

12.0 Land Use

This chapter addresses existing and proposed future land use within and in the vicinity of the Project Site and the relationship of the Project to these land uses. The chapter assesses the potential impacts of the continuation of quarrying and brick making operations on the existing and future surrounding land use, including development proposed as part of the SWGC.

12.1 Overview

The Project Site has been operated as a quarry and brick making facility for the past thirty years prior to which it was used for agricultural purposes. The site is zoned Rural RU1 (Primary Production) under LLEP 2008 which is consistent with the zoning of land directly to the north and south of the Project Site.

The existing and future land use context of the Project Site is shown in **Figure 3**. Land to the west of the Project Site (west of Badgerys Creek) is zoned Special Activities SP1 (Commonwealth activities) and land to the east of the Project Site, and east of South Creek is zoned Rural RU4 (Rural Small Holdings). Agricultural enterprises including chicken farming and market gardens and rural residential development are the predominant land uses surrounding the Project Site. ANL operates a bulk landscaping supplies handling facility north east of the Project Site.

As discussed in **Chapter 5** of the EA, the Project Site has been earmarked under the *Sydney Metropolitan Strategy* as 'future industrial' employment land. Surrounding areas have been designated for either 'future industrial' or 'residential' land use. The potential land use impacts of the Project are generally associated with the compatibility of the proposed works with existing and future planned land use in the surrounding area. In considering these potential impacts, the importance of retaining opportunities both for the full utilisation of the valuable natural resource existing on the Project Site and the redevelopment of the Project Site in the future consistent with the vision set out in the Metropolitan Strategy, is acknowledged.

12.2 Existing Land Use

The Project Site

As described previously in this EA, the Project Site is currently used for the purposes of extractive industry and brick production. Other land uses on the Project Site include agricultural and residential uses as described in the following sections.

Residential

The Project Site accommodates a single residence used by a dairy farmer who currently leases land from the Proponent for the agistment of stock. This residence is located in the north eastern section of the Project Site on Martin Road and adjacent to the northern boundary of the Project Site. Two other residential buildings are located on the Project Site, comprising a former site manager's residence in the central eastern portion of the Project Site and a small farm house in the central northern portion of the Project Site, however these are vacant.

Residential land use surrounding the Project Site is predominantly low density rural residential development. Many of the surrounding residences are small hobby farms and market gardens. Residential properties located adjacent to South Creek to the east and Badgerys Creek to the west are set back from the creeks, with property frontages to nearby streets.

Agricultural

Parts of the Project Site are utilised for agricultural land use being the grazing of stock in the northern and eastern portions of the Project Site and limited grazing and stock watering adjacent to South Creek. The lease between the Proponent and the dairy farmer is intended to remain until such time as quarrying activities extend into the eastern area, at which time the lease would be discontinued.

Agricultural land use surrounding the Project Site is variable and includes large-scale commercial chicken farming on properties immediately south (approximately 60 m) and north west (approximately 170 m) of the Project Site (Inghams), and market gardening at neighbouring properties. An agricultural pharmaceutical research company operates in the vicinity of the Project Site on the opposite side of South Creek and also agists sheep in the north eastern portion of the property, where they are maintained for research purposes.

Other

Other significant land uses in the surrounding area include ANL - a bulk landscape supply centre approximately 150 m north of the Project Site, on Martin Road and a landfill and advanced waste treatment facility north of the Project Site on Elizabeth Drive (SITA).

More broadly, within the region coal seam methane (CSM) gas is extracted from the underlying Bulli coal seam for energy production as part of the Camden Gas Project.

12.3 Future Land Use

The Project Site is located within the SWGC one of two key centres of growth in the broader Sydney region as identified under the *Sydney Metropolitan Strategy*. The *Metropolitan Strategy* has as one of its aims the creation of an additional 89 000 jobs by 2031. The SWGC comprises 18 Precincts covering approximately 17 000 ha and having a capacity to accommodate approximately 110, 000 new homes, along with employment land.

SEPP (Sydney Region Growth Centres) 2006 is the planning instrument which defines the future planning outcomes in the Growth Centres as part of the *Metropolitan Strategy*. However, at a local level, LLEP 2008 controls land use in the Liverpool LGA.

The Project Site has been earmarked for future industrial development under the *Metropolitan Strategy*, designated as Category 1 Employment Land. Category 1 employment lands include sites that presently function as industrial areas and provide a regional or national economic role. Designation of these lands as Category 1 Employment Land does not necessarily limit potential intensification or redevelopment of the sites to meet modern industrial land use, but simply that industrial operations at these sites should continue within the range generally allowed under current zoning. The proposed continuation of quarrying and brick making activities at the Project Site aligns with this vision as part of the *Sydney Metropolitan Strategy*, maintaining the output of the facility and the number of its employees. This designation also supports the retention of the brick making facility on the Project Site and the Concept Plan in so far as it seeks approval for the clarification of permissibility of this component of the project.

