

## APPENDIX 4

### Traffic Impact Assessment Addendum



# Addendum to Transport Impact Assessment



**ARDG Stone Ridge Quarry**

Australian Resource Development Group Pty Limited

24 January 2024

→ **The Power of Commitment**



<b>Project name</b>		ARDG - Pac Hwy Intersection Upgrade					
<b>Document title</b>		Addendum to Transport Impact Assessment   ARDG Stone Ridge Quarry – Addendum to Transport Impact Assessment					
<b>Project number</b>		2219467					
<b>File name</b>		2219467-REP-3-TIA_Addendum ARDG 20240116.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	M. Petrusma	A. Sneddon		A. Sneddon		08/09/23
S4	1	M. Fletcher-Kennedy	T. Cooper		A. Sneddon		02/11/23
S4	2	G Wood	A . Sneddon		A. Sneddon		29/11/23
S4	3	M. Fletcher-Kennedy	A. Sneddon		A. Sneddon		24/01/24

**GHD Pty Ltd | ABN 39 008 488 373**

GHD Tower, Level 3, 24 Honeysuckle Drive  
Newcastle, New South Wales 2300, Australia

**T** +61 2 4979 9999 | **F** +61 2 9475 0725 | **E** ntlmail@ghd.com | **ghd.com**

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# 1. Introduction

## 1.1 Background

Australian Resource Development Group Pty Ltd (ARDG) is seeking development consent for a new hard rock quarry known as Stone Ridge Quarry (the project). The project is located within Wallaroo State Forest at Balickera, NSW, approximately 25 kilometres north of Newcastle. The project is seeking access to a high quality, hard rock resource suitable for producing a wide range of quarry products for the Lower Hunter, Central Coast, and northern Sydney construction materials markets (ARDG 2020).

## 1.2 Purpose of this report

### 1.2.1 Submission made to NSW Planning

GHD was previously engaged by ARDG to prepare a Transport Impact Assessment (TIA) to support the preparation of an Environmental Impact Statement (EIS) for a State Significant Development application for the project. The TIA was submitted and subsequently, a submission was made by Boral, the operator of the Seaham Quarry located on the opposite side of Italia Road (refer to Appendix A). The key matters from Boral's submissions are shown below in Figure 1.1.

Boral requests that Australian Resource Development Group (ARDG) provide an updated Transport Impact Assessment to address the following matters:

- Sight distance assessment be undertaken to the left and right along Italia Road in accordance with relevant Austroads guidelines.
- An assessment of the potential impacts of the Boral / Stone Ridge Quarry intersection on Italia Road based on the vehicle movements proposed under both SSD applications and future growth.

*Figure 1.1 Boral Submission*

This report has therefore been prepared as an addendum to the TIA with the purpose of addressing Boral's submission regarding the impact of the Stone Ridge Quarry access on Italia Road.

Compared to the original TIA, this addendum looks at a potential future scenario (Scenario 2 in this report) where the Stone Ridge Quarry is developed and subsequently Seaham Quarry has developed its operations in accordance with a redevelopment currently being planned (SSD-59254474).

Furthermore, this report includes additional sensitivity testing whereby the background traffic volumes along Italia Road are increased to represent hypothetical future year traffic volumes. The +10 year future traffic volumes are based on the base case with 2% pa growth applied over 10 years. This should be considered a sensitivity test on the performance of the intersection.

### 1.2.2 Stakeholder Meeting

On 5 December 2023 a meeting was convened with representatives of Boral, including their engineering consultant. A general discussion was held discussing the proposed response to their submission (as noted above in Section 1.2.1).

A range of items were discussed including intersection performance as noted above, and Boral's concerns with respect to sight distance, and in particular sight distance from the Seaham Quarry access. This matter is explored further in Section 3.

## 1.3 Limitations

This report has been prepared by GHD for Australian Resource Development Group Pty Limited and may only be used and relied on by Australian Resource Development Group Pty Limited for the purpose agreed between GHD and Australian Resource Development Group Pty Limited as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Australian Resource Development Group Pty Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Australian Resource Development Group Pty Limited and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## 2. Assumptions and Limitations

This report was developed based on the following assumptions developed with ARDG:

- All light vehicles arrive to the site prior to 8:00 am.
- 50% of staff in light vehicles depart the site during the 15:00-16:00 pm peak hour.
- All vehicles travelling to/from the quarries will be distributed from the Italia Road/Pacific Highway intersection.
- The future traffic estimates generated by the Boral Seaham Quarry have been supplied by Boral.
- Future traffic volumes are based on the base case with an additional 2% growth applied per annum over 10 years.

### 3. Sight distance

As part of the strategic design to support the application a preliminary review of sight distance was undertaken. The strategic design was prepared in 2D to identify potential access geometry and is a result of pre-lodgement discussions with Port Stephens Council (as the Road Authority under the *Roads Act, 1993* (NSW)).

