)	175	9.9	A	0.038	1.3 (south-west approach)

³ Intersection count data is not available for three subject intersections. Therefore, the peak hourly through traffic and turn movements for each approach have been extrapolated from the historic baseline tube traffic count data for the existing roads and the forecast peak hourly project traffic demand for the MOD1 application construction and operations traffic, combined with the relevant forecast peak hourly traffic demand from the Atlas-Campaspe (now Tronox) mining project, which may operate concurrently with the MOD1 traffic.

Operation scenario	173	10.5	A	0.045	1.7 (south-west approach)	195	10.2	A	0.051	1.9 (south-west approach)
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The SIDRA results show that:

- both the AM and PM peak hours, all three intersections will operate at LOS A with minimal delay, even for the minor approaches; and
- for Sturt Highway/Tooleybuc Road (Mallee Highway), there will be queuing for a maximum one vehicle on any approach to the intersection.

The proposed type CHR(S) right turn bay from Sturt Highway to Tooleybuc Road, which would have a combined length of 96 m⁴ including taper, is sufficient to cater for the forecast demand and there will not be any traffic impact on the south-eastbound through movement on the highway. The SIDRA layouts (proposed with MOD1 development) and the associated results for each intersection are presented in Appendix A.

3 Conclusion

The proposed modification warrants granting of approval from a traffic and transport perspective with new conditions of consent for intersection upgrades based on the TIA findings, turning lane warrant analysis and SIDRA results.

I trust the above information meets your requirements, however, please feel free to call me on 0425 478 650 if you require any further clarification.

Yours sincerely



Abdullah Uddin
Associate Traffic Engineer
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⁴ Based on Austroads assessment