The current zoning of the Project Site (Rural RU1 Primary Production) is compatible with the designation as Category 1 Employment Land earmarked as 'future industrial' under the *Sydney Metropolitan Strategy*. Although the Project Site is located in a 'future industrial' precinct, many of the surrounding areas would support residential uses in the Kemps Creek, North Bringelly and North Rossmore precincts.

12.4 Potential Impacts

Potential impacts of the Project in terms of land use are focussed on the future use of the Project Site itself, along with the potential impacts of the Project on surrounding existing and future land use.

12.4.1 Future Use of the Project Site

The future use of the site is of integral importance to the Proponent, government agencies and the local community, especially given the location of the Project Site within an area designated for significant growth and land use change in the short to medium term.

Given the extent of the clay/shale resource on the Project Site, it is vitally important to the Proponent that future options for continued extraction both in other areas of the Project Site and deeper extraction within existing pits is preserved. The Proponent's rehabilitation strategy for the Project Site is reflective of this key objective through the retention of certain voids to allow for future extraction within these pits should this option become viable in the longer term. It is important that rehabilitation and/or redevelopment on the Project Site does not sterilise these opportunities which would result in the loss of a potentially significant resource to the region and the State.

The vision of the NSW DoP and other relevant government and community stakeholders for the Badgerys Creek area and surrounds is also acknowledged and it is the Proponent's intention that the Project Site is ultimately redeveloped in line with this vision and the relevant provisions of SEPP (Growth Centres) 2006. It is therefore likely that the long-term future land use on the Project Site would be some form of industrial development and that the final landform of the Project Site be designed to accommodate this future use. In this sense, the planned conceptual final landform would incorporate areas of level land and the retention of certain voids which could be used as pads for industrial development either with basement levels or utilising the void to absorb an industrial building/operation with minimal visual and acoustic impact.

At this stage future land use on the Project Site is intended to be continued quarrying and brick production as described in the EA. Given the substantial change in surrounding land use, landscape and development set to occur over the next ten to twenty years, a specific future land use beyond the twenty year proposed life of the quarry operations has not been identified. However, any future use would be in line with relevant planning strategies and controls applicable to the land.

12.4.2 Compatibility with Existing and Future Land Use

Potential land use impacts of the project include the compatibility of the project with existing and proposed future land use in the surrounding area, particularly given the location of the Project Site within the SWGC (refer to **Figure 12**). Land use impacts in this regard are generally associated with amenity, i.e. noise, traffic, air quality and visual impacts.

Characteristic of landforms resulting from quarrying activities, some voids would remain at the Project Site upon quarry closure in order to preserve options for further quarrying and other land uses as described previously. A RP has been prepared as part of this EA (refer to **Section 4.3**) broadly describing the rehabilitation strategies to be progressively implemented in conjunction with continued quarrying activities over the next twenty years of quarry life. The intent of the RP is to continue rehabilitation of certain areas and components of the Project Site. In particular the RP focuses on the stabilisation and rehabilitation of stockpiles with the aim of creating a landform which is compatible with a future industrial land use, in line with the objectives of the *Sydney Metropolitan Strategy*, but which also retains opportunities for future extraction if viable.

Given that quarrying and brick making activities have been taking place on the Project Site for some 30 years without significant conflict, the potential impacts of the proposed continuation of operations upon existing surrounding land use are considered to be similar to those experienced under existing conditions. The movement of quarrying activities across the Project Site in the future would result in certain changes in impacts related to noise and visual amenity, however these have been assessed as part of the EA (**Chapters 9 and 15**) and potential impacts (with the implementation of recommended mitigation measures) are not considered to be significant. Further, an assessment of the air quality and traffic impacts of the proposed continued operations has been undertaken and concludes that impacts would be manageable through the implementation of appropriate mitigation strategies.