A meeting was held with Port Stephens Council on 1 June 2022, and intersection location with sight distance considerations were discussed. General advice from Council included that the site access be at Hamburger Trail, opposite the Seaham Quarry access to minimise the number of conflict points along Italia Road.

The proposed intersection upgrade contains a widening on the northern side of Italia Road, and the assessment undertaken identified potential impacts for the Stone Ridge Quarry access, which would be addressed once survey and detail design are undertaken as part of a subsequent approval process under the *Roads Act 1993*.

As noted in Section 1.2.2, a meeting was convened with Boral and its engineering consultants in respect to Boral's submission. In terms of sight distance impacts, Boral's particular concern was impacts of the proposed access on sight distance relative to its site access.

#### 3.1 Site access intersection

It is noted the proposed intersection upgrade only suggests widening on the northern side of Italia Road, and as noted in Figure 3.1 below, the known cadastral boundary (as shown in yellow) on the southern side of Italia Road is in close proximity to the constructed road. There is substantial road reserve space available to widen the intersection on the northern side, and this forms the basis of the concept as shown below in Figure 3.1.

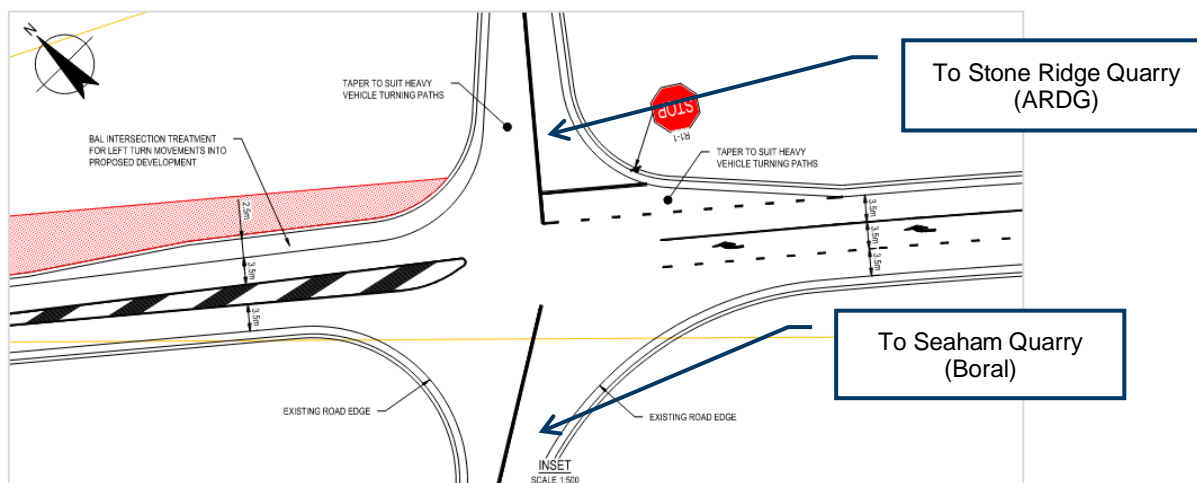


Figure 3.1 Intersection arrangement

At the meeting of 5 December 2023, Boral representatives raised outcomes of a Road Safety Audit (RSA) (prepared by GHD, ref 12599191) for the purposes of supporting Boral's development application to modify their current approval to continue operating prior to undertaking a major redevelopment that would be subject to a state significant development application. Their primary concern as noted in the meeting and in follow-up correspondence was Finding No. 1, relating to sight distance at Boral's site access.

The RSA findings noted sight distance as approximately 180 m to the east. Road design criteria calls for sight distance criteria of speed limit + 10 km/h (i.e., 100 km/h). The actual sight distance achieved corresponds to a design speed of 80 km/h.

In terms of the proposed access to Stone Ridge Quarry, it is noted that the proposed works do not impact on the west bound travel lane (from the Pacific Highway towards East Seaham). The strategic design as it currently stands involves widening on the northern side of Italia Road. As such, the sight distance to the east would not be affected and therefore remain unchanged. Boral's consultant raised concerns about increased traffic along Italia Road, however this does not impact on physical characteristics of sight distance.

Boral's consultant also raised the issue of increased traffic volumes from Boral's proposed redevelopment (subject to an SSD). A review of the existing access to Seaham Quarry indicates that it does not comply with current standards and as such the impacts of Boral's increased traffic volumes and current access arrangements are matters for consideration by any development application made by Boral.

Sight distance issues to the west for the Stone Ridge Quarry access are acknowledged and as such, vegetation clearing is proposed and is noted in the shaded area in Figure 3.1. This widening (on the northern side) may result in a minor sight distance improvement for Seaham Quarry with the slight curve along Italia Road. This is subject to detail design however it is not anticipated to be a significant change.

## 4. Traffic modelling

### 4.1 Intersection location

The Stone Ridge Quarry access will utilise the existing Hamburger Trail in an upgraded intersection which is located directly opposite, and north of, the existing Seaham Quarry access. Together the two accessways would form a cross-intersection with Italia Road, as shown in the concept design provided below in Figure 4.1.