Appendix A

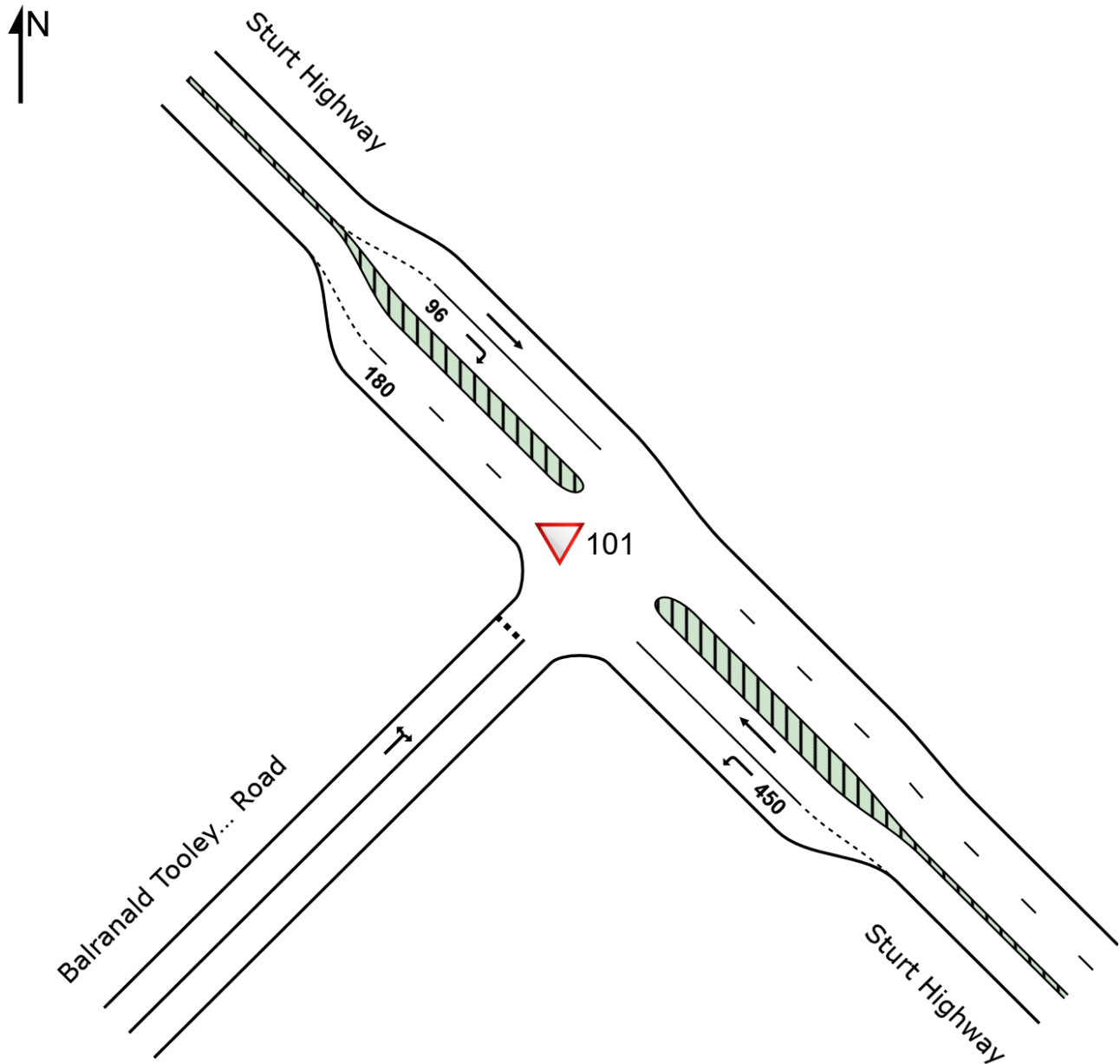
SIDRA layouts and results

SITE LAYOUT

▽ Site: 101 [Sturt Highway/Tooleybuc Road (Mallee Highway)
proposed CHR(S) intersection AM Peak (Site Folder:
Construction scenario (proposed intersection))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

▼ Site: 101 [Sturt Highway/Tooleybuc Road (Mallee Highway)
proposed CHR(S) intersection AM Peak (Site Folder:
Construction scenario (proposed intersection))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				km/h
SouthEast: Sturt Highway														
21	L2	18	5	19	27.8	0.012	8.0	LOS A	0.0	0.0	0.00	0.65	0.00	61.3
22	T1	51	16	54	31.4	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
Approach		69	21	73	30.4	0.033	2.1	NA	0.0	0.0	0.00	0.17	0.00	80.2
NorthWest: Sturt Highway														
28	T1	51	16	54	31.4	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
29	R2	7	5	7	71.4	0.008	9.5	LOS A	0.0	0.3	0.21	0.60	0.21	52.4
Approach		58	21	61	36.2	0.033	1.1	NA	0.0	0.3	0.03	0.07	0.03	82.8
SouthWest: Balranald Tooleybuc Road														
30	L2	8	6	8	75.0	0.033	10.2	LOS A	0.1	1.2	0.23	0.63	0.23	50.7
32	R2	18	5	19	27.8	0.033	9.6	LOS A	0.1	1.2	0.23	0.63	0.23	62.0