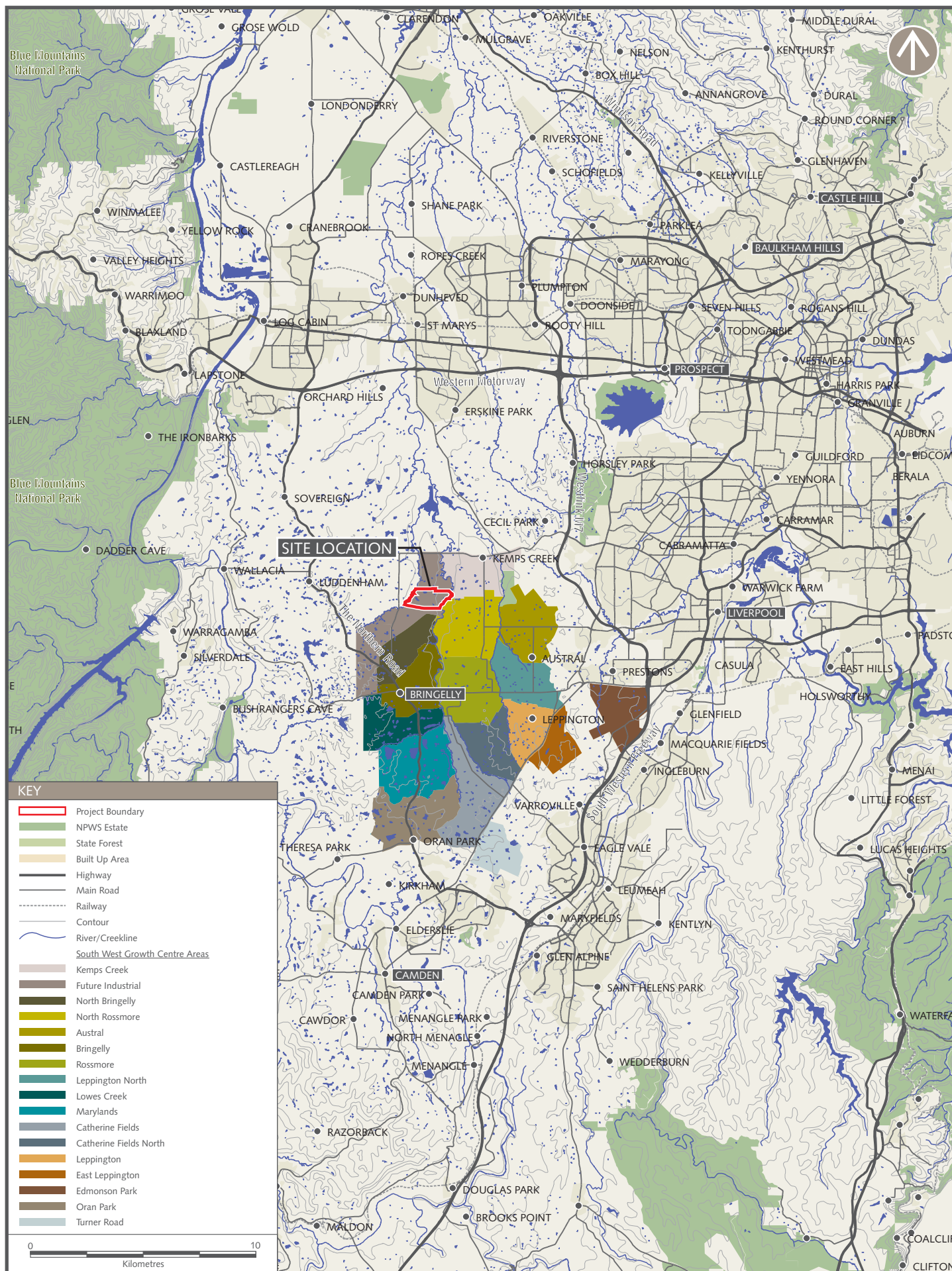
The continuation of operations at the Project Site would therefore mean the retention of industrial presence in the area. Into the future with the development of the SWGC, the proposed operations are considered to integrate well with the proposed future industrial/ employment use of the Project Site and surrounding area. Further, the existing rural landscape of the surrounding area would likely change significantly such that the Project Site would be viewed within an industrial context.

As stated previously, rehabilitation works would continue on the Project Site in accordance with the RP and would include improvements to the riparian corridor along Badgerys Creek. Existing Pit 2 would also be filled during the life of the proposed operations, creating a level platform in the western part of the Project Site where industrial or other development may take place in the future. Retained voids would also preserve an opportunity to be used as platforms for industrial development.

12.5 Mitigation Measures

Given that many of the land use impacts relate to amenity issues discussed elsewhere in this EA, the measures proposed in **Chapters 8 to 20** to manage air quality, noise, visual and traffic impacts in particular, would also assist in managing potential land use impacts. Specific safeguards to minimise the potential impacts of the project upon existing and future land use include:

- Ongoing consultation with the relevant authorities managing the release of land for industrial and urban development within the vicinity of the Project Site to ensure that project activities and management of infrastructure is effectively integrated with future development in the area. This would also ensure that Boral is promptly informed of changes to the existing road networks and the relevant matters as part of development within the area.
- Quarrying and rehabilitation activities at the Project Site to be undertaken in accordance with the RP prepared and attached as **Appendix D** to this EA.



LAND USE CONTEXT (SOUTH WEST GROWTH CENTRES)

Environmental Assessment
Boral Quarry and Brick Making Facility, Badgerys Creek

Figure 12

12.6 Conclusion

The impact of the proposed works on land use is not considered to be significant. Many of the potential land use impacts are related to amenity issues which can be effectively managed through the implementation of appropriate mitigation measures.

The Project Site and surrounding area is set to experience significant land use changes over the life of the project and as such, the project has been designed to adapt and integrate with that change. It is anticipated that the proposed operations would integrate effectively with both existing and future planned land uses in the area for the life of the project.

13.0 Traffic and Transportation

This chapter assesses the potential impacts of the proposed continuation of quarrying and brick making operations at Boral Badgerys Creek in terms of traffic impacts on the surrounding strategic and local road networks. In this regard, consideration is given to anticipated background traffic volumes independent of the continued operation of the quarry and brick making facility and proposed methods for the management of traffic should operations continue at the Project Site.

