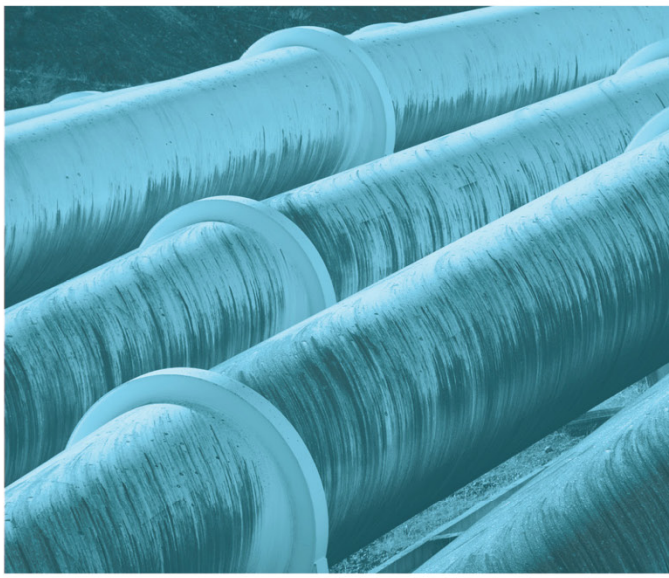



Boral St Peters concrete plant and materials handling facility

Statement of Environmental Effects - Modification 12

Prepared for Boral Resources (NSW) Pty Limited
September 2019

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Statement of Environmental Effects - Modification 12

Report Number

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Client

Boral Resources (NSW) Pty Limited

Date

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Version

v6 Final

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20 September 2019

Approved by

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20 September 2019

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

Executive Summary

ES1 Overview

Boral Resources (NSW) Pty Ltd (Boral) owns and operates a concrete batching plant (concrete plant) and construction materials handling facility (materials handling facility) at 25 Burrows Road South, St Peters (the site).

The approved production limit for concrete plant at the site is 750,000 cubic metres (m^3) per annum and throughput of the materials handling facility is 1 million tonnes per annum (Mtpa). The impact of these limits was estimated through the environmental assessment of the previous modification (Modification 11). Consent condition A6 was inserted to provide limits on peak hourly traffic movements for the concrete plant, making a clear distinction between traffic movements for the concrete plant and materials handling facility, based on what was assessed in the Traffic Impact Assessment for Modification 11.

Boral is proposing to modify the site's development consent (Modification 12 or the proposed modification) to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11. To ensure a worst-case scenario has been assessed, an increase for the materials handling facility throughput from 1 Mtpa to 1.75 Mtpa has been assumed, whilst correspondingly decreasing the concrete plant annual production to 650,000 m^3. The current site layout of the site will not change as part of Modification 12.

ES2 Approval history

The site operates under Development Consent No. DA 14/96, which was granted on 6 September 1996 by the then NSW Minister for Urban Affairs and Planning. Since the development consent was granted, eleven modifications to the consent have been approved.

ES3 Approval pathway

The proposed modification relates to the reconfiguration of traffic movements and does not involve increasing traffic movements; therefore, the proposed modification is of minimal environmental impact in relation to what was assessed for previous modifications.

Boral is therefore applying for a modification involving minimal environmental impact under section 4.55(1A) of the Environmental Planning and Assessment Act 1979 (EP&A Act).

ES4 Impact assessment

ES4.1 Traffic

The road network and intersection traffic impacts of the additional traffic associated with the proposed Modification 12 application have been considered in the Traffic Impact Assessment (TIA) with reference to the previously assessed and approved Modification 11 application for a different proposed combination of operations (of the concrete plant and materials handling facility) at the Boral St Peters site.

The TIA concluded the future peak hour intersection traffic impacts for the Modification 12 proposal are in effect identical to the assessed impacts for the Modification 11 application and the additional daily traffic effects of the proposed project daily traffic increases for the Modification 12 application are exactly the same as the Modification 11 application daily traffic increases (which are now approved).

The TIA also concluded there will be a negligible additional effect in terms of further daily traffic increases from the proposed Modification 12 application, in comparison to Modification 11. The future potential road safety related traffic impacts from the modification have been reviewed for Burrows Road South between the site access gates and the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South. No additional traffic safety improvements will be required at the intersection to accommodate the proposed modification.

Additionally, the current and future proposed on site car and truck parking areas and the site's accessibility for walking, cycling and public transport users have also been reviewed in the TIA and found to be satisfactory for the anticipated levels of car and truck parking usage and/or travel by non car-based travel modes.

ES4.2 Air quality

EMM has completed an assessment of the potential changes in particulate matter emissions associated with the proposed Modification 12. The assessment utilised input data used for the assessment of Modification 11, completed by Ramboll (2018), which assumed maximum site material throughputs, and is therefore considered a conservative upper estimate.

The air quality assessment of Modification 12 made the following key findings:

- the proposed modification to site operations would result in a decrease in total site annual particulate matter emissions relative to Modification 11;
- the decrease in emissions is associated with a reduction in the concrete plant operations and improved particulate matter mitigation measures at the handling facility;
- the proposed telescopic chute at the tripper car and redesigned storage bunker walls will effectively reduce key emissions sources relative to Modification 11;
- the model predictions for Modification 12 showed a decrease in impacts at immediately adjacent industrial receptors;
- the predicted compliance with NSW EPA impact assessment criteria for cumulative annual average TSP, 24-hour average and annual average PM_{10} and $PM_{2.5}$ presented in the MOD11 AQIA would not change for Modification 12 operations;
- further afield, the change in predicted impacts at other representative assessment locations, including residential receptors, is considered negligible; and
- the proposed real-time particulate matter monitoring network will assist with the management of particulate matter impacts at neighbouring receptors.

ES4.3 Noise

EMM has assessed potential noise and vibration impacts from the proposed Modification 12.

No changes to construction noise and construction vibration are anticipated as a result of the proposed modification.

The assessment has shown that onsite operational noise levels from the proposed modification are not predicted to change from current approved operations. Proposed night-time operations for Modification 12 are unlikely to cause sleep disturbance at residential assessment locations.

Road traffic noise generated by the proposed modification is not expected to result in any noticeable increase in road traffic noise levels at the nearest residential locations on the transport route and therefore will satisfy the relevant assessment requirements.

ES4.4 Surface water

The amendments proposed by Modification 12 are to consolidate the allowable truck volumes and reconfigure truck movements around the site. Based on the following aspects of the proposed amendments, Modification 12 is not expected to impact the surface water system:

- there are no proposed changes to the site layout or development footprint;
- the currently approved concrete production limit of 750,000m^3 per annum is not proposed to be increased; and
- approved upgrades to the water management system will remain unaffected.

ES5 Conclusion

This Statement of Environmental Effects focussed on investigating any potential environmental impacts from reconfiguring the traffic movements for the site. This included the potential effects on traffic, air quality, noise, and surface water. In addition to the proposed and existing environmental mitigation, management and monitoring measures applied at the site, the proposed modification would result in minimal environmental impact, therefore complying with an application under section 4.55(1A) of the EP&A Act.