Approach		26	11	27	42.3	0.033	9.8	LOS A	0.1	1.2	0.23	0.63	0.23	58.0
All Vehicles		153	53	161	34.6	0.033	3.0	NA	0.1	1.2	0.05	0.21	0.05	76.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▼ Site: 101 [Sturt Highway/Tooleybuc Road (Mallee Highway)
proposed CHR(S) intersection PM Peak (Site Folder:
Construction scenario (proposed intersection))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
SouthEast: Sturt Highway														
21	L2	16	5	17	31.3	0.011	8.1	LOS A	0.0	0.0	0.00	0.65	0.00	60.4
22	T1	56	17	59	30.4	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
Approach		72	22	76	30.6	0.036	1.8	NA	0.0	0.0	0.00	0.14	0.00	81.1
NorthWest: Sturt Highway														
28	T1	56	17	59	30.4	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
29	R2	16	8	17	50.0	0.016	8.9	LOS A	0.1	0.6	0.21	0.60	0.21	56.9
Approach		72	25	76	34.7	0.036	2.0	NA	0.1	0.6	0.05	0.13	0.05	79.6
SouthWest: Balranald Tooleybuc Road														
30	L2	15	7	16	46.7	0.038	9.4	LOS A	0.1	1.3	0.22	0.63	0.22	57.0
32	R2	16	5	17	31.3	0.038	9.9	LOS A	0.1	1.3	0.22	0.63	0.22	60.9
Approach		31	12	33	38.7	0.038	9.7	LOS A	0.1	1.3	0.22	0.63	0.22	59.0
All Vehicles		175	59	184	33.7	0.038	3.3	NA	0.1	1.3	0.06	0.23	0.06	75.5