13.1 Strategic and Local Road Network

The Macarthur region is an important hub for south western Sydney's industrial and residential zones, connecting several important transport corridors from Sydney to the south coast of NSW and Victoria. The strategic road network servicing the Project Site includes the Westlink M7 and the Western Motorway (M4), as shown in **Figure 13**.

The Westlink M7 is a 40km motorway linking the M2, M4 and M5 motorways. It links the M5 at Prestons in the south, with the M4 at Eastern Creek and the M2 at West Baulkham Hills in the north. The Westlink M7 provides access to Liverpool, Fairfield, Blacktown and Baulkham Hills. The motorway has two lanes in each direction, separated by a wide median and speed limits of up to 100km/hr.

The M4 is an urban expressway of 40 km that connects Concord in Sydney's Inner West to Penrith in the west. The motorway connects with the Westlink M7 at Eastern Creek and has three lanes in each direction for the majority of its length. The speed limit along the Western Motorway varies, reaching 100km/hr at various points.

The local road network comprises Martin Road, Elizabeth Drive and The Northern Road. A description of the local roads is provided below:

- **Martin Road** - Martin Road is a two-way, undivided, sealed road that connects Elizabeth Drive to the Project Site. The road runs in a north-south direction and has a speed limit of 60km/h leading to and from the Project Site. NSW does not have specific standards or guidelines relating to lane widths and alignments for roads with heavy vehicle traffic.
- **Elizabeth Drive** - Elizabeth Drive is a two-way sealed road that runs in an east-west direction north of the Project Site. Elizabeth Drive connects to The Northern Road to the west and to the Westlink M7 to the east, via Wallgrove Road. Martin Road and Elizabeth Drive are connected with a priority controlled T-intersection. The speed limit along the section of the road that runs north of the Project Site on Elizabeth Drive is 80km/h.
- **The Northern Road** - The Northern Road is a two-way, undivided, sealed road that connects to Elizabeth Drive with a roundabout west of the Project Site. The road runs in a north-south direction and connects to the M4 to the north and Camden Valley Way to the south. The Northern Road has a speed limit of 80km/h where it connects to Elizabeth Drive.