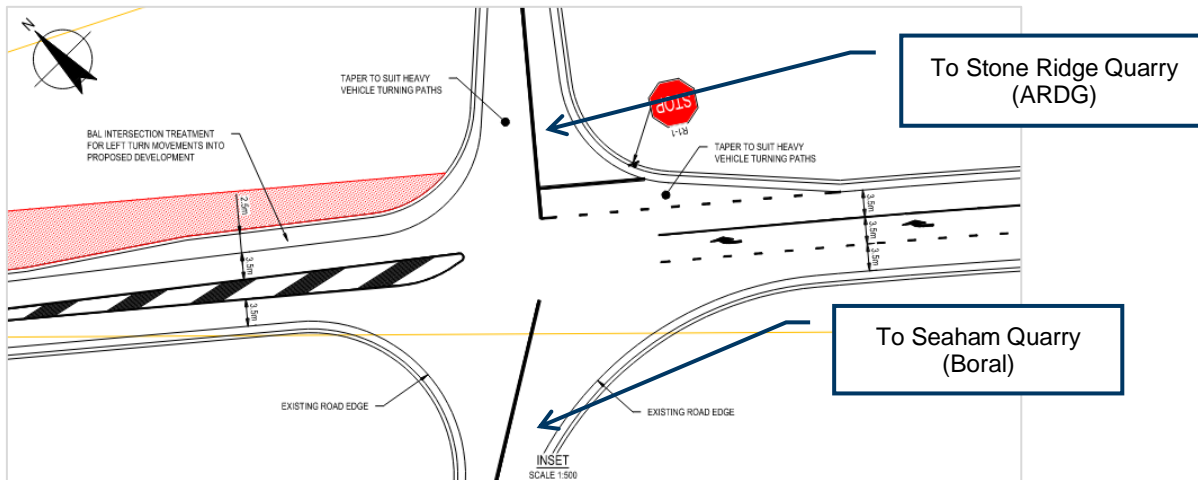


Figure 4.1 Intersection arrangement

### 4.2 Modelled scenarios

The performance at the site access to Italia Road has been modelled under various scenarios, in order to determine the impact of each the Stone Ridge Quarry on the north side of the road, the Seaham Quarry on the south side of the road and the impact of background traffic volume growth. These scenarios include:

Current year scenarios:

- Base case Existing traffic (Italia Road and only existing Seaham Quarry in operation).
- Scenario 1 Existing traffic + Stone Ridge Quarry traffic.
- Scenario 2 Existing traffic + Stone Ridge Quarry traffic + Seaham Quarry expansion traffic.

Future year scenarios (sensitivity testing):

- Future volumes Existing traffic + 2% growth over 10 years.
- Scenario 1 Future volumes + Stone Ridge Quarry traffic.
- Scenario 2 Future volumes + Stone Ridge Quarry traffic + Seaham Quarry expansion traffic.

It is noted that each of the scenarios have been modelled in the AM and PM peak hours. ARDG's proposal is modelled as Scenario 1 as it has advanced through the planning phases and is currently at "Response to Submissions" phase and Seaham Quarry is in "Prepare EIS" phase (as of the date of this report, refer to NSW Planning Portal Application Tracker for more details).

## 4.3 Traffic volumes

### 4.3.1 Current year scenarios

#### 4.3.1.1 Existing traffic – Base

The existing traffic volumes have been determined using the 7-day tube count undertaken on Italia Road, to the northwest of the Ringwood Park Motor Complex and Killaloe Lane, from 14 June 2022. For purposes of this assessment, it has been assumed all the heavy vehicles recorded at the tube count were travelling to or from Boral and therefore turning left-in or right-out of this access point.

Noting the Seaham Quarry also generates some light vehicle traffic, it is further assumed that of the 28 staff that were working at the time of the surveys, all arrive to the site prior to the AM peak hour (9:00 -10:00 am) and half departed during the PM peak hour (15:00-16:00 pm) for a total of 14 outbound movements.

The adopted AM and PM peak hour traffic volumes for the base case are shown in Figure 4.2.