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MOVEMENT SUMMARY

▼ Site: 101 [Sturt Highway/Tooleybuc Road (Mallee Highway)
proposed CHR(S) intersection AM Peak (Site Folder: Operation
scenario (proposed intersection))]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
SouthEast: Sturt Highway														
21	L2	20	6	21	30.0	0.014	8.1	LOS A	0.0	0.0	0.00	0.65	0.00	60.7
22	T1	53	18	56	34.0	0.035	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
Approach		73	24	77	32.9	0.035	2.2	NA	0.0	0.0	0.00	0.18	0.00	79.4
NorthWest: Sturt Highway														
28	T1	52	17	55	32.7	0.034	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
29	R2	14	12	15	85.7	0.016	9.9	LOS A	0.1	0.8	0.23	0.60	0.23	49.7
Approach		66	29	69	43.9	0.034	2.1	NA	0.1	0.8	0.05	0.13	0.05	76.8
SouthWest: Balranald Tooleybuc Road														
30	L2	14	12	15	85.7	0.045	10.5	LOS A	0.2	1.7	0.23	0.64	0.23	48.7
32	R2	20	6	21	30.0	0.045	9.9	LOS A	0.2	1.7	0.23	0.64	0.23	61.2
Approach		34	18	36	52.9	0.045	10.1	LOS A	0.2	1.7	0.23	0.64	0.23	55.4
All Vehicles		173	71	182	41.0	0.045	3.7	NA	0.2	1.7	0.06	0.25	0.06	72.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: \\emmsvr1\EMM3\2020\S200529 - Balranald Modification of Development Consent Stage 2\Technical studies\Transport\SIDRA\S200529_SIDRA_v1_10 August 2022.sip9

MOVEMENT SUMMARY

▼ Site: 101 [Sturt Highway/Tooleybuc Road (Mallee Highway)
proposed CHR(S) intersection PM Peak (Site Folder: Operation
scenario (proposed intersection))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
SouthEast: Sturt Highway														
21	L2	18	6	19	33.3	0.012	8.2	LOS A	0.0	0.0	0.00	0.65	0.00	59.8
22	T1	57	18	60	31.6	0.037	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
Approach		75	24	79	32.0	0.037	2.0	NA	0.0	0.0	0.00	0.16	0.00	80.2
NorthWest: Sturt Highway														
28	T1	58	19	61	32.8	0.038	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	90.0
29	R2	22	14	23	63.6	0.024	9.3	LOS A	0.1	1.0	0.22	0.60	0.22	53.9
Approach		80	33	84	41.3	0.038	2.6	NA	0.1	1.0	0.06	0.17	0.06	76.0
SouthWest: Balranald Tooleybuc Road														
30	L2	22	14	23	63.6	0.051	9.9	LOS A	0.2	1.9	0.22	0.64	0.22	53.1
32	R2	18	6	19	33.3	0.051	10.2	LOS A	0.2	1.9	0.22	0.64	0.22	60.3
Approach		40	20	42	50.0	0.051	10.1	LOS A	0.2	1.9	0.22	0.64	0.22	56.1
All Vehicles		195	77	205	39.5	0.051	3.9	NA	0.2	1.9	0.07	0.26	0.07	72.2