Table of Contents

Appendices

Tables

Figures

Photographs

1 Introduction

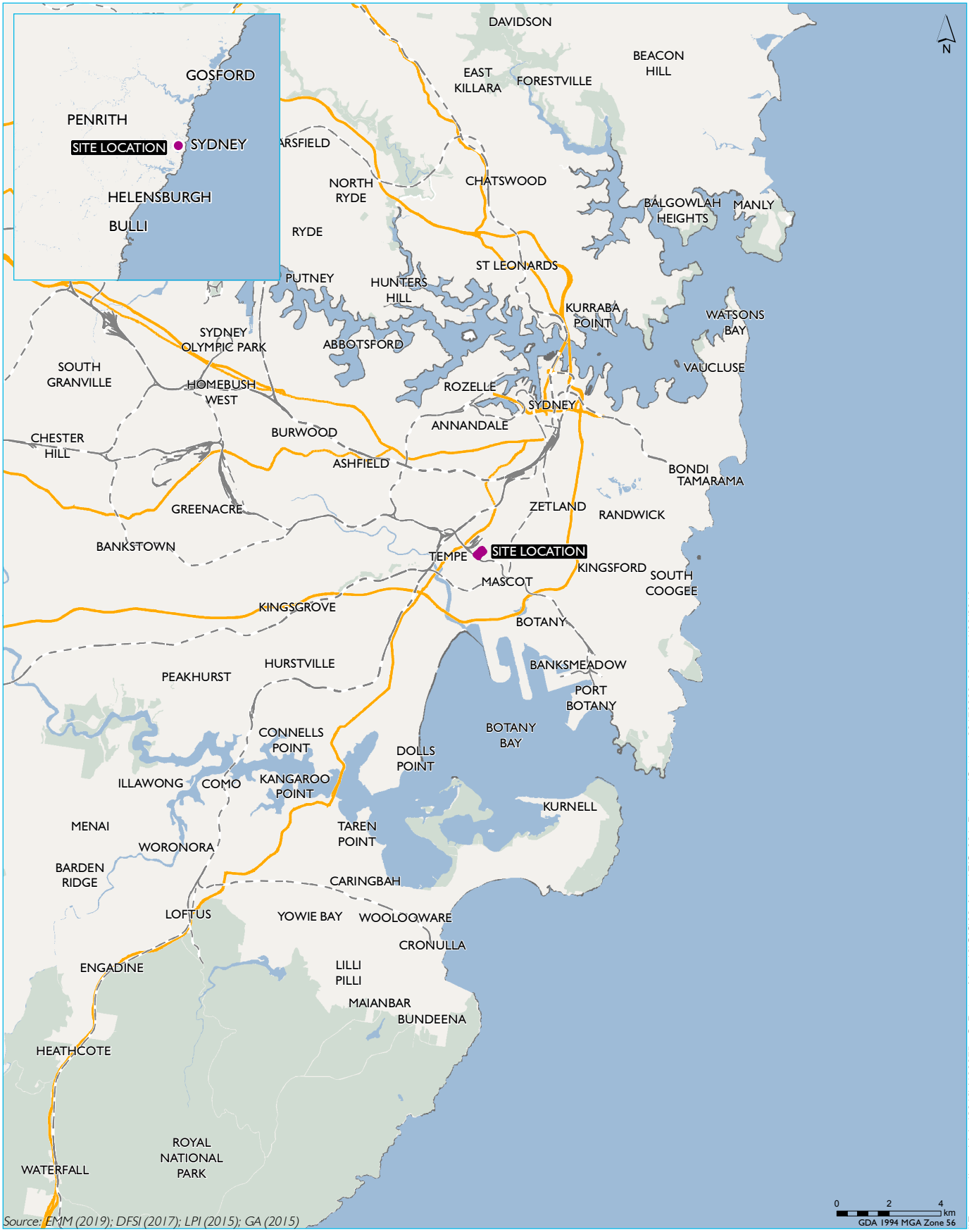
1.1 Overview

Boral Resources (NSW) Pty Ltd (Boral) owns and operates a concrete batching plant (concrete plant) and construction materials handling facility (materials handling facility) at 25 Burrows Road South, St Peters (the site). The site's regional setting and local context is illustrated in Figure 1.1 and Figure 1.2, respectively.

The approved production limit for concrete plant at the site is 750,000 cubic metres (m^3) per annum and throughput of the materials handling facility is 1 million tonnes per annum (Mtpa). The impact of these limits was estimated through the environmental assessment of the previous modification (Modification 11). Consent condition A6 was inserted to provide limits on peak hourly traffic movements for the concrete plant, making a clear distinction between traffic movements for the concrete plant and materials handling facility, based on what was assessed in the Traffic Impact Assessment (TIA) for Modification 11.

Boral is proposing to modify the site's development consent (Modification 12 or the proposed modification) to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11. To ensure a worst-case scenario has been assessed, an increase for the materials handling facility throughput from 1 Mtpa to 1.75 Mtpa has been assumed, whilst correspondingly decreasing the concrete plant annual production to 650,000 m^3 . The current site layout of the site will not change as part of Modification 12.

The purpose of this document is to provide an overview of the proposed modification and assess the modification in relation to the approved operations (documented in Modification 11). While the overall traffic movements remain the same as those assessed for Modification 11, the configuration of traffic movements between the concrete plant and the materials handling facility will change to allow for flexibility of operations. Accordingly, the focus of this assessment is the impact of the reconfiguration of traffic movements around the site on traffic, noise and vibration, air quality and surface water. Other environmental aspects have not been considered.



Source: EMM (2019); DFSI (2017); LPI (2015); GA (2015)

KEY

- Site location
- Highway
- Road
- Railway
- Watercourse
- Waterbody
- NPWS reserve

Regional setting

Statement of Environmental Effects

Modification 12

Boral St Peters

Figure 1.1

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Source: EMM (2019); DFSI (2017); LPI (2015); GA (2015)

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KEY

- Site location
- Local government area
- Railway

Site location

Statement of Environmental Effects

Modification 12

Boral St Peters

Figure 1.2

EMM

1.2 Background

The site receives bulk construction materials (aggregate, sand and cement) predominantly by rail from Boral's Peppertree and Dunmore quarries, Berrima Cement Works and other sites as required. These construction materials are used to make concrete at the concrete plant, or are temporarily stored at the materials handling facility for later distribution to other concrete and asphalt plants within the Sydney metropolitan area. All concrete and construction materials are despatched from the site by truck.

On 6 September 1996, the then NSW Minister for Urban Affairs and Planning granted development consent to Boral under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of the concrete plant and the materials handling facility at the site. The development consent also permitted Boral to construct and operate an asphalt plant. The asphalt plant was constructed and operated, but was subsequently decommissioned and demolished in 2002.

Since the development consent was granted, eleven modifications to the consent have been approved, which are detailed in Section 2.1. A copy of the consolidated development consent, as currently modified, is contained in Appendix A.

This modification (Modification 12) is an administrative modification as per section 4.55 (1A) of the EP&A Act seeking to have combined truck volumes as the overarching restriction which would correspond to the traffic volumes assessed in the Modification 11 TIA.

1.3 Site location and surrounding land uses

The site is located at 25 Burrows Road South St Peters, which is approximately 7 kilometres (km) south-west of the Sydney CBD. The site is legally described as Lot 1 in Deposited Plan (DP) 866946 (Figure 1.2).

The site is a completely modified industrial site, located within the Inner West Local Government Area (LGA), adjacent to its eastern boundary with the Botany LGA. The site was formerly within the Marrickville LGA, which was merged with the LGAs of Ashfield and Leichhardt on 12 May 2016 to form the Inner West LGA.

The site is surrounded by industrial land uses which correspond with the site's and surrounding properties' zoning as IN1 General Industrial under the *Marrickville Local Environmental Plan 2011* (Marrickville LEP).

The site is bordered by the Alexandra Canal to the south-east, Burrows Road South to the north-east, industrial land uses to the north-west and the Botany Goods Line to the south-west. It is serviced by arterial roads, with access to the Princes Highway via Burrows Roads South and Canal Road. The nearest residential properties are about 600 metres (m) to the north-west of the site on the northern side of the Princes Highway (Figure 1.3). Other surrounding features are:

- **North:** industrial land uses immediately north of the site, the Princes Highway, and residential areas on the northern side of the Princes Highway in Sydenham and St Peters.
- **East:** industrial land uses for approximately 1-1.5 km to the east, and beyond this, residential areas in Mascot.
- **South**: Sydney Airport is about 300 m to the south of the site beyond the Alexandra Canal.
- **West:** the Botany Goods Line is a railway line immediately west of the site; beyond this are industrial and commercial land uses, and residential areas further west in Tempe.

Source: EMM (2019); DFSI (2017); LPI (2015); GA (2015)

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KEY

- Site location
- Highway
- Railway
- Alexandra Canal
- Suburb boundary

Marrickville Local Environmental Plan 2011 - Zoning

- B1 Neighbourhood Centre
- B2 Local Centre
- B5 Business Development
- B6 Enterprise Corridor
- B7 Business Park
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- RE1 Public Recreation
- RE2 Private Recreation
- SP1 Special Activities
- SP2 Infrastructure

Surrounding land uses and zones

Statement of Environmental Effects

Modification 12

Boral St Peters

Figure 1.3

EMM

1.4 Applicant

Boral is the applicant for the proposed modification. Boral is a wholly owned subsidiary of Boral Limited.

Boral Limited is an Australian owned, international building and construction materials group, with its headquarters in Sydney, Australia. With more than $5.2 billion worth of annualised sales, Boral Limited primarily serves customers in the building and construction industries with operations concentrated in three key geographical markets – Australia, the USA and Asia. Boral Limited has around 11,000 full-time equivalent employees.

In Australia, Boral Limited has over 500 operating sites. Boral Limited produces and distributes a broad range of construction materials, including quarry products, cement, fly ash, pre-mix concrete and asphalt; and building products, including clay bricks and pavers, clay and concrete roof tiles, concrete masonry products, plasterboard and timber.

The Boral Australia division employs around 5,000 people alone in its quarry, concrete, asphalt, concrete placing and cement operations.

1.5 Document structure

The structure of this Statement of Environmental Effects (SEE) is as follows:

- Chapter 1 – introduction;
- Chapter 2 – existing and approved operations - provides a background to the modification, including the original DA and subsequent eleven modifications to the development consent, and details on existing and approved operations at the site;
- Chapter 3 – proposed modification - provides details of the proposed modification, including a table identifying proposed changes to all conditions in the development consent;
- Chapter 4 – statutory framework - provides an overview of the statutory approval framework for the administrative modification;
- Chapter 5 – stakeholder consultation - provides details of consultation with State and local agencies;
- Chapter 6 – traffic - provides a summary of the results of the traffic assessment;
- Chapter 7 – air quality - provides a summary of the results of an air quality assessment;
- Chapter 8 – noise - provides a summary of the results of a noise assessment;
- Chapter 9 – surface water – provides a summary of the results of a surface water assessment;
- Chapter 10 – justification and conclusion.