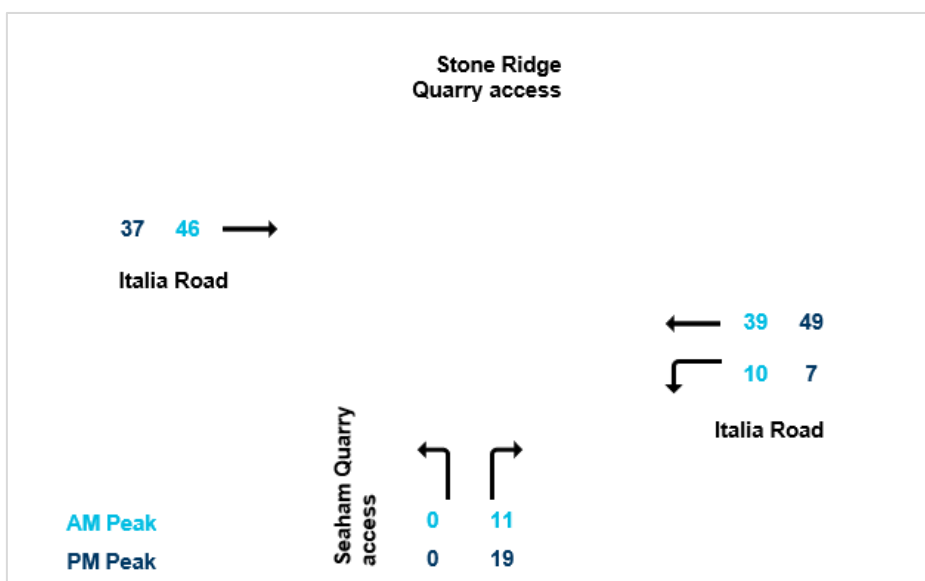


Figure 4.2 Traffic volumes – Base case

#### 4.3.1.2 Existing traffic + Stone Ridge Quarry Proposal – Scenario 1

The traffic generated to/from the Stone Ridge Quarry for Scenario 1 has been adopted from the TIA (dated 17 May 2023). Note that the adoption of 30 inbound and 30 outbound trucks is considered very conservative and represents peak operation of the quarry.

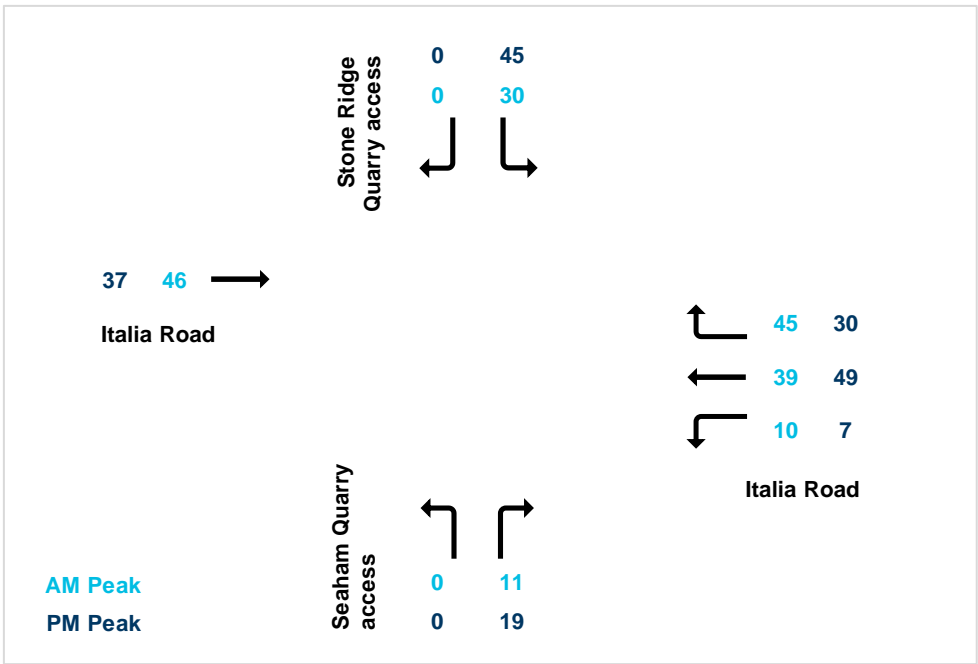


Figure 4.3 Traffic volumes – Existing Scenario 1

#### 4.3.1.3 Existing traffic + Stone Ridge Quarry Proposal + Seaham Quarry SSD – Scenario 2

The future traffic generation estimates for the Seaham Quarry have been provided by Boral. It is noted these projections are conservative, assuming concrete and asphalt plants are operational in the new development (neither of which are currently operational although are approved for use of the site). These volumes are shown in Figure 4.4.