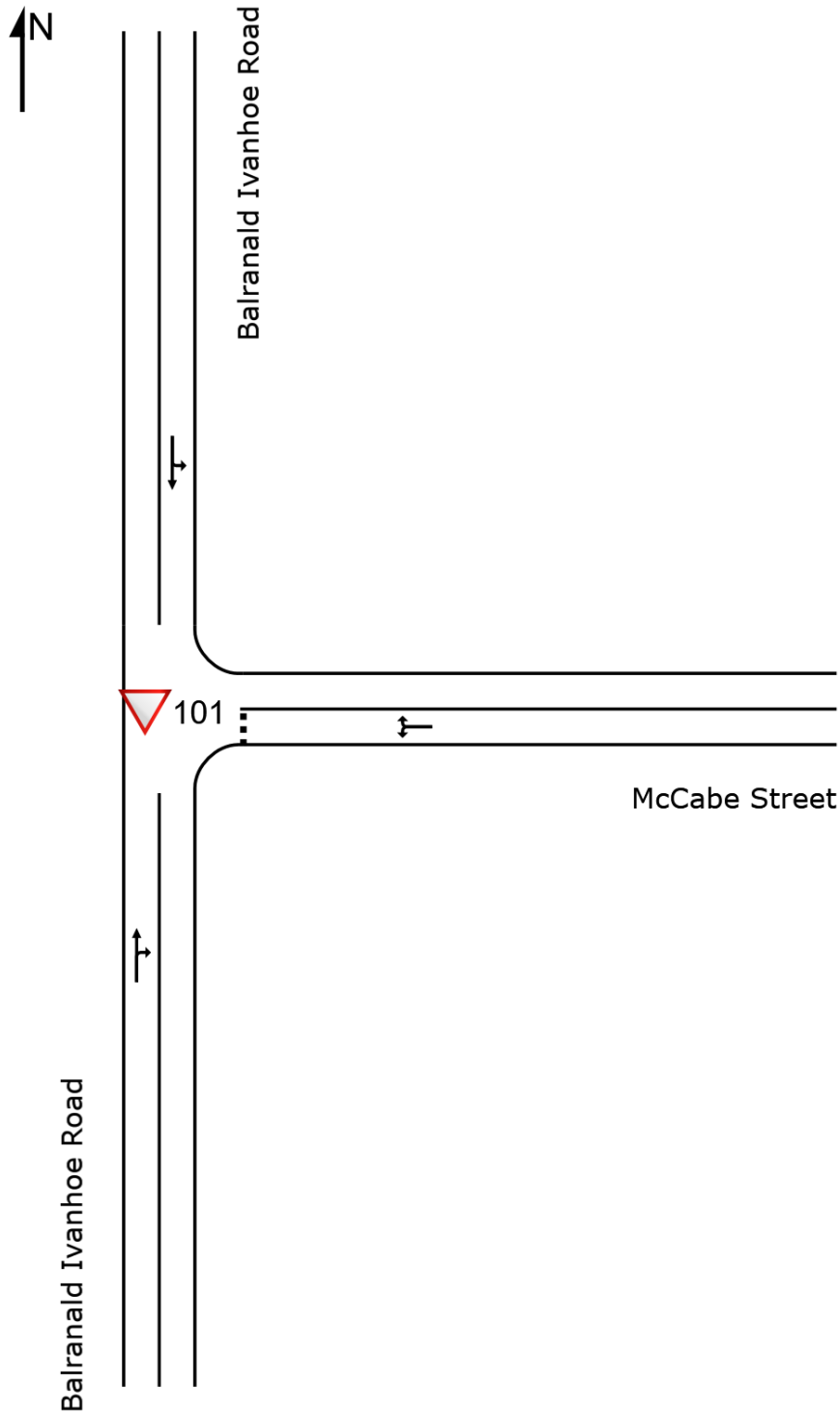
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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