This SEE contains four appendices, including:

- Appendix A – existing Development Consent No. DA 14/96
- Appendix B – Traffic Impact Assessment

- Appendix C –Air Quality Impact Assessment
- Appendix D –Noise and Vibration Impact Assessment

2 Current operations

This chapter provides an overview of the approvals history of the site to demonstrate how the current operations were reached. A general overview of the operations of the site and the site layout is provided for context but as the focus of all assessments is on traffic movements, outlining the current approved and existing total daily and peak hourly traffic movements has been the focus of this chapter.

2.1 Approvals history

The site operates under Development Consent No. DA 14/96 (refer to Appendix A), which was granted on 6 September 1996 by the then NSW Minister for Urban Affairs and Planning.

The development consent enabled the construction and operation of the concrete plant, an asphalt plant, and the materials handling facility. The asphalt plant has since been decommissioned and demolished.

Since the development consent was granted, eleven modifications to the consent have been approved. In most cases, the modifications have been relatively minor and related to site layout changes, as described in Table 2.1.

Table 2.1 Summary of modifications to Development Consent

Modification	Approval date	Description
Modification 1	12 May 1997	Alteration of approved site layout to improve operational aspects of the concrete plant, and addition of one line to railway siding, making a total of three spur lines.
Modification 2	8 December 1998	Alteration of the approved site layout of the asphalt plant and materials handling facility, and additional time to complete construction of the rail siding.
Modification 3	25 June 1999	Installation of liquefied gas tank to fuel asphalt dryer and bitumen heaters at asphalt plant.
Modification 4	7 April 2000	Rearrangement of the materials handling facility from the approved site layout, including construction of the storage bunkers for quarry product and additional cement silos, and delivery of cement by rail (in addition to road).
Modification 5	23 August 2001	Altered layout of weighbridge, office and single large ground storage bunker.
Modification 6	16 May 2003	Altered site layout to reflect decommissioning of the asphalt plant and subsequent changes to the materials handling facility.
Modification 7	11 February 2004	Altered site layout to improve materials handling, including introducing a manual truck loading system, rearrangement of existing storage bunkers and provision of new bunkers and changes to vehicle access in the materials handling facility. Overall changes to the traffic circulation on the site were also approved.
Modification 8	3 December 2012	Altered rail siding to accommodate the full length of 28 wagon trains to improve the efficiency of receival of construction materials by rail.
Modification 9	4 July 2013	Altered site layout to relocate the materials handling facility's site office and car park, reconfigured and increased the capacity of the aggregate and sand storage bunkers, relocated the weighbridge and wheel wash and improved traffic flow.
Modification 10	1 November 2016	Simplified the development consent (ie removed complexity), removed irrelevant conditions, and increased production at the concrete plant by 10%.
Modification 11	31 January 2019	Increase concrete production to 750,000 m^3 and throughput of materials handling facility to 1 Mtpa. Included updates to site facilities and site layout.

2.2 General description and site layout

The site has two existing land uses; the concrete plant and the construction materials handling facility. Both uses predominantly receive bulk construction materials (aggregate, sand and cement) from Boral's Peppertree and Dunmore quarries and Berrima Cement Works.

The majority of aggregate and sand is received by rail. There are two train unloading areas on one of four rail sidings; one unloading area for the concrete plant and one for the handling facility. Trains are parked and shunted in the rail sidings. Some fly ash and special admixtures used in the concrete plant are delivered to the site by road.

All materials received are either used to make concrete at the concrete plant or stored at the materials handling facility for subsequent distribution to other concrete plants and asphalt plants within the Sydney metropolitan area. Concrete from the concrete plant is despatched by road in concrete agitator trucks. All construction materials are despatched from the site by road in trucks.

The site is approved to operate 24 hours per day, seven days a week.

The current layout of the site is illustrated in Figure 2.1.

2.2.1 Concrete plant

The concrete plant is located in the south-western section of the site.

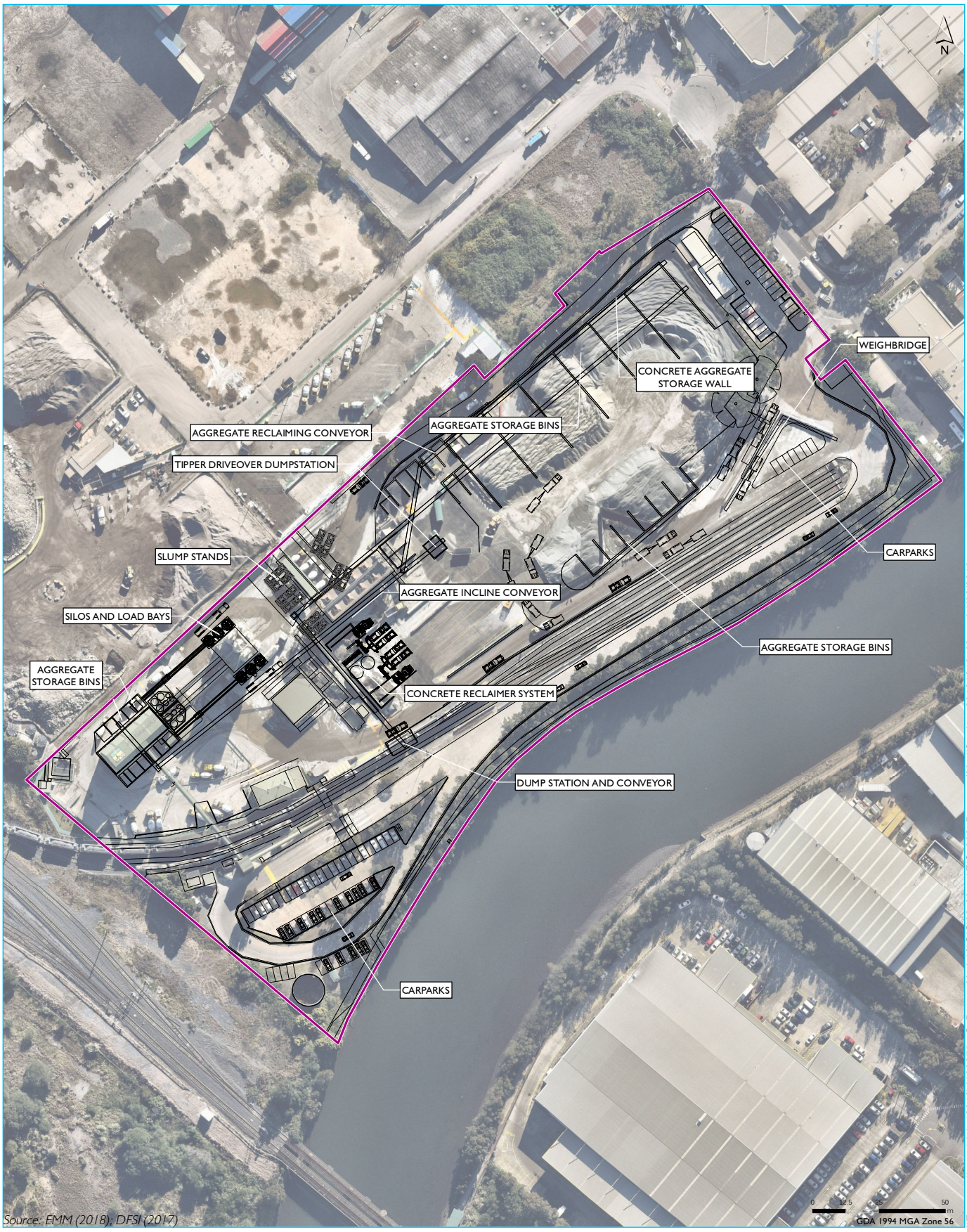
Aggregates and sand are stored in large elevated bins, and cement and fly ash are stored in large elevated silos located above the concrete plant. Aggregates and sand are transferred from the concrete plant train unloading area to the storage bins by conveyor.

The concrete plant mixes the aggregates, sand, cement and admixtures, and gravity dispenses the batched product into concrete agitators inside the loading bays building. Once loaded, the concrete agitators drive out of the loading bay building and proceed to the slump stands where water is added. The concrete agitators mix all ingredients and concrete is then transported to customers by road.

2.2.2 Materials handling facility

The handling facility is located in the centre and north-eastern section of the site. The handling facility receives and temporarily stores aggregates and sand from Boral's Peppertree and Dunmore quarries before dispatching them by road truck to other concrete batching plants and asphalt plants within the Sydney metropolitan area.

The aggregates and sand are transferred from the handling facility's train unloading area to storage bins by conveyors, which are then loaded into road trucks for dispatch offsite or for transfer to storage bunkers or stockpiles.