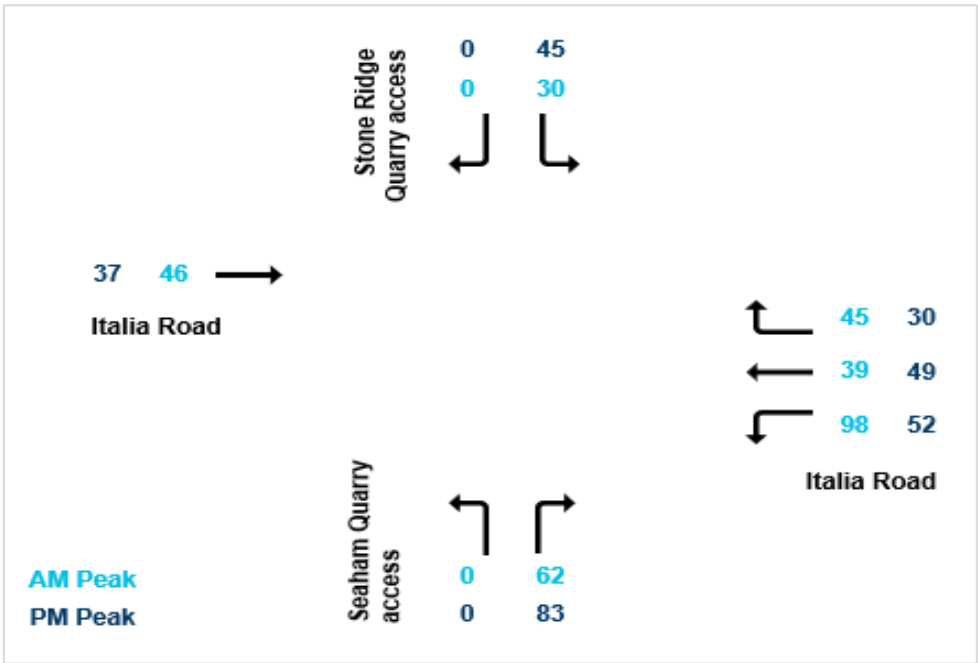


Figure 4.4 Traffic volumes – Existing Scenario 2

## 4.3.2 Future year scenarios

### 4.3.2.1 Future volumes

The future volumes are based on the existing volumes provided in Section 4.3.1.1, with 2% growth applied over 10 years. While GHD have not been able to obtain historic growth rates for Italia Road, 2% has been conservatively adopted to provide sensitivity testing. A review of Port Stephens Council planning strategy documentation indicates population growth is earmarked to occur in areas to the east of the Pacific Highway, noting land to the west is generally flood impacted. In the absence of any data supporting growth in traffic a nominal rate of 2% per annum is anticipated to be an overestimation, and therefore has provided a conservative assessment.

The adopted future volumes for the AM and PM peak hours are shown in Figure 4.5.

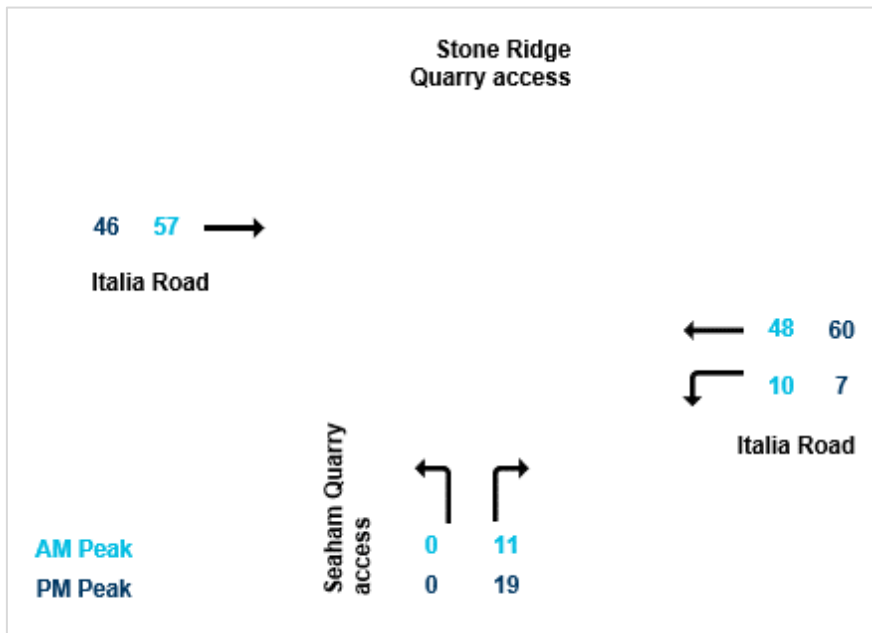


Figure 4.5 Traffic volumes – Future volumes

### 4.3.2.2 Future volumes + Stone Ridge Quarry Proposal – Scenario 1

As per Section 4.3.1.2, the traffic generated to/from the Stone Ridge Quarry for Scenario 1 has been adopted from the TIA (dated 17 May 2023). The background traffic volumes along Italia Road include 2% growth applied over 10 years. The adopted future volumes for the AM and PM peak hours are shown in Figure 4.6.