▽ Site: 101 [Balranald-Ivanhoe Road/McCabe Street intersection AM Peak (Site Folder: Construction scenario (existing intersections))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Balranald-Ivanhoe Road/McCabe Street intersection AM Peak (Site Folder: Construction scenario (existing intersections))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
2	T1	34	9	36	26.5	0.023	0.0	LOS A	0.0	0.1	0.02	0.04	0.02	98.9
3	R2	2	1	2	50.0	0.023	9.0	LOS A	0.0	0.1	0.02	0.04	0.02	60.3
Approach		36	10	38	27.8	0.023	0.5	NA	0.0	0.1	0.02	0.04	0.02	95.5
East: McCabe Street														
4	L2	2	1	2	50.0	0.017	8.0	LOS A	0.1	0.5	0.17	0.61	0.17	55.6
6	R2	13	7	14	53.8	0.017	8.1	LOS A	0.1	0.5	0.17	0.61	0.17	53.9
Approach		15	8	16	53.3	0.017	8.1	LOS A	0.1	0.5	0.17	0.61	0.17	54.1
North: Balranald Ivanhoe Road														
7	L2	12	6	13	50.0	0.031	9.1	LOS A	0.0	0.0	0.00	0.18	0.00	66.0
8	T1	34	9	36	26.5	0.031	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	96.0
Approach		46	15	48	32.6	0.031	2.4	NA	0.0	0.0	0.00	0.18	0.00	85.8
All Vehicles		97	33	102	34.0	0.031	2.6	NA	0.1	0.5	0.03	0.19	0.03	81.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 101 [Balranald-Ivanhoe Road/McCabe Street intersection PM Peak (Site Folder: Construction scenario (existing intersections))]**

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
2	T1	41	10	43	24.4	0.027	0.0	LOS A	0.0	0.1	0.02	0.03	0.02	99.1
3	R2	2	1	2	50.0	0.027	9.1	LOS A	0.0	0.1	0.02	0.03	0.02	60.4
Approach		43	11	45	25.6	0.027	0.4	NA	0.0	0.1	0.02	0.03	0.02	96.2
East: McCabe Street														
4	L2	2	1	2	50.0	0.015	8.1	LOS A	0.0	0.5	0.18	0.61	0.18	55.6
6	R2	12	6	13	50.0	0.015	8.1	LOS A	0.0	0.5	0.18	0.61	0.18	54.7
Approach		14	7	15	50.0	0.015	8.1	LOS A	0.0	0.5	0.18	0.61	0.18	54.8
North: Balranald Ivanhoe Road														
7	L2	13	7	14	53.8	0.036	9.2	LOS A	0.0	0.0	0.00	0.16	0.00	65.2
8	T1	41	10	43	24.4	0.036	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	96.6
Approach		54	17	57	31.5	0.036	2.2	NA	0.0	0.0	0.00	0.16	0.00	86.6
All Vehicles		111	35	117	31.5	0.036	2.3	NA	0.0	0.5	0.03	0.17	0.03	83.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 101 [Balranald-Ivanhoe Road/McCabe Street intersection AM Peak (Site Folder: Operation scenario (existing intersections))]**

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
2	T1	52	21	55	40.4	0.039	0.0	LOS A	0.0	0.3	0.04	0.05	0.04	98.3
3	R2	4	2	4	50.0	0.039	9.2	LOS A	0.0	0.3	0.04	0.05	0.04	60.1
Approach		56	23	59	41.1	0.039	0.7	NA	0.0	0.3	0.04	0.05	0.04	94.0
East: McCabe Street														
4	L2	4	2	4	50.0	0.031	8.1	LOS A	0.1	1.1	0.23	0.62	0.23	55.4
6	R2	21	14	22	66.7	0.031	8.8	LOS A	0.1	1.1	0.23	0.62	0.23	51.1
Approach		25	16	26	64.0	0.031	8.7	LOS A	0.1	1.1	0.23	0.62	0.23	51.8
North: Balranald Ivanhoe Road														
7	L2	21	13	22	61.9	0.053	9.5	LOS A	0.0	0.0	0.00	0.19	0.00	62.5
8	T1	52	21	55	40.4	0.053	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	95.7
Approach		73	34	77	46.6	0.053	2.7	NA	0.0	0.0	0.00	0.19	0.00	83.1
All Vehicles		154	73	162	47.4	0.053	3.0	NA	0.1	1.1	0.05	0.21	0.05	78.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 101 [Balranald-Ivanhoe Road/McCabe Street intersection PM Peak (Site Folder: Operation scenario (existing intersections))]**