Source: EMM (2018); DFSI (2017)

KEY

Site location

Site layout

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Site layout

Statement of Environmental Effects

Modification 12

Boral St Peters

Figure 2.1

EMM creating opportunities

2.3 Existing approval and operations – total daily and peak hourly movements

Table 2.2 presents daily and peak hourly traffic numbers prepared for and documented in the environmental assessment and response to submissions for St Peters Modification 11, for an increase to 750,000 m^3 for the concrete plant and an increase of up to 1 Mtpa for the materials handling facility.

Note a default assumption of ten percent of all daily traffic movements possibly travelling in either the am or pm commuter traffic peak hours was then also applied to both the concrete plant and materials handling facility operations, which is considered necessary for the concrete plant operations but less so for the materials handling facility, as it can rely more on night-time truck movements.

Table 2.2 also presents the maximum peak hourly movements stipulated in the consent conditions for Modification 11, dated 31 January 2019.

Table 2.2 St Peters Modification 11 total daily and peak hourly traffic movements - 750,000 m^3 annual production for the concrete plant and 1 Mtpa throughput for materials handling facility

Truck generation source	Assessed total daily movements	Assessed peak hourly movements*	Approved** maximum peak hourly movements
Concrete plant	524 in +524 out (1,046 total)	52 in +52 out (104 total)	44 in +44 out (88 total)
Materials handling facility	92 in +92 out (184 total)	9 in +9 out (18 total)	
All site truck movements	**616 in** **+616 out** **(1,232 total)**	**62 in** **+62 out***** **(124 total)**	

Notes: * Peak hourly movements were assessed in the Modification 11 analysis for both the am and pm peak hours as 10% of total daily site traffic movements for the average daily site concrete production or materials handling facility throughput

** In the conditions of consent dated 31 January 2019, the Department of Planning and Environment specified the maximum peak hourly traffic movements for the concrete plant to be reduced to 88 total movements (44 in and 44 out).

*** There is a rounding error when you take 10% of the assessed total daily movements for the separate entities (104 total + 18 total does not equal 124 total), however the 62 in and out (124 total) is the correct number as it is 10% of assessed total daily movements for all site traffic.

3 Proposed modification

3.1 Introduction

Boral is proposing to modify the site's development consent to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11. To this end, this modification seeks to remove the production and through-put limits on the concrete plant and handling facility, and replace this with an overall site traffic volume. This will allow the necessary flexibility for the two businesses operating on the site, and keep traffic impacts at the same level as those that were modelled for Modification 11.

This chapter outlines the proposed modification to the daily and peak hourly traffic movements, demonstrating that the all site daily and peak hourly truck movements for the proposed Modification 12 will remain essentially the same as what was assessed and subsequently approved for Modification 11. This chapter also outlines the proposed changes sought to the conditions of consent.

As previously mentioned in Section 1.1, to ensure a worst-case scenario has been assessed, an increase for the materials handling facility throughput from 1 Mtpa to 1.75 Mtpa has been assumed, whilst correspondingly decreasing the concrete plant annual production to 650,000 $m^{3.}$

3.2 Proposed modification – revised traffic movements

Taking the traffic movements outlined in Table 2.2, the following breakdown is now proposed for the materials handling facility to determine combined site traffic movements for the proposed Modification 12 application:

- the EIS for Modification 11 assessed 1 Mtpa throughput for the materials handling facility which corresponds to 184 average daily truck movements, of which potentially 18 (9 in and 9 out) could potentially occur in the am or pm peak hours; and

- increasing the materials handling facility throughput to 1.75 Mtpa corresponds to an extra 138 average daily truck movements;

The consent for Modification 11 did not specify maximum peak hourly movements for the materials handling facility. Under the proposed Modification 12 a potential maximum of 36 (18 in and 18 out) truck movements could occur in either the am or pm peak hours.

With a corresponding reduction of 138 daily truck movements in the concrete plant operations (which was estimated to be 1,046 average daily truck movements for Modification 11), this 13.2% reduction would reduce the approved production limit to 650,000 m^3 with 908 average daily truck movements. However, the maximum peak hourly truck movements for the concrete plant would remain the same (88, or 44 in and 44 out) as stipulated in the current approval.

The proposed Modification 12 changes to the daily and peak hourly truck movements in relation to Modification 11 are shown in Table 3.1

Table 3.1 Proposed total daily and peak hourly traffic movements for Modification 12

	Modification 11 - 750,000 m³ annual production for the concrete plant and 1 Mtpa throughput for materials handling facility			Proposed Modification 12 - 650,000 m³ annual production for the concrete plant and 1.75 Mtpa throughput for materials handling facility	
Truck generation source	**Assessed total daily movements**	**Assessed peak hourly movements**	**Approved maximum peak hourly movements**	**Proposed total daily movements**	**Proposed maximum peak hourly movements**
Concrete plant	524 in +524 out (1,046 total)	52 in +52 out (104 total)	44 in +44 out (88 total)	454 in +454 out (908 total)	44 in +44 out (88 total)
Materials handling facility	92 in +92 out (184 total)	9 in +9 out (18 total)		161 in +161 out (322 total)	18 in + 18 out (36 total)
All site truck movements	**616 in +616 out (1,232 total)**	**62 in +62 out (124 total)***		**615 in +615 out (1,230 total)**	**62 in +62 out (124 total)**

Notes: * There is a rounding error when you take 10% of the assessed total daily movements for the separate entities (104 total + 18 total does not equal 124 total), however the 62 in and out (124 total) is the correct number as it is 10% of assessed total daily movements for all site.

Table 3.1 demonstrates that the all site daily and peak hourly truck movements for the proposed Modification 12 will remain essentially the same as what was assessed and subsequently approved for Modification 11, as no formal limit was actually specified for the peak hourly truck movements from the materials handling facility in the Modification 11 approval.

Both the approved Modification 11 and proposed Modification 12 traffic impact assessments are also potentially conservative in that both the am and pm peak hour truck movements have been considered to be the same, while in reality the pm peak hourly truck movements are likely to be much lower than during the am peak hour, so the actual site traffic impacts will be generally much lower than the assessed traffic impacts during the pm peak hour.

3.3 Proposed changes to conditions of consent

The following changes are proposed for condition of consent A6 as part of the proposed modification (Modification 12):

A6 The Applicant must:

(a) ensure the maximum hourly truck movements during the morning peak (7 am to 9 am) and afternoon peak (4 pm to 6 pm) do not exceed the limits outlined in Table 1 below

Table 1: *Maximum hourly heavy vehicle movements from ~~concrete batching plant~~ site*

Period	Hourly Two-way Movements
7 am – 9 am	~~88~~ 124
4 pm – 6 pm	~~88~~ 124

4 Statutory approval pathway

4.1 Introduction

This chapter describes the statutory planning framework that applies to the proposed modification, including an overview of the potential approval requirements under relevant Commonwealth and NSW legislation and environmental planning instruments.

4.2 Commonwealth legislation

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as matters of national environmental significance (MNES). MNES, as defined under the EPBC Act, include:

- world heritage properties;
- places listed on the National Heritage Register;
- Ramsar wetlands of international significance;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have an impact on a MNES is to be referred to the Commonwealth Department of the Environment and Energy (DoEE) for determination as to whether or not it is a controlled action.

The proposed modification will not have a significant impact on any MNES and therefore is not required to be referred to DoEE and does not require approval from the Commonwealth Minister for the Environment.

4.3 New South Wales legislation

4.3.1 NSW Environmental Planning and Assessment Act 1979 and its regulation

Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. The EP&A Act contains three parts that impose requirements for planning approval. Part 4 is the relevant section to this proposal, it provides for control of 'development' that requires development consent from the relevant consent authority. For this application, the relevant consent authority is the NSW Minister for Planning.

Section 4.10(1) of the EP&A Act states that 'designated development is development that is declared to be designated development by an environmental planning instrument or the regulations'.

Section 4(1) of the NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) states that 'development described in Part 1 of Schedule 3 is declared to be designated development for the purposes of the Act unless it is declared not to be designated development by a provision of Part 2 or 3 of that Schedule'. Clauses 14 and 19 of Schedule 3 of the EP&A Regulation are applicable to the concrete plant and materials handling facility and therefore may be declared to be designated development.

Clause 14 of Schedule 3 of the EP&A Regulation states:

14 Concrete works

(1) Concrete works that produce pre-mixed concrete or concrete products and:

(a) that have an intended production capacity of more than 150 tonnes per day or 30,000 tonnes per year of concrete or concrete products, or

(b) that are located:

(i) within 100 metres of a natural waterbody or wetland, or

(ii) within 250 metres of a residential zone or dwelling not associated with the development.