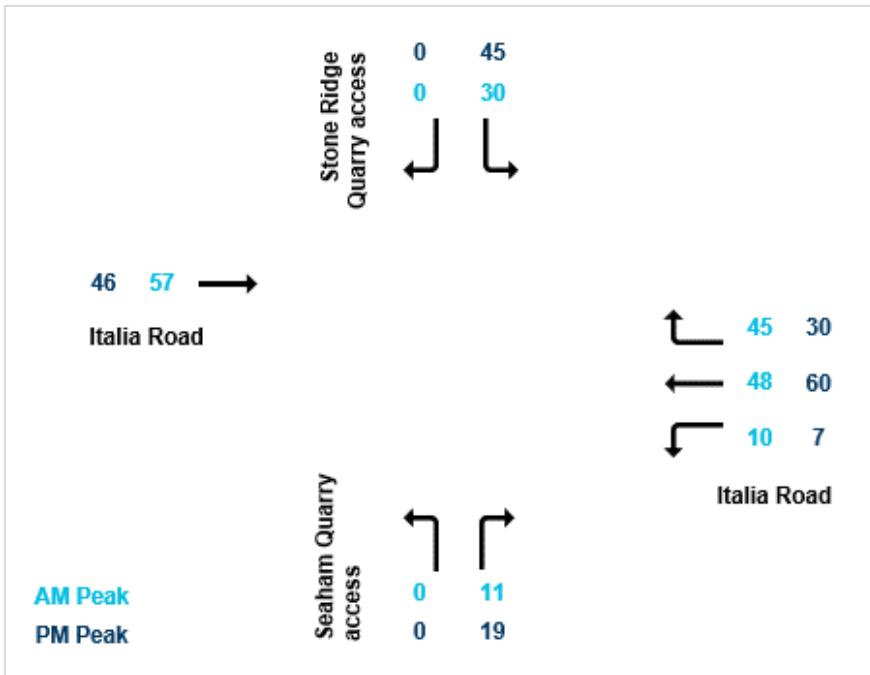


Figure 4.6 Traffic volumes – Future Scenario 1

### 4.3.2.3 Future volumes + Stone Ridge Quarry Proposal + Seaham Quarry SSD – Scenario 2

As per Section 4.3.1.3, the future traffic generation estimates for the Seaham Quarry have been provided by Boral. The background traffic volumes along Italia Road include 2% growth applied over 10 years. The adopted future volumes for the AM and PM peak hours are shown in Figure 4.7.

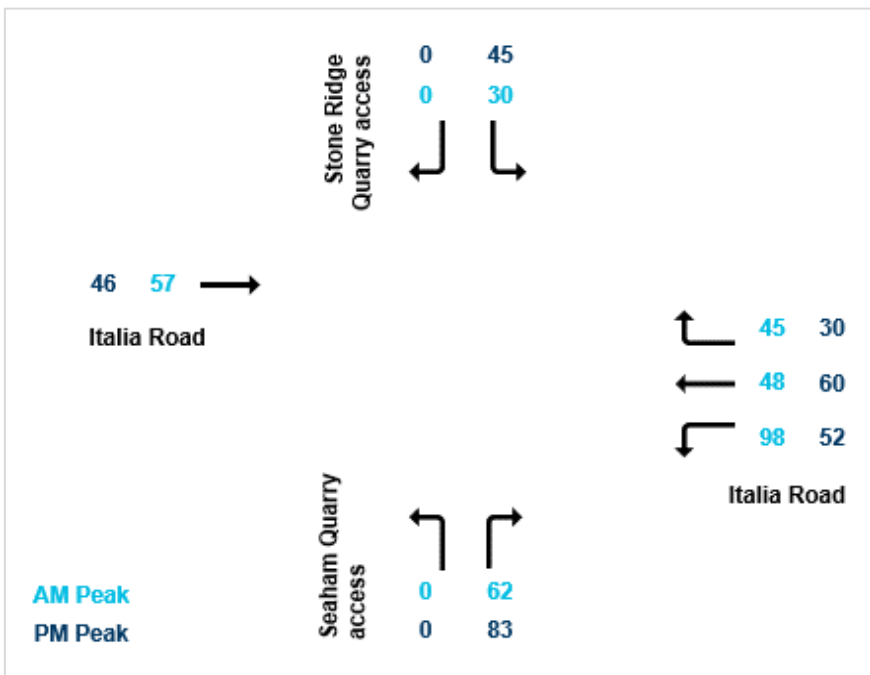


Figure 4.7 Traffic volumes – Future Scenario 2

## 4.4 SIDRA results

The SIDRA results for the Seaham Quarry access/Italia Road/Stone Ridge Quarry access under each of the modelled scenarios is included below in Table 4.1.