13.2 Existing Traffic Volumes and Intersection Performance

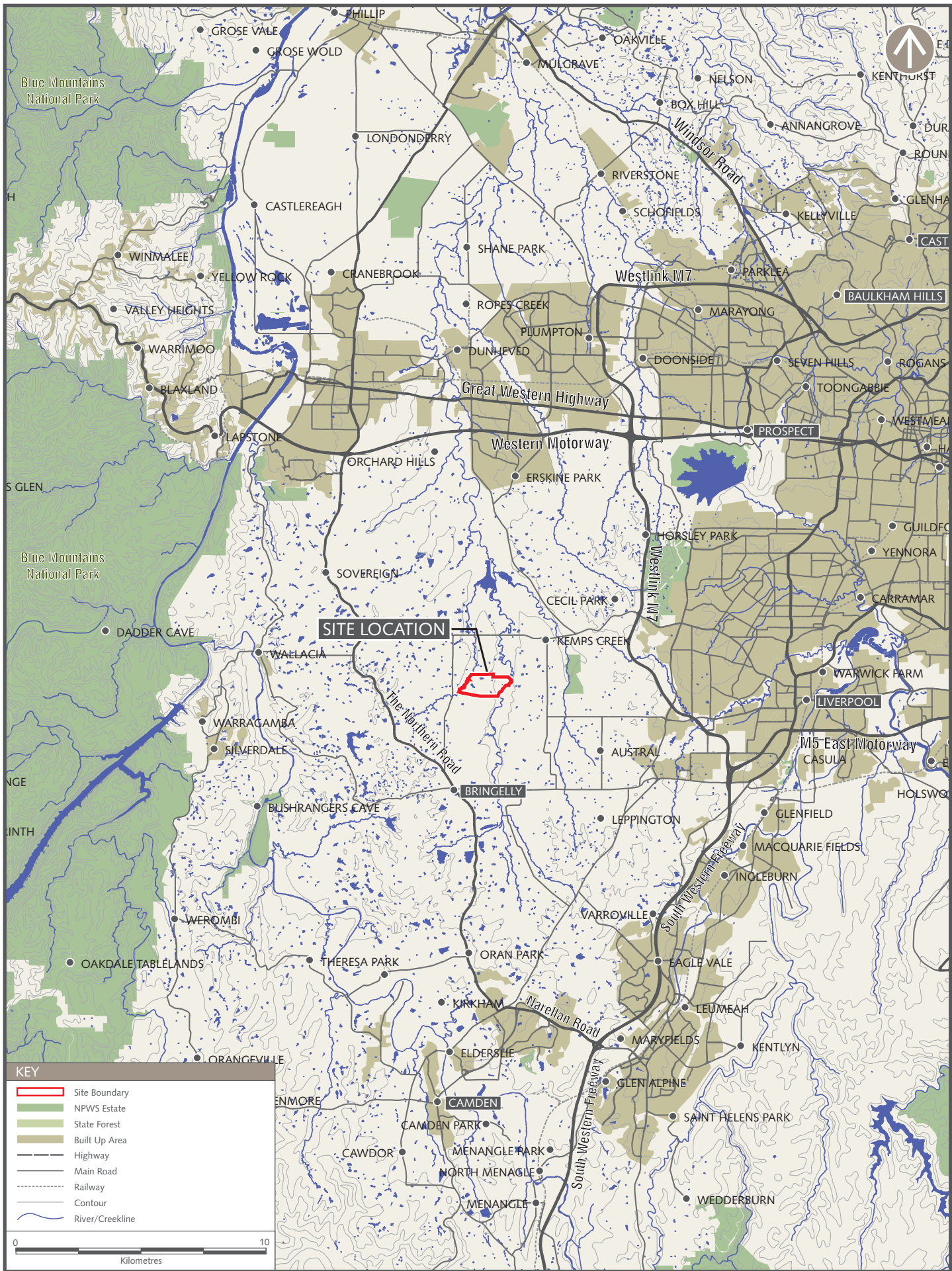
13.2.1 Traffic Volumes

Two permanent RTA traffic count stations are located on Elizabeth Drive in the vicinity of the Project Site. The first is positioned east of The Northern Road and the second, at South Creek Bridge. Average annual daily traffic (AADT) at both of these locations increased at an average rate of 1.2% pa from 1999 to 2005. Historical traffic volumes are shown in **Table 41**.

Table 41: Historical Traffic Volumes

Station Number	Location	AADT Volumes			Annual Growth Rate
		1999	2002	2005	1999-2005
64.032	Elizabeth Drive, E of The Northern Road	6,753	6,592	7,311	1.3%
64.037	Elizabeth Drive, at South Creek Bridge	9,117	9,098	9,757	1.1%

Source: RTA, 2005



13.2.2 Current Traffic Generation

At present, delivery and dispatch of packaged bricks off-site by truck originates from the storage yard. Currently, there are approximately 60 truck pickups/deliveries (120 truck movements) per day during the week and approximately 12 truck pickups/deliveries (24 truck movements) on a Saturday.

There are currently 56 people employed in the Brick Production Facility and 20 employees in the office generating in the order of 152 light vehicle movements (to and from the site) per day. The number of employees working at the Project Site is not proposed to change as part of the continued operations of quarrying and brick making activities at the Project Site.

13.2.3 Intersection Counts

Sky High Traffic Data conducted intersection counts at the Elizabeth Drive and Martin Road intersection on 10 November 2009, for the AM and PM peak periods.

The data indicated that the morning peak period occurred between 7 am to 8 am and the evening peak period from 4.30 to 5.30 pm. It was observed that traffic on Elizabeth Drive is of a 'tidal' nature, with heavier flows of both light and heavy vehicles eastbound on Elizabeth Drive (towards the city) in the morning peak period and westbound (away from the city) in the evening peak period.

13.2.4 Existing Intersection Performance

The Elizabeth Drive and Martin Road intersection performance in the AM and PM peak hour has been evaluated using *SIDRA Intersection 3.2*, a computer based modelling package designed for calculating isolated intersection performance.

The main performance indicators for SIDRA 3.2 include:

- Degree of Saturation (DoS) – a measure of the ratio between traffic volumes and capacity of the intersection used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur with a DoS range between 0.7-0.8 or below 0.7;
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection; and
- Level of Service (LoS) – a measure of the overall performance of the intersection, as described in **Table 42**.

Table 42: Performance Criteria for Intersections

Level of Service	Average Delay per Vehicle (seconds/vehicle)	Traffic Signals and Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents would cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments, Roads and Traffic Authority, 2002

Table 43 and **Table 44** summarise the performance of the Elizabeth Drive and Martin Road intersection, based on the 2009 traffic flows for the morning and evening peak hours respectively.

Table 43: 2009 AM Peak Intersection Performance

Location	Demand Flow (veh/h)	LoS	DoS (v/c)	Ave Delay (sec)	95% Back of Queue (m)
Martin Road	20	LoS C	0.133	34.7	6
Elizabeth Drive (E)	227	LoS A	0.111	1.7	N/A
Elizabeth Drive (W)	756	LoS A	0.401	0.1	0
All vehicles	1,003	N/a	0.401	1.2	6

Notes to table:

- 95% Back of Queue – the maximum extent of the queue relative to the stop line or give-way (yield) line during a signal cycle or gap-acceptance cycle.
- v/c – intersection vehicle volumes divided by the intersection capacity.