Clause 19 of Schedule 3 of the EP&A Regulation states:

19 Extractive industries

(1) Extractive industries (being industries that obtain extractive materials by methods including excavating, dredging, tunnelling or quarrying or that store, stockpile or process extractive materials by methods including washing, crushing, sawing or separating):

(a) that obtain or process for sale, or reuse, more than 30,000 cubic metres of extractive material per year, or

(b) that disturb or will disturb a total surface area of more than 2 hectares of land by:

(i) clearing or excavating, or

(ii) constructing dams, ponds, drains, roads or conveyors, or

(iii) storing or depositing overburden, extractive material or tailings, or

(c) that are located:

(i) in or within 40 metres of a natural waterbody, wetland or an environmentally sensitive area, or

(ii) within 200 metres of a coastline, or

(iii) in an area of contaminated soil or acid sulphate soil, or

(iv) on land that slopes at more than 18 degrees to the horizontal, or

(v) if involving blasting, within 1,000 metres of a residential zone or within 500 metres of a dwelling not associated with the development, or

(vi) within 500 metres of the site of another extractive industry that has operated during the last 5 years.

The concrete plant produces more than 150 tonnes per day (tpd) or 30,000 tonnes per annum (tpa) of concrete, and the materials handling facility obtains or processes for sale, more than 30,000 m^3 of extractive material per year, and as such, could be defined as designated development.

However, Part 2 of Schedule 3 of the EP&A Regulation states:

> **35 Is there a significant increase in the environmental impacts of the total development?**
>
> Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.

The proposed modification involves alterations to the approved development that do not significantly increase the environmental impacts of the total development as outlined in Chapters 6-9. Therefore Part 2 of Schedule 5 of the EP&A Regulation applies and the proposed modification is not designated development.

Boral is therefore applying for a modification involving minimal environmental impact under section 4.55(1A) of the EP&A Act, which states:

> Section 4.55(1A) of the EP&A Act: Modifications involving minimal environmental impact
>
> A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:
>
> (a) it is satisfied that the proposed modification is of minimal environmental impact, and
>
> (b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all), and
>
> (c) it has notified the application in accordance with:
>
> (i) the regulations, if the regulations so require, or
>
> (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and
>
> (d) it has considered any submissions made concerning the proposed modification within any period prescribed by the regulations or provided by the development control plan, as the case may be.
>
> Subsections (1), (2) and (5) do not apply to such a modification.

As demonstrated in the subsequent chapters, the proposed Modification 12 is of minimal environmental impact in relation to what was assessed for previous modifications. Modification 12 relates to the reconfiguration of traffic movements and does not involve increasing traffic movements.

The EP&A Regulation states clause 115 of the EP&A Regulation is to be addressed for an application for modification of a development consent under section 4.55(1), (1A) or (2) or 4.56(1) of the EP&A Act,. Table 4.1 outlines the details of this clause and where they are addressed in this document.

Table 4.1 Clause 115 of the EP&A Act, application for modification of development consent – where addressed in this document

(1) An application for modification of a development consent under section 4.55 (1), (1A) or (2) or 4.56 (1) of the Act must contain the following information:	Section 1.1
(a) the name and address of the applicant,	
(b) a description of the development to be carried out under the consent (as previously modified),	Chapter 2
(c) the address, and formal particulars of title, of the land on which the development is to be carried out,	Section 1.3
(d) a description of the proposed modification to the development consent,	Chapter 3
(e) a statement that indicates either:	
(i)that the modification is merely intended to correct a minor error, misdescription or miscalculation, or	
(ii) that the modification is intended to have some other effect, as specified in the statement,	Section 3.2
(f) a description of the expected impacts of the modification,	Chapters 6-9
(g) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved,	Section 3.1
(g1) in the case of an application that is accompanied by a biodiversity development assessment report, the reasonable steps taken to obtain the like-for-like biodiversity credits required to be retired under the report to offset the residual impacts on biodiversity values if different biodiversity credits are proposed to be used as offsets in accordance with the variation rules under the Biodiversity Conservation Act 2016,	Not applicable – the application is not accompanied by a biodiversity development assessment report
(h) if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner),	Not applicable – the applicant is the owner of the land
(i) a statement as to whether the application is being made to the Court (under section 4.55) or to the consent authority (under section 4.56), and, if the consent authority so requires, must be in the form approved by that authority.	Section 4.2.1
(2) The notification requirements of clause 49 apply in respect of an application if the consent of the owner of the land would not be required were the application an application for development consent rather than an application for the modification of such consent.	Not applicable
(3) In addition, if an application for the modification of a development consent under section 4.55 (2) or section 4.56 (1) of the Act relates to residential apartment development and the development application was required to be accompanied by a design verification from a qualified designer under clause 50 (1A), the application must be accompanied by a statement by a qualified designer.	Not applicable

Table 4.1 Clause 115 of the EP&A Act, application for modification of development consent – where addressed in this document

(3A) The statement by the qualified designer must: (a) verify that he or she designed, or directed the design of, the modification of the development and, if applicable, the development for which the development consent was granted, and (b) provide an explanation of how: (i) the design quality principles are addressed in the development, and (ii) in terms of the Apartment Design Guide, the objectives of that guide have been achieved in the development, and (c) verify that the modifications do not diminish or detract from the design quality, or compromise the design intent, of the development for which the development consent was granted.	Not applicable
(3B) If the qualified designer who gives the design verification under subclause (3) for an application for the modification of development consent (other than in relation to State significant development) does not verify that he or she also designed, or directed the design of, the development for which the consent was granted, the consent authority must refer the application to the relevant design review panel (if any) for advice as to whether the modifications diminish or detract from the design quality, or compromise the design intent, of the development for which the consent was granted.	Not applicable
(4) If an application referred to in subclause (3) is also accompanied by a BASIX certificate with respect to any building, the design quality principles referred to in that subclause need not be verified to the extent to which they aim: (a) to reduce consumption of mains-supplied potable water, or reduce emissions of greenhouse gases, in the use of the building or in the use of the land on which the building is situated, or (b) to improve the thermal performance of the building.	Not applicable
(5) The consent authority may refer the proposed modification to the relevant design review panel but not if the application is for modification of a development consent for State significant development.	Not applicable
(6) An application for the modification of a development consent under section 4.55 (1A) or (2) of the Act, if it relates to development for which the development application was required to be accompanied by a BASIX certificate or BASIX certificates, or if it relates to BASIX optional development in relation to which a person has made a development application that has been accompanied by a BASIX certificate or BASIX certificates (despite there being no obligation under clause 2A of Schedule 1 for it to be so accompanied), must also be accompanied by the appropriate BASIX certificate or BASIX certificates.	Not applicable – a BASIX certificate is not required
(7) The appropriate BASIX certificate for the purposes of subclause (6) is: (a) if the current BASIX certificate remains consistent with the proposed development, the current BASIX certificate, and (b) if the current BASIX certificate is no longer consistent with the proposed development, a new BASIX certificate to replace the current BASIX certificate.	Not applicable

Table 4.1 Clause 115 of the EP&A Act, application for modification of development consent – where addressed in this document

(8) An application for modification of a development consent under section 4.55 (1), (1A) or (2) or 4.56 (1) of the Act relating to land owned by a Local Aboriginal Land Council may be made only with the consent of the New South Wales Aboriginal Land Council.	Not applicable – the land is not owned by a Local Aboriginal Land Council
(9) The application must be accompanied by the relevant fee prescribed under Part 15.	The application will be accompanied by the relevant fee
(10) A development consent may not be modified by the Land and Environment Court under section 4.55 of the Act if an application for modification of the consent has been made to the consent authority under section 4.56 of the Act and has not been withdrawn.	Not applicable

4.3.2 NSW Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the NSW Environment Protection Authority (EPA). It aims to protect, restore and enhance the quality of the environment, having regard for the need to maintain ecologically sustainable development. This is achieved through installing mechanisms to reduce risks to human health and prevent the degradation of the environment by regulating pollution to the land, air and waters.

An environment protection licence is required to be obtained and held by entities that undertake activities listed under Schedule 1 of the POEO Act. The site is not required to hold or obtain an EPL, as concrete plants and handling facilities are not listed under Schedule 1 of the POEO Act.

4.3.3 Roads Act 1993

The NSW *Roads Act 1993* (Roads Act), administered by Roads and Maritime Services (RMS) regulates activities that may impact on public roads in NSW. Approval is required under the Roads Act to carry out works in, on or over a public road, including the provision or upgrade of access to that road.

The proposed modification does not require any changes to the site's access to facilitate additional truck movements. It does not involve any works in, on or over a public road.

A traffic assessment has been prepared which concludes the traffic impacts for the proposed modification are the same as the assessed impacts for the Modification 11 application.

4.3.4 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act* 1974 (NP&W Act), administered by the Office of Environment and Heritage (OEH), aims to conserve nature and objects, places or features of cultural value. Generally, an Aboriginal heritage impact permit is required under section 90 of the NP&W Act to knowingly destroy, deface or damage, or knowingly cause or permit the destruction or defacement of, or damage to, a relic or Aboriginal place.

No relics or Aboriginal places would be impacted by the modification.

4.3.5 Biodiversity Conservation Act 2016

On 25 August 2017 the new *Biodiversity Conservation Act 2016* (BC Act) commenced operation. Under this Act, impacts to biodiversity are assessed and offset in accordance with the clearing thresholds prescribed by the *Biodiversity Conservation Regulation 2017*.