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
2	T1	52	18	55	34.6	0.038	0.0	LOS A	0.0	0.3	0.04	0.05	0.04	98.4
3	R2	4	2	4	50.0	0.038	9.2	LOS A	0.0	0.3	0.04	0.05	0.04	60.1
Approach		56	20	59	35.7	0.038	0.7	NA	0.0	0.3	0.04	0.05	0.04	94.1
East: McCabe Street														
4	L2	4	2	4	50.0	0.030	8.1	LOS A	0.1	1.0	0.22	0.62	0.22	55.4
6	R2	21	13	22	61.9	0.030	8.7	LOS A	0.1	1.0	0.22	0.62	0.22	52.1
Approach		25	15	26	60.0	0.030	8.6	LOS A	0.1	1.0	0.22	0.62	0.22	52.6
North: Balranald Ivanhoe Road														
7	L2	21	14	22	66.7	0.052	9.6	LOS A	0.0	0.0	0.00	0.19	0.00	61.6
8	T1	52	18	55	34.6	0.052	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	96.4
Approach		73	32	77	43.8	0.052	2.8	NA	0.0	0.0	0.00	0.19	0.00	82.9
All Vehicles		154	67	162	43.5	0.052	3.0	NA	0.1	1.0	0.05	0.21	0.05	78.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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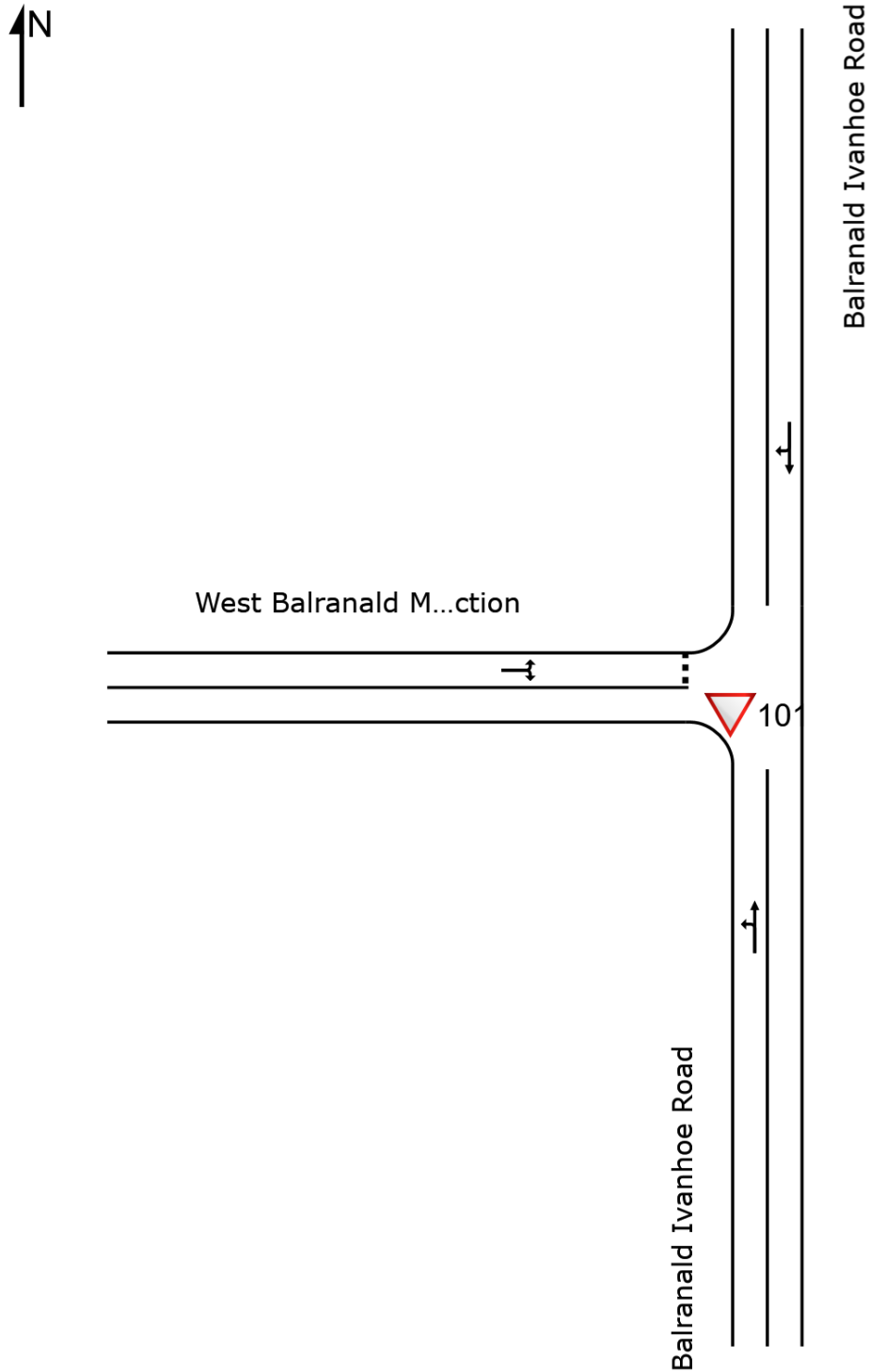
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SITE LAYOUT