Source: AECOM, November 2009

Table 44: 2009 PM Peak Intersection Performance

Location	Demand Flow (veh/h)	LoS	DoS (v/c)	Ave Delay (sec)	95% Back of Queue (m)
Martin Road	8	LoS B	0.027	25.9	1
Elizabeth Drive (E)	719	LoS A	0.375	0.3	N/A
Elizabeth Drive (W)	230	LoS A	0.125	0.6	1
All vehicles	957	N/A	0.375	0.6	1

Notes to table:

- 95% Back of Queue – the maximum extent of the queue relative to the stop line or give-way (yield) line during a signal cycle or gap-acceptance cycle.
- v/c – intersection vehicle volumes divided by the intersection capacity.

Source: AECOM, November 2009

In the morning peak hour, the Elizabeth Drive and Martin Road intersection operates with approximately 60% spare capacity and with minimal average delays. Elizabeth Drive (east and west) performs at LoS A and Martin Road performs at LoS C, with slightly longer average delays, which demonstrates both are operating at an acceptable performance level.

In the evening peak hour, the Elizabeth Drive and Martin Road intersection operates with approximately 62% spare capacity with minimal average delays. Both Elizabeth Drive and Martin Road perform at acceptable LoS A and C respectively.

13.2.5 Traffic Safety

Accident data at the intersection of Martin Road / Elizabeth Drive for the period of January 2004 to December 2009 has been obtained from the RTA.

During this period, there were 2 crashes at the intersection, both occurring in 2004, one injury and one non-casualty. The injury crash was a rear end collision involving a car and a truck both proceeding to travel in the westbound direction on Elizabeth Drive. The non casualty crash involved two lorries, one of which was turning from Martin Road onto Elizabeth Drive and the other was travelling along Elizabeth Drive resulting in a 'cross traffic' accident.

Based on the low number of crashes, with none being recorded since 2004, there does not appear to be an issue with safety at the intersection of Martin Road / Elizabeth Drive.

13.3 Future Transport Conditions (without the Project)

An assessment was undertaken of the ability of the surrounding road network to cope with future traffic volumes as a result of background traffic growth, regardless of the continuation of Boral's operations at the Project Site or any traffic increases that may be associated with the project. The purpose was to identify the future performance and capacity of the Elizabeth Drive / Martin Road intersection without any Project traffic added, to provide a base case for the impact assessment.

The Project Site is located in an area that is expected to see significant future urban growth. Accordingly, for a robust assessment of the base case future year (without Project generated traffic), this future development was considered. The assessment considered traffic associated with committed development, including the SWGC, as well as future predicted traffic growth.

The assessment was undertaken for the future year of 2029, which is the proposed life of the Project, and provides the worst case scenario in terms of the base case. The assessment focuses on the morning and evening peak hours, when traffic movements on the surrounding network are highest and the greatest demand is placed on road infrastructure. It is noted that there are no firm residential or industrial development proposals being assessed or considered that AECOM are aware of in the surrounding area, which would contribute significantly to traffic growth at this time. As such the assessment below represents a worst case scenario.

The intersection of Martin Road and Elizabeth Drive was assessed with future year (2029) traffic flows, without any project traffic present on the road network. A growth rate of 3.8%² per annum was applied to the 2009 existing traffic counts to determine the future year traffic volumes on Elizabeth Drive and Martin Road.

Table 45 summarises the change in intersection performance from 2009 to 2029 base traffic flows for the morning and evening peak hours.

Table 45: Intersection Performance Summary Table (all vehicles)

Location		Demand Flow (veh/h)	DoS (v/c)	Average Delay (sec)	95% Back of Queue (m)
AM Peak	2009 Base Case	1,003	0.401	1.2	6
	2029 Base Case	2,114	1.000	20.6	104
PM Peak	2009 Base Case	957	0.375	0.6	1
	2029 Base Case	2,017	0.800	4.3	29

Notes to table:

- 95% Back of Queue – the maximum extent of the queue relative to the stop line or give-way (yield) line during a signal cycle or gap-acceptance cycle.
- v/c – intersection vehicle volumes divided by the intersection capacity.

Source: AECOM, November 2009

The combined results indicate that the Martin Road and Elizabeth Drive intersection does not perform satisfactorily in the 2029 morning peak hour. In the evening peak hour, the intersection operates within capacity, but Martin Road performs at LoS F and with long average delays (refer to Traffic Impact Assessment, **Appendix G**).

² Refer to Section 3.2 of Traffic Impact Assessment (AECOM, 2010) for basis of the growth rate.

13.4 Traffic Generation and Potential Impacts

13.4.1 Proposed Production and Operations

Beyond September 2011, the hours of operation of the brick product storage yard (6 am to 6 pm) would increase to 6 am to 10 pm Monday to Friday, with no change to Saturday operating hours, as shown in **Table 46**.

Table 46: Current and Proposed Hours of Operation

Site Facility	Current Hours of Operation	Proposed Hours of Operation
Quarry	Monday to Saturday, 7 am to 6 pm for 2 to 3 months per year	Monday to Saturday, 7 am to 6 pm for 2 to 3 months per year
Brick Making Facility	24 hours a day, Monday to Sunday	24 hours a day, Monday to Sunday
Brick Product Storage Yard	Monday to Friday, 6am to 6pm. Saturday 6 am to 12 pm.	Monday to Friday, 6 am to 10 pm and Saturday 6 am to 12 pm.