No native vegetation, threatened or endangered flora or fauna species or endangered ecological communities would be cleared or otherwise impacted by the proposed modification.

4.3.6 Water Act 1912 and Water Management Act 2000

The NSW *Water Act 1912* and *Water Management Act 2000* (WM Act) regulate the use and interference with surface water (streams, creeks, rivers etc) and groundwater in NSW.

The proposed modification will not use or interfere with any surface or groundwater sources in accordance with legislative requirements.

4.3.7 Environmental planning instruments

i Marrickville Local Environmental Plan 2011

The site is within the IN1 General Industrial zone of the *Marrickville Local Environmental Plan* 2011 (Marrickville LEP) and shown in Figure 1.3.

The land use table contained in the Marrickville LEP for the IN1 General Industrial zone is as follows:

Zone IN1 General Industrial

1 Objectives of zone

- To provide a wide range of industrial and warehouse land uses.
- To encourage employment opportunities.
- To minimise any adverse effect of industry on other land uses.
- To support and protect industrial land for industrial uses.
- To protect industrial land in proximity to Sydney Airport and Port Botany.
- To enable a purpose built dwelling house to be used in certain circumstances as a dwelling house.

2 Permitted without consent

Home occupations

3 Permitted with consent

Agricultural produce industries; Depots; Dwelling houses; **Freight transport facilities**; Garden centres; **General industries**; Hardware and building supplies; Industrial training facilities; Intensive plant agriculture; Kiosks; Light industries; Markets; Neighbourhood shops; Places of public worship; Roads; Take away food and drink premises; Timber yards; Warehouse or distribution centres; Any other development not specified in item 2 or 4

4 Prohibited

Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Commercial premises; Community facilities; Correctional centres; Eco-tourist facilities; Educational establishments; Environmental facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Heavy industrial storage establishments; Heavy industries; Helipads; Highway service centres; Home occupations (sex services); Information and education facilities; Jetties; Marinas; Mooring pens; Moorings; Offensive industries; Open cut mining; Passenger transport facilities; Port facilities; Public administration buildings; Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Respite day care centres; Restricted premises; Rural industries; Tourist and visitor accommodation; Transport depots; Veterinary hospitals; Water recreation structures; Water supply systems; Wholesale supplies

The existing land uses on the site (ie concrete plant and materials handling facility) and the proposed modification (an increase in production at the concrete plant) are consistent with the objectives of the IN1 General Industrial zone.

Within the IN1 General Industrial zone, general industries and freight transport facilities are permitted but only with development consent. The concrete plant can be defined as a general industry while the materials handling facility can be defined as a freight transport facility.

General industry is defined under the Marrickville LEP as:

> ... a building or place (other than a heavy industry or light industry) that is used to carry out an industrial activity.

An industrial activity is defined as:

> ... the manufacturing, production, assembling, altering, formulating, repairing, renovating, ornamenting, finishing, cleaning, washing, dismantling, transforming, processing, recycling, adapting or servicing of, or the research and development of, any goods, substances, food, products or articles for commercial purposes, and includes any storage or transportation associated with any such activity.

The concrete plant is considered to be a general industry as it involves the manufacturing of concrete, which is a product used for commercial purposes.

A freight transport facility is defined under the Marrickville LEP as:

> ... a facility used principally for the bulk handling of goods for transport by road, rail, air or sea, including any facility for the loading and unloading of vehicles, aircraft, vessels or containers used to transport those goods and for the parking, holding, servicing or repair of those vehicles, aircraft or vessels or for the engines or carriages involved.

Part 4 of the Marrickville LEP contains a number of principal development standards that relate to development in the Inner West LGA. None of these standards apply to the site or the proposed modification.

Part 5 and Part 6 of the Marrickville LEP contain miscellaneous provisions relating to development in the Inner West LGA, such as development near zone boundaries, development in areas subject to aircraft noise and development in the coastal zone. None of these provisions are relevant to the site or the proposed modification. While the site is in an area subject to aircraft noise, the proposed modification does not trigger application of the provisions in the Marrickville LEP.

ii State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) applies to NSW, including the Inner West LGA. It requires the consent authority to consider whether a proposal is a potentially hazardous or offensive development.

The proposed modification is not potentially hazardous or offensive development.

iii State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) applies to NSW, including the Inner West LGA. It requires that a consent authority not grant development consent unless it has considered any potential contamination issues. Clause 7(1) of SEPP 55 states:

> A consent authority must not consent to the carrying out of any development on land unless:
>
> (a) it has considered whether the land is contaminated, and
>
> (b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
>
> (c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Whilst the site was contaminated as a result of historic filling of ash from the former Bunnerong power station and previous industrial uses, this contamination was subsequently remediated in accordance with a remediation strategy. The remediation was signed off by an accredited EPA Site Auditor. Although the site was remediated in accordance with relevant legislation and guidelines (Greencap 2015; 2016) some asbestos containing material fragments may remain.

No activities have been undertaken since the remediation was undertaken which would lead to further contamination of the site.

5 Stakeholder engagement

5.1 Overview

Boral recognises that engagement and consultation with stakeholders is integral to the operation of the site and determination of the proposed modification.

Boral contacted officers from the then Department of Planning and Environment (DPE), now referred to as the NSW Department of Planning, Industry and Environment (DPIE) on 6 June 2019 via email to discuss the proposed modification. DPIE advised via email on 11 June 2019 that formal Secretary's Environmental Assessment Requirements were not required to be issued. However, consultation with the EPA, RMS and Inner West Council was advised.

5.2 Commonwealth government

As stated in Chapter 4, the proposed modification is not predicted to have a significant impact on a MNES listed in the EPBC Act. Therefore, DoEE was not consulted regarding the proposed modification.

5.3 State and local government

Government agencies (RMS, Inner West Council and EPA) have been consulted to inform them of the proposed modification. This consultation is summarised in Table 5.1.

Table 5.1 Agency consultation

Agency	Date	Method	Matter
RMS	25/07/2019	Phone	Introduced the proposed modification and provided a brief description.
	30/07/2019	Email	Follow up email providing an overview of the proposed modification.
EPA	25/07/2019	Phone	Left a message with details regarding the proposed modification
	31/07/2019	Phone	Discussion with EPA officers, determining best contact to provide an overview of the proposed modification to.
	31/07/2019	Email	Follow up email providing an overview of the proposed modification.
	31/07/2019	Phone	Phone call discussing proposed modification in further detail, EPA requested site visit. Air quality exceedances were also raised during this discussion with no further comments from the EPA.
Inner West Council	25/07/2019	Phone	Left a message with details regarding the proposed modification
	31/07/2019	Phone	Discussion with officers, determining best contact to provide an overview of the proposed modification to.
	05/08/2019	Email	Follow up email to correct contact at council providing an overview of the proposed modification

6 Traffic

6.1 Introduction

EMM has prepared a traffic impact assessment (TIA) and is included as Attachment B. The TIA has been prepared in accordance with the Roads and Traffic Authority (RTA) - now RMS - *Guide to Traffic Generating Developments* (RTA 2002), to assess the impact of the proposed modification on the surrounding road network.

The assessment documents the additional daily traffic movements associated with the proposed modification on the surrounding locality road network, including Burrows Road, Burrows Road South, Canal Road, Ricketty Street and the Princes Highway route through St Peters.

In addition, the future peak hourly daily traffic volumes at the following three intersections are identified and assessed for the future maximum daily and peak hourly concrete production and bulk construction materials traffic:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road/Talbot Street (the Container Terminal Access); and
- Princes Highway, Canal Road and Mary Street.

It is also noted in the assessment that the future effects of the new road network capacity from the Westconnex project in the St Peters and Mascot/Alexandria areas will substantially relieve the existing daily and peak hourly traffic movements using the Canal Road and Ricketty Street route, by additional bridge crossings over the Alexandra Canal at both the Campbell Road and Gardeners Road extensions. This additional traffic capacity will provide significant traffic congestion relief benefits to the St Peters area, when Westconnex Stage 3 is completed.

6.2 Existing conditions

6.2.1 Site location and access

The Boral site is approximately 7 km south-west of the Sydney CBD. The site access is via Burrows Road South, approximately 300 metres (m) south of the intersection with Canal Road and Ricketty Street. The Princes Highway is approximately 570 m further to the west via Canal Road. Between these two intersections, approximately 320 m to the west of Burrows Road, is the entry to the St Peters Container Terminal (Talbot Street) from Canal Road. The Boral site's location in relation to the surrounding road networks is shown on Figure 6.1. Additional internal site details including the general traffic circulation paths and car parking are discussed in further detail in Section 2.6 of the TIA.

The speed limit on Burrows Road South is 50 kilometres per hour (km/hr). On the external major roads in the locality, Canal Road, Ricketty Street and the Princes Highway, the speed limit is generally higher (60 km/hr).