Table 4.1 SIDRA results – Current year scenarios

Approach	Movements	Degree of Saturation			Average delay (s)			Level of Service			95 <sup>th</sup> Percentile Queue Length (m)		
		Scenario	Base	1	2	Base	1	2	Base	1	2	Base	1
AM Peak													
Seaham Quarry access	Left	0.033	0.081	0.596	8.2	8.2	23.0	A	A	B	2.5	6.8	75.7
	Right	0.033	0.081	0.596	15.7	33.9	65.4	B	C	E	2.5	6.8	75.7
Italia Road (east)	Left	0.036	0.036	0.129	10.3	10.3	9.1	A	A	A	0.0	0.0	0.0
	Through	0.036	0.036	0.129	0.0	0.0	0.0	A	A	A	0.0	0.0	0.0
	Right	-	0.058	0.058	-	9.7	9.7	-	A	A	-	5.1	5.1
Hamburger Trail / Stone Ridge access	Left	-	0.063	0.063	-	15.0	15.0	-	B	B	-	6.2	6.2
	Right	-	0.063	0.063	-	9.0	9.0	-	A	A	-	6.2	6.2
Italia Road (west)	Left	-	0.026	0.026	-	7.4	7.4	-	A	A	-	0.1	0.1
	Through	0.025	0.026	0.026	0.0	0.0	0.0	A	A	A	0.0	0.1	0.1
	Right	0.025	0.026	0.026	7.1	7.1	8.3	A	A	A	0.0	0.1	0.1
PM Peak													
Seaham Quarry access	Left	0.022	0.059	0.446	8.2	8.2	12.2	A	A	A	0.1	2.1	33.6
	Right	0.022	0.059	0.446	9.0	16.3	34.1	A	B	C	0.1	2.1	33.6
Italia Road (east)	Left	0.033	0.037	0.095	9.6	10.3	9.8	A	A	A	0.0	0.0	0.0
	Through	0.033	0.037	0.095	0.0	0.0	0.0	A	A	A	0.0	0.0	0.0
	Right	-	0.048	0.048	-	10.7	10.7	-	A	A	-	5.5	5.5
Hamburger Trail / Stone Ridge access	Left	-	0.073	0.073	-	12.6	12.6	-	A	A	-	5.6	5.6
	Right	-	0.073	0.073	-	8.9	8.9	-	A	A	-	5.6	5.6
Italia Road (west)	Left	-	0.021	0.021	-	7.4	7.4	-	A	A	-	0.1	0.1
	Through	0.021	0.021	0.021	0.0	0.0	0.0	A	A	A	0.0	0.1	0.1
	Right	0.021	0.021	0.021	7.1	7.2	7.8	A	A	A	0.0	0.1	0.1

Table 4.2 SIDRA results – Future year scenarios

Approach	Movements	Degree of Saturation			Average delay (s)			Level of Service			95 <sup>th</sup> Percentile Queue Length (m)		
		Scenario	Fu	1	2	Fu	1	2	Fu	1	2	Fu	1
AM Peak													
Seaham Quarry access	Left	0.034	0.087	0.651	8.2	8.2	28.0	A	A	B	2.6	7.3	84.2
	Right	0.034	0.087	0.651	16.4	36.4	74.7	B	C	F	2.6	7.3	84.2
Italia Road (east)	Left	0.041	0.041	0.134	10.3	10.3	9.1	A	A	A	0.0	0.0	0.0
	Through	0.041	0.041	0.134	0.0	0.0	0.0	A	A	A	0.0	0.0	0.0
	Right	-	0.059	0.064	-	9.8	9.8	-	A	A	-	5.1	5.1
Hamburger Trail / Stone Ridge access	Left	-	0.064	0.064	-	15.3	15.3	-	B	B	-	6.4	6.4
	Right	-	0.064	0.064	-	9.2	9.2	-	A	A	-	6.4	6.4
Italia Road (west)	Left	-	0.032	0.032	-	7.4	7.4	-	A	A	-	0.1	0.1
	Through	0.031	0.032	0.032	0.0	0.0	0.0	A	A	A	0.0	0.1	0.1
	Right	0.031	0.032	0.032	7.1	7.1	8.2	A	A	A	0.0	0.1	0.1
PM Peak													
Seaham Quarry access	Left	0.023	0.062	0.482	8.2	8.2	13.3	A	A	A	0.6	2.2	36.3
	Right	0.023	0.062	0.482	9.2	17.1	37.4	A	B	C	0.6	2.2	36.3
Italia Road (east)	Left	0.039	0.043	0.101	9.7	10.3	9.8	A	A	A	0.0	0.0	0.0
	Through	0.039	0.043	0.101	0.0	0.0	0.0	A	A	A	0.0	0.0	0.0
	Right	-	0.049	0.049	-	10.9	10.9	-	A	A	-	5.6	5.6
Hamburger Trail / Stone Ridge access	Left	-	0.074	0.074	-	12.7	12.7	-	A	A	-	5.7	5.7
	Right	-	0.074	0.074	-	9.1	9.1	-	A	A	-	5.7	5.7
Italia Road (west)	Left	-	0.026	0.026	-	7.4	7.4	-	A	A	-	0.1	0.1
	Through	0.025	0.026	0.026	0.0	0.0	0.0	A	A	A	0.0	0.1	0.1
	Right	0.025	0.026	0.026	7.1	7.2	7.8	A	A	A	0.0	0.1	0.1

## 4.5 Description of outputs

A description of the SIDRA traffic modelling outputs is provided below:

- **Degree of saturation (DoS)** is a measure of the traffic volume as a ratio of the total capacity for that movement. It is expressed as a percentage. A movement that is operating at a degree of saturation of 50% is effectively operating at half of its total capacity.
- **Average delay (s)** is a measure of the average delay experienced by any one vehicle performing a particular movement. It includes time spent in queue, time spent waiting at the stop line as well as time taken to perform the left or right turn movement (i.e., geometric delay). For large trucks, geometric delay is often a material portion of the overall delay at the intersection.
- **Level of service (LOS)** is a qualitative measure of the performance of the intersection. It is calculated based on the average delay as shown in Figure 4.8. The target level of service is LOS C; however, LOS D is typically acceptable in most circumstances.