Source: Boral Bricks Pty, 2009

The number of employees associated with the Project Site is not proposed to change.

13.4.2 Trip Generation

The existing loading practices and employee movements are used to estimate the likely traffic generation from the Project Site into the future. **Table 47** indicates the number of trucks per hour required to transport product bricks off-site under the existing and proposed operating hours of the brick product storage yard, Monday to Friday. Peak hour truck numbers are also presented and are assumed to be 50% higher than a normal hour. **Table 48** indicates the number of vehicles generated by employees of the brick making facility and office. Proposed transportation of product brick on week days is considered to have the greatest potential for impact on the road network, compared to proposed movements on Saturdays, as the number of truck movements would be higher during the week. This traffic assessment therefore focuses on the impact of the continuation of production on weekdays as the worst case scenario.

Table 47: Truck Trip Generation Table

Operating Hours	Trucks per day	Trucks per hour	Trucks per peak hour	Truck movements per peak hour
Existing – 6 am to 6 pm (12 hours)	60	5	8	16
Proposed – 6 am to 10 pm (16 hours)	60	4	6	12

Source: AECOM, November 2009

Table 48: Employee Trip Generation Table

Operating Hours	Vehicles per day	Vehicles per hour	Vehicles per peak hour	Vehicle movements per peak hour
Production Facility 24 hours	76	4	6	12

Source: AECOM, November 2009

The continuation of operations at the Project Site, including the extended operating hours of the brick product storage yard, would generate approximately 12 truck movements per peak hour (in and out). Under current operating hours, the brick product storage yard generates approximately 16 truck movements per peak hour (in and out).

The extended operating hours of the Brick Product Storage Yard would enable a broader distribution of truck movements throughout the day/evening and provide greater opportunity for trucks to avoid peak hour movements. This spreads the impact of the trucks over a longer period of time, reducing the impact to the intersection of Martin Road and Elizabeth Drive in the peak hours. Employee movements associated with the continuation of production would continue to be in the order of 12 vehicle movements per peak hour.

Table 47 shows the existing truck movements generation (8 trucks per peak hour) and the future truck movement generation (6 trucks per peak hour), as well as employee generated trips (6 vehicles per peak hour) as a proportion of the traffic volumes at the Martin Road / Elizabeth Drive intersection in 2009 and 2029 respectively.

Table 49: Proportion of Project Generated Traffic at Martin Road / Elizabeth Drive Intersection

Peak Hour	2009 Intersection count	% of existing traffic (current ops)	2029 Forecast Intersection count	% of future traffic (proposed ops)
AM	1,003	1.3%	2,670	0.4%
PM	957	1.3%	2,240	0.5%

Source: AECOM, November 2009

The table indicates that Project generated traffic accounts for 1.3% of the traffic volume at the Martin Road and Elizabeth Drive intersection in both peak hours at present, which is a negligible contribution to traffic volumes.

With the inclusion of the development of the SWGC, by the forecast year of 2029, Project generated traffic accounts for 0.4% of the traffic at the intersection in the morning peak hour and 0.5% of traffic in the evening peak hour. Accordingly, the Project generated traffic would have a negligible impact on the performance of the intersection in the future year of 2029.

The proposed Project is expected to generate less truck movements than currently generated due to recent capital investment in new packaging equipment that has resulted in significant efficiencies in brick packaging and dispatch. The new plant has resulted in the achievement of 400 bricks per pack rather than the 288 bricks per pack previously achieved, meaning that fewer trucks are required to move the same number of brick, directly reducing truck movements to and from the site. Modelling of the existing intersection (under existing conditions) with the proposed number of trucks, indicates improved results in terms of efficiency than under current conditions.

The analysis undertaken shows that the most significant impact on the intersection would be as a result of background growth, rather than project generated traffic. The traffic impact assessment highlights that the development of the SWGC is the primary contributor to future projected traffic volumes along Elizabeth Drive. The Traffic Impact Assessment indicates that the intersection fails in the future without Project generated traffic present. Consequently, the project is not the key contributor to this reduced level of performance.

13.4.3 Martin Road/Elizabeth Drive Intersection

The Traffic Impact Assessment report in **Appendix G** shows that the intersection of Martin Road and Elizabeth Drive currently performs satisfactorily and Martin Road performs at a LoS C in the worst case (the AM peak). During Project operations the number of trucks entering and exiting the site during the am and pm peak hours would decrease (due to the extended operating hours and investment in the Dehacker) which means fewer trucks would be turning right onto Elizabeth Drive per hour. There is therefore, no need for upgrade works to the Martin Road/Elizabeth Drive intersection to accommodate the proposed continued operation.

As discussed in **Section 13.3**, the Martin Road and Elizabeth Drive intersection would not perform satisfactorily in the forecast future year of 2029, should the future planning initiatives in the SWGC be realised. With the potential increase in traffic growth the intersection Martin Road and Elizabeth Drive would require an upgrade regardless of Project generated traffic. Based upon the results of the traffic impact assessment, there is no nexus to justify a contribution by Boral in relation to intersection upgrades to accommodate these future traffic volumes.