▽ Site: 101 [Balranald Ivanhoe/West Balranald Mine Access
intersection AM Peak (Site Folder: Construction scenario
(existing intersections))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

▼ Site: 101 [Balranald Ivanhoe/West Balranald Mine Access intersection AM Peak (Site Folder: Construction scenario (existing intersections))]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
1	L2	18	7	19	38.9	0.034	8.9	LOS A	0.0	0.0	0.00	0.24	0.00	68.3
2	T1	33	9	35	27.3	0.034	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	93.7
Approach		51	16	54	31.4	0.034	3.1	NA	0.0	0.0	0.00	0.24	0.00	82.8
North: Balranald Ivanhoe Road														
8	T1	34	9	36	26.5	0.022	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	99.1
9	R2	1	0	1	0.0	0.022	7.6	LOS A	0.0	0.1	0.01	0.02	0.01	87.4
Approach		35	9	37	25.7	0.022	0.2	NA	0.0	0.1	0.01	0.02	0.01	98.7
West: West Balranald Mine Access intersection														
10	L2	1	0	1	0.0	0.020	7.9	LOS A	0.1	0.6	0.17	0.64	0.17	74.1
12	R2	18	7	19	38.9	0.020	8.9	LOS A	0.1	0.6	0.17	0.64	0.17	60.9
Approach		19	7	20	36.8	0.020	8.8	LOS A	0.1	0.6	0.17	0.64	0.17	61.5
All Vehicles		105	32	111	30.5	0.034	3.2	NA	0.1	0.6	0.03	0.24	0.03	82.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Balranald Ivanhoe/West Balranald Mine Access intersection PM Peak (Site Folder: Construction scenario (existing intersections))]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Balranald Ivanhoe Road														
1	L2	18	7	19	38.9	0.038	8.9	LOS A	0.0	0.0	0.00	0.21	0.00	68.8
2	T1	40	10	42	25.0	0.038	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	94.5
Approach		58	17	61	29.3	0.038	2.7	NA	0.0	0.0	0.00	0.21	0.00	84.7
North: Balranald Ivanhoe Road														
8	T1	40	10	42	25.0	0.026	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	99.2
9	R2	1	0	1	0.0	0.026	7.6	LOS A	0.0	0.1	0.01	0.02	0.01	87.5
Approach		41	10	43	24.4	0.026	0.2	NA	0.0	0.1	0.01	0.02	0.01	98.9
West: West Balranald Mine Access intersection														
10	L2	1	0	1	0.0	0.020	8.0	LOS A	0.1	0.6	0.19	0.64	0.19	74.0
12	R2	18	7	19	38.9	0.020	9.0	LOS A	0.1	0.6	0.19	0.64	0.19	60.9
Approach		19	7	20	36.8	0.020	8.9	LOS A	0.1	0.6	0.19	0.64	0.19	61.5
All Vehicles		118	34	124	28.8	0.038	2.9	NA	0.1	0.6	0.03	0.21	0.03	83.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Balranald Ivanhoe/West Balranald Mine Access intersection AM Peak (Site Folder: Operation scenario (existing intersections))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Balranald Ivanhoe Road														
1	L2	22	13	23	59.1	0.045	9.4	LOS A	0.0	0.0	0.00	0.24	0.00	62.7
2	T1	40	17	42	42.5	0.045	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	94.3
Approach		62	30	65	48.4	0.045	3.3	NA	0.0	0.0	0.00	0.24	0.00	80.0
North: Balranald Ivanhoe Road														
8	T1	40	17	42	42.5	0.028	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	99.0
9	R2	1	0	1	0.0	0.028	7.6	LOS A	0.0	0.1	0.01	0.02	0.01	87.4
Approach		41	17	43	41.5	0.028	0.2	NA	0.0	0.1	0.01	0.02	0.01	98.7
West: West Balranald Mine Access intersection														
10	L2	1	0	1	0.0	0.027	8.0	LOS A	0.1	0.9	0.21	0.64	0.21	73.9
12	R2	22	13	23	59.1	0.027	9.7	LOS A	0.1	0.9	0.21	0.64	0.21	55.8
Approach		23	13	24	56.5	0.027	9.6	LOS A	0.1	0.9	0.21	0.64	0.21	56.4
All Vehicles		126	60	133	47.6	0.045	3.5	NA	0.1	0.9	0.04	0.24	0.04	78.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 Minor Road Approach LOS values are based on average delay for all vehicle movements.
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
 Delay Model: SIDRA Standard (Geometric Delay is included).
 Queue Model: SIDRA Standard.
 Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Balranald Ivanhoe/West Balranald Mine Access intersection PM Peak (Site Folder: Operation scenario (existing intersections))]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] veh/h	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Balranald Ivanhoe Road														
1	L2	22	13	23	59.1	0.044	9.4	LOS A	0.0	0.0	0.00	0.24	0.00	62.9
2	T1	40	14	42	35.0	0.044	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	94.7
Approach		62	27	65	43.5	0.044	3.3	NA	0.0	0.0	0.00	0.24	0.00	80.3
North: Balranald Ivanhoe Road														
8	T1	40	14	42	35.0	0.027	0.0	LOS A	0.0	0.1	0.01	0.02	0.01	99.1
9	R2	1	0	1	0.0	0.027	7.6	LOS A	0.0	0.1	0.01	0.02	0.01	87.5
Approach		41	14	43	34.1	0.027	0.2	NA	0.0	0.1	0.01	0.02	0.01	98.8
West: West Balranald Mine Access intersection														
10	L2	1	0	1	0.0	0.027	8.0	LOS A	0.1	0.9	0.21	0.64	0.21	73.9
12	R2	22	13	23	59.1	0.027	9.7	LOS A	0.1	0.9	0.21	0.64	0.21	55.8
Approach		23	13	24	56.5	0.027	9.6	LOS A	0.1	0.9	0.21	0.64	0.21	56.4
All Vehicles		126	54	133	42.9	0.044	3.5	NA	0.1	0.9	0.04	0.24	0.04	79.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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