Views of Burrows Road South at the site frontage, Burrows Road in the vicinity of the Canal Road and Ricketty Street intersection, Ricketty Street and Kent Road looking north towards Ricketty Street are shown in Photograph 6.1 to 6.4

The other additional future locality road connections which are either approved and/or proposed to be constructed in the St Peters and Mascot localities as part of the Westconnex project, are shown on Figure 2.2 of the TIA. Burrows Road South is identified by Roads and Maritime Services (RMS) as a suitable B Double truck access route.

6.2.2 Road network

The road routes which will generally be used by most site traffic are:

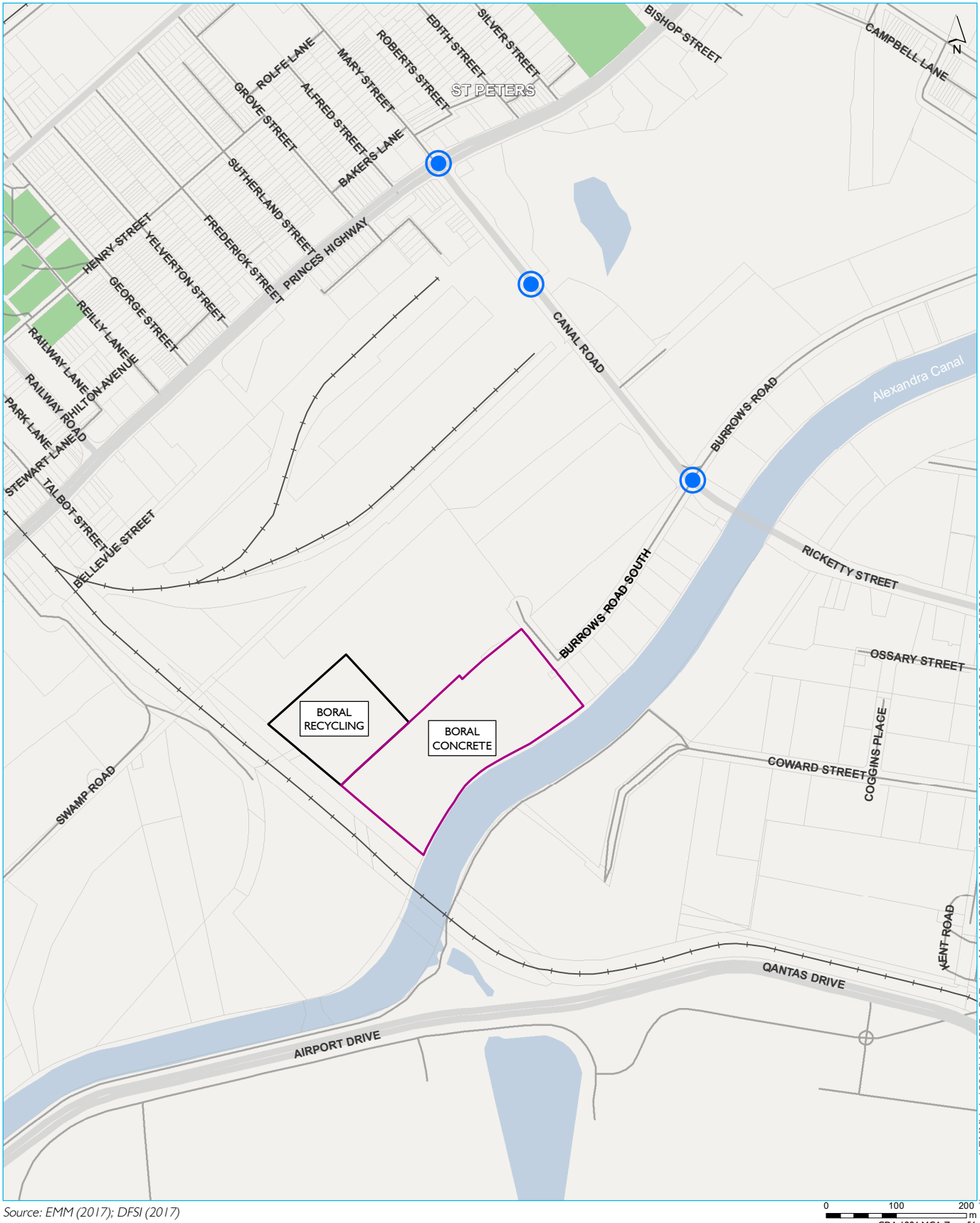
- Burrows Road and Burrows Road South – local industrial roads, having two traffic lanes (one in each direction) with parking permitted away from the major intersections;
- Canal Road and Ricketty Street – a significant arterial road route which connects the Princes Highway to Mascot. It is between four to six lanes wide between Kent Road (at Mascot) and the intersection with the Princes Highway (at St Peters); and
- The Princes Highway – a significant arterial road, which is generally at least six lanes wide. The road has peak hourly tidal flow arrangements south and east of the intersection with Canal Road, which change the direction of the central traffic lane on The Princes Highway, south of the intersection, with a corresponding closure of the kerbside lane at times on Canal Road west-bound.

The roads carrying largest proportion of the site traffic are Burrows Road South, Canal Road and the Princes Highway.

6.2.3 Intersections

The three intersections which will be used by most of the site traffic, as shown on Figure 6.1, are:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road at the St Peters Container Terminal access (Talbot Street); and
- The Princes Highway, Canal Road and Mary Street.



Source: EMM (2017); DFSI (2017)

KEY

- Site location
- Intersections potentially affected by site traffic
- Main road
- Local road
- Rail line
- Watercourse
- Waterbody
- Cadastral boundary
- Parks and recreation

Road network and intersections near the site

Statement of Environmental Effects
Modification 12
Boral St Peters

Figure 6.1

EMM

Photograph 6.1 Burrows Road South looking into the site near Gate 1

Photograph 6.2 Burrows Road South looking north towards the Canal Road intersection

Photograph 6.3 Ricketty Street showing the bridge over the Alexandria Canal looking west

Photograph 6.4 Kent Road looking north towards the Ricketty Street intersection

Approximately 40% of the total site truck traffic leaving the Burrows Road area travels to and from the west. The other truck traffic proportions which travel via Burrows Road north of Canal Road and via Ricketty Street east of Canal Road are approximately 25% and 35% respectively.

Site employee and other visitor light vehicle traffic also use these routes, but have a slightly higher proportion (approximately 50%) travelling via the Canal Road and Princes Highway routes.

The operating performance of the existing peak hourly traffic volumes at the existing major road intersections are assessed in Section 6.2.5, based on the existing peak hourly traffic volumes which are summarised in Section 6.2.4.

6.2.4 Daily Traffic volumes

The previous locality background daily traffic volumes using the road network in the Burrows Road locality of St Peters were estimated from peak hourly traffic surveys at the main intersections in December 2017, prior to the preparation of the site Modification 11 Traffic Impact Assessment.

These surveyed/estimated daily traffic volumes and heavy vehicle traffic proportions are summarised in Table 6.1, and the corresponding adjusted locality daily traffic volumes, including the approved Boral St Peters Modification 11 daily traffic movements are summarised in Table 6.2.

Table 6.1 Previous baseline locality daily traffic volumes in December 2017

Road	Intersection survey location	Morning peak hour volume	Afternoon peak hour volume	Estimated daily traffic*	Average weekday heavy vehicles*	% heavy vehicles
Burrows Road South	South of Canal Road	217	210	2,600	840	32.7
Burrows Road	North of Canal Road	489	542	6,200	950	15.4
Ricketty Street	East of Canal Road	2,816	2,891	34,200	1,670	4.9
Canal Road	West of Ricketty Street	2,846	2,915	34,600	2,010	5.8
Canal Road	East of Talbot Street	2,848	2,726	33,400	1,540	4.6
Canal Road	West of Talbot Street	2,851	2,704	33,300	1,400	4.2
Canal Road	East of Princes Highway	2,847	2,691	33,200	1,300	3.9
Talbot Street	South of Canal Road	47	52	600	470	78.4
Princes Highway	South of Canal Road	4,181	4,806	53,900	1,830	3.4
Princes Highway	North of Canal Road	2,055	2,966	30,100	900	3.0
Mary Street	West of Princes Highway	441	464	5,400	0	0.0

Notes: *Average daily traffic is estimated as 12 times the average peak hourly traffic for all roads. Daily heavy vehicle numbers and their % have been extrapolated from the am and pm peak hourly heavy vehicle traffic proportions.

In December 2017, the proportions of heavy vehicle traffic on Burrows Road South and Burrows Road were respectively 33% and 15% of all traffic. These high proportions are a reflection of the industrial nature of the land uses in this area. The proportion of trucks using Talbot Street (78.4%) was very high due to this being the entrance to a shipping container terminal.

On the other major traffic routes in the locality (Canal Road, Ricketty Street and the Princes Highway) the proportions of heavy vehicle traffic in December 2017 were much closer to the normal range for major roads and were 3.0% and 3.4% respectively for the Princes Highway north and south of Canal Road, and 3.9% to 5.8% at

various locations on Canal Road and 4.9% on Ricketty Street. On Mary Street, west of the Princes Highway, the heavy vehicle traffic proportion was effectively zero due to the load limit restricting heavy vehicle access.