13.4.4 Suitability of Martin Road

Martin Road is a two-way, undivided, sealed road that connects Elizabeth Drive to the Project Site and is currently used by both Boral and ANL trucks. An assessment of the suitability of the alignment and pavement condition of Martin Road was undertaken which took into consideration the type and volume of transport vehicles currently using this road and those vehicles that are proposed to continue to use Martin Road for the proposed Project.

Road Alignment

A visual assessment of the alignment of Martin Road was undertaken to determine the road's suitability for heavy vehicles at a road speed limit of 60km/hr. The assessment took into consideration the basic elements of road / alignment design with reference to 'Austroads' Guide to Road Design Documents (GRD Part 3 & 4a).

Martin Road runs in a north-south direction, is approximately 2.1km in length, and is generally straight with graduated bends considered suitable for truck movements. The cross section profile of the road was assessed at a number of locations along the alignment of Martin Road. The overall width of the two lanes of Martin Road varied from approximately 7.0 – 7.5m, therefore meeting the standard lane width requirement of 3.5m for heavy vehicles.

There are no significant alignment issues identified that would suggest Martin Road is unsuitable for existing or ongoing operations associated with Boral Bricks Pty Ltd, however a number of improvements in relation to shoulder widths, and the alignment and sight distances within the vicinity of the horizontal reverse curves would be investigated and may include:

- Construction of shoulders at minimum standard widths where required;
- Clearing of existing roadside vegetation to improve sight lines within the vicinity of the reverse curves; and
- Provision of 'W1-4(L)' warning signposting in advance of the reverse curves to advise motorists of the upcoming curved alignment.

Road Pavement

Traffic volumes on Martin Road are low to moderate, although the proportion of commercial vehicles is high, with commercial vehicles constituting approximately 50% of total vehicle traffic. Boral's existing operation contributes to this commercial traffic volume, however the proposed Project would result in fewer heavy vehicle movements per hour than under existing operating conditions.

A visual assessment of the road pavement of Martin Road was undertaken which identified that the asphalt wearing course looks to be nearing the end of its service life, with significant areas of fatigue cracking noted. Signs of failure were evident in previous patching and pavement crack sealing work undertaken along the road.

Although the wearing surface of Martin Road is in need of replacement, deformation or rutting of the pavement were only found in limited areas, indicating a reasonable level of pavement structural integrity.

The existing truck loadings from the Boral operation are the largest contributor to the impact on the pavement of Martin Road to the south of the ANL facility, i.e. from approximately 1.6 to 2.1km south of Elizabeth Drive. However, impacts to the pavement north of the ANL facility are due to the combined truck loadings from the Boral and ANL operations, in addition to any other heavy commercial traffic which may be generated from other operations along Martin Road.

Martin Road is currently serviceable although is in need of considerable maintenance for its entire length. Boral proposes no increase in truck traffic as a result of the proposed Project, however, and instead would lead to a decrease in peak hour truck movements from the Project Site. Consequently the impact of the proposed Project on Martin Road will remain largely the same as current operations.

As part of the existing and ongoing operations at the Project Site, a detailed pavement investigation and rehabilitation program would be considered to protect the value of the existing road structure.

13.5 Mitigation Measures

The Traffic Impact Assessment concludes that the Project would have a negligible impact on the performance of the Martin Road and Elizabeth Drive intersection and that no mitigation measures are necessary. However, the following mitigation measures would be implemented in relation to the management of traffic:

- Personnel operating trucks and vehicles to and from the Project Site would be required to undertake a site-specific health and safety induction, specifying operating hours, avoidance of the AM and PM peak periods and vehicle speed limits on Martin Road.
- A heavy vehicle protocol would be developed for the Project Site and distributed to relevant staff and contractors during induction procedures. The protocol would deal with such issues as timing of vehicle movements, idling of vehicles, speed limits on Martin Road and parking.
- Unnecessary vehicle movements would be minimised where possible.
- Deliveries would be scheduled on larger capacity 'Truck and Trailer' vehicles rather than 'Truck Only' vehicles where possible to minimise truck movements.

Where non-routine vehicular movements are required, such as for the transport of oversized loads, where practical and subject to appropriate standards, Boral would undertake these tasks outside of normal working hours and/or the peak AM and PM periods.

13.6 Conclusion

During peak hours, traffic generated by the proposal would be less than existing traffic during peak hours, due to the proposed extended operating hours of the brick product storage yard and improved efficiency of truck transport. The extended operating hours spreads the impact of the trucks over a longer period of time, thereby reducing the traffic impact to the intersection of Martin Road and Elizabeth Drive in the peak hours.

Project generated traffic is considered to have a negligible impact on the performance of the Martin Road and Elizabeth Drive intersection in 2029, as it accounts for a very small proportion of the forecast traffic volumes in the SWGC.

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