Level of Service	Control delay per vehicle in seconds (d) (including geometric delay)
	All Intersection Types
<b>A</b>	$d \leq 14.5$
<b>B</b>	$14.5 < d \leq 28.5$
<b>C</b>	$28.5 < d \leq 42.5$
<b>D</b>	$42.5 < d \leq 56.5$
<b>E</b>	$56.5 < d \leq 70.5$
<b>F</b>	$70.5 < d$




Figure 4.8 Level of service definitions (RTA NSW method)

Source: SIDRA Intersection 9.1

- **95 percentile queue length (m)** is a measure of the queue length that is not exceeded 95% of the time. It generally represents the longest queue that would be experienced by most road users and is used as a key performance metric in the design of the length of turn lanes.

## 4.6 Discussion

### Current year modelling

During the current year modelling, the results of the SIDRA assessment demonstrates the cross intersection formed by the two quarry accessways is operating under excellent conditions during the base case and Scenario 1. During the Scenario 2 AM peak, conditions deteriorate due to the traffic volumes associated with the right-turn out of the Seaham Quarry. With the exception of the Seaham Quarry access, all movements at the intersection operate with minimal queues and delays with capacity in the intersection.

It is noted however, that the volumes used for the full Seaham Quarry development in Scenario 2 assume the operation of the concrete and asphalt plant. These operations may not be realised and as such, the volumes are considered conservative compared to current operations.

Notwithstanding, the traffic modelling shows that even with this significant increase in traffic, the intersection would still only be operating at approximately 60% of its capacity in the AM peak and 45% in the PM peak, with a maximum queue length of up to four trucks (75 metres) on the Seaham Quarry leg resulting in a Level of Service E, and this leg is contained entirely within Seaham Quarry site. Of critical importance, the primary contributor to this change in Level of Service within the Seaham Quarry site is the additional traffic generated by Seaham Quarry in Scenario 2. It is noted the queueing will be contained within the Boral site and will not impact performance for the general public on the external road network (i.e. Italia Road eastbound and westbound).

### Future year modelling

Modelling was undertaken for a +10 year horizon to look at the cross intersection in a 'future year'. As part of this modelling 2% annual growth was added for 10 years. It is noted that this level of growth is considered very conservative when considering the location of the quarries. We note that future development in Port Stephens is anticipated to be concentrated to the areas to the east of the Pacific Highway. As such, the future year modelling is provided for sensitivity purposes.

Nevertheless, the results of the future year modelling are fairly similar to the current year modelling. The cross intersection operates under excellent conditions during the Future Year and Scenario 1. During the Scenario 2 AM peak, conditions within the leg contained entirely within the Seaham Quarry site deteriorate, with the Level of Service dropping from E in the current year modelling to F in the future year. Again, this is due to the additional traffic generated by Seaham Quarry in Scenario 2 (i.e., right-turn volumes out of the Seaham Quarry), with all future year modelling indicating there will be minimal queues and delays at all approaches other than the Seaham Quarry egress.

As with the current year modelling however, the future year modellings shows that the intersection will operate at approximately 65% of capacity in the AM peak and 48% in the PM peak. There will be a maximum queue length of approximately five trucks (84 metres) at the Seaham Quarry leg. Again, as this queue is located within the Seaham Quarry site, there will be no discernible impact to the general public on the external road network.

### Summary

Based on the above, this report demonstrates the following with respect to the matters raised in Boral's submission:

1. Sight distance
  - a. The proposed Stone Ridge Quarry access design does not affect the existing sight distance to the east from Seaham Quarry, which at present does not comply with the posted speed limit of 90 km /hr.
  - b. Proposed clearing of vegetation on the northern side of Italia Road to the west of the proposed Stone Ridge Quarry will improve sight distance to the west for the Stone Ridge Quarry access.
2. Intersection performance
  - a. The addition of the Stone Ridge Quarry traffic and the addition of background traffic growth has little impact on the intersection.

- b. The primary contributor to a change in Level of Service within the Seaham Quarry site leg of the intersection (wholly contained with the Seaham Quarry site) is the additional traffic generated by Seaham Quarry under Scenario 2. Therefore, neither quarry is significantly impacted by the other quarry's proposed traffic movements.
- c. The LOS (A) on the external public road network (i.e., Italia Road eastbound and westbound) remains unaffected under Scenarios 1 and 2, including when future growth on the network is taken into account.



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