Table 6.2 Adjusted baseline locality daily traffic movements including Modification 11 traffic

Road	Survey location	December 2017 weekday baseline daily traffic*	Boral Modification 11 daily traffic movements (on an average production day)	Boral Modification 11 daily traffic movements (on a maximum production day)	Adjusted weekday average daily traffic volumes including Boral Modification 11 traffic
Burrows Road South	South of Canal Road	2,600	723	1,116	3,323- 3,716
Canal Road	West of Ricketty Street	34,600	294	451	34,894-35,051
Ricketty Street	East of Canal Road	34,200	248	385	34,428-34.585
Burrows Road	North of Canal Road	6,200	181	280	6,381-6,480
Canal Road	East of Talbot Street	33,400	294	451	33,694-33,851
Talbot Street	South of Canal Road	600	0	0	600
Canal Road	West of Talbot Street	33,300	294	451	33,594-33,751
Canal Road	East of Princes Highway	33,200	294	451	33,494-33,651
Princes Highway	South of Canal Road	53,900	147	225	54,047-54,125
Princes Highway	North of Canal Road	30,100	147	225	30,247-30,325
Mary Street	West of Princes Highway	5,400	0	0	5,400

Notes: *Existing daily vehicle numbers have been determined from the am and pm peak period heavy vehicle traffic proportions.

The Boral Modification 11 daily traffic volumes on an average and a maximum production day are an additional 337-533 daily truck loads (673-1,066 additional daily truck movements) and approximately 50 additional daily car or other light vehicle movements, all travelling via Burrows Road South and then distributed onto a range of other traffic routes via the Canal Road, Ricketty Street, Burrows Road and Burrows Road South intersection.

The adjustment for the Boral Modification 11 daily traffic increases on a maximum production day is most noticeable on Burrows Road South, where the additional daily traffic would result in up to +43% increased daily traffic. On Canal Road and Ricketty Street, the percentage increases are much more moderate at up to +1.4% daily traffic increases and on the Princes Highway route north and south of St Peters, the percentage daily traffic daily traffic increases are even lower at up to +0.7%.

6.2.5 Intersection performance

The December 2017 baseline and adjusted baseline (including Boral Modification 11) traffic movements and the corresponding morning and afternoon peak hourly levels of service at the three nearby major road intersections have been assessed using the SIDRA intersection traffic model.

The SIDRA intersection program measures the intersection capacity and performance by calculating parameters such as average vehicle delay, maximum queue length, degree of saturation and level of service, based on the RTA/RMS Guide to traffic generating developments standards (Roads and Traffic Authority, 2002) which were developed from the international Highway Capacity Manual standards. The intersection levels of service (LoS) for the morning and afternoon peak hour periods are reported according to RMS defined ranges (Table 6.3) which range from A (best) to F (worst).

Table 6.3 LoS definitions

Description	LoS	Average vehicle delay (sec)
Very good	A	<14.5
Good	B	14.5 to ≤28.5
Satisfactory	C	28.5 to ≤42.5
Near capacity	D	42.5 to ≤56.5
At capacity	E	56.5 to ≤70.5
Over capacity	F	≥70.5

Source RTA/RMS Guide to Traffic Generating Developments, 2002

The detailed SIDRA intersection analysis results are included in Appendix A and a summary of the results for each intersection is provided in Table 6.4, Table 6.5 and Table 6.6.

The future intersection traffic performances are summarised in each table for the morning and afternoon peak hour traffic periods for December 2017 baseline traffic (based on actual intersection traffic surveys) and for the adjusted baseline traffic including the Boral Modification 11 peak hourly traffic.

In comparison to the surveyed December 2017 baseline traffic, the additional peak hourly Boral Modification 11 traffic is an additional 34 truck loads (68 additional heavy vehicle movements) at the Canal Road, Ricketty Street, Burrows Road and Burrows Road South intersection and an additional 14 truck loads (28 additional heavy vehicle movements) at the Canal Road, Princes Highway and Mary Street and Canal Road, Container Terminal access intersections.

Table 6.4 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at the Canal Road/Ricketty Street/ Burrows Road and Burrows Road South intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.15 to 8.15 am	3,352	20.1	B	0.851	172 (Canal Road W)
	3.00 to 4.00 pm	3,452	43.4	D	1.265	283 (Ricketty Street)
Including Boral Modification 11 Traffic	7.15 to 8.15 am	3,423	36.2	C	1.191	179 (Canal Road W)
	3.00 to 4.00 pm	3,523	77.9	F	1.909	284 (Burrows Road N)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

Table 6.5 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at the Canal Road/Container Terminal access intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.30 to 8.30 am	3,065	4.2	A	0.579	108 (Canal Road W)
	5.00 to 6.00 pm	3,161	4.9	A	0.635	89 (Canal Road W)
Including Boral Modification 11 Traffic	7.30 to 8.30 am	3,095	3.8	A	0.531	99 (Canal Road W)
	5.00 to 6.00 pm	3,191	4.8	A	0.631	87 (Canal Road W)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

Table 6.6 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at Princes Highway/Canal Road/Mary Street intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.30 to 8.30 am	5,013	69.1	E	1.061	474 (Princes Highway S)
	5.00 to 6.00 pm	5,735	48.2	D	0.964	210 (Princes Highway N)
Including Boral Modification 11 Traffic	7.30 to 8.30 am	5,042	108.2	F	1.210	554 (Princes Highway S)
	5.00 to 6.00 pm	5,763	65.7	E	1.153	234 (Princes Highway S)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

The adjustments to the surveyed baseline December 2017 traffic in Table 6.4, Table 6.5 and Table 6.6 as a result of the additional Boral Modification 11 traffic, show some changes to the peak hour traffic signal operations at two of the three assessed intersections.

Under the adjusted baseline traffic conditions, both the Canal Road/Burrows Road/Ricketty Street intersection and the Princes Highway/Canal Road/Mary Street intersection are now operating at borderline over capacity levels of service C/F and F/E during the morning and afternoon peak hours respectively, with average peak hour intersection delays of 36/78 and 108/66 seconds per vehicle during the peak hour periods.

The highest peak hour traffic queues at these two intersections were calculated as follows:

- At Burrows Road/Burrows Road South, Canal Road has a traffic queue in the east bound direction of 179 m during the morning peak hour and Burrows Road has a traffic queue in the southbound direction of 284 m in the afternoon peak hour; and

- At the Canal Road/Princes Highway intersection, Princes Highway has a traffic queue in the northbound direction of 554 m during the morning peak hour and also a queue travelling northbound of 234 m during the afternoon peak hour.

6.2.6 Existing site daily and peak hourly traffic

Table 6.7 summarised the total site daily and peak hourly traffic numbers which were prepared for and documented in the environmental assessment reports and responses to submissions for St Peters Modification 11, for an increase to 750,000 cubic metres (m^3) for the concrete plant and an increase of up to 1 Mtpa for the materials handling facility.

Table 6.7 also presents the maximum peak hourly movements stipulated in the consent conditions for Modification 11, dated 31 January 2019.

Table 6.7 St Peters Modification 11 total daily and peak hourly traffic movements - 750,000 cum annual production for the concrete plant and 1 Mtpa throughput for the materials handling facility

Truck Generation Source	Assessed total daily traffic movements (average day)	Assessed total daily traffic movements (maximum day)	Assessed peak hourly traffic movements*	Approved** maximum peak hourly movements
Concrete plant	524 in +524 out (1,046 total)	667 in +667 out (1,334 total)	52 in +52 out (104 total)	44 in +44 out (88 total)
Materials handling facility	92 in +92 out (184 total)	145 in +145 out (290 total)	9 in +9 out (18 total)	
All Site Truck Movements	616 in +616 out (1,232 total)	812 in +812 out (1,628 total)	62 in +62 out*** (124 total)	

Note:
*Peak hourly movements were assessed in the Mod 11 analysis for both the am and pm peak hours as 10% of total daily site traffic movements for the average daily site concrete production or materials handling facility throughput
**In the conditions of consent dated 31 January 2019, the Department of Planning and Environment specified the maximum peak hourly traffic movements for the concrete plant to be reduced to 88 total movements (44 in and 44 out).
*** There is a rounding error when you take 10% of the assessed total daily movements for the separate entities (104 total + 18 total does not equal 124 total), however the 62 in and out (124 total) is the correct number as it is 10% of assessed total daily movements for all site traffic.

A default assumption of ten percent of all daily traffic movements possibly travelling in either the am or pm commuter traffic peak hours has been assumed to apply to the average daily traffic movements for both the concrete plant and materials handling facility operations.

Also there are normally relatively few car traffic movements at the site during these peak hour periods. The site employee shift start and finish times are either earlier or later than the normal commuter peak traffic hours when the site traffic is normally all heavy vehicle traffic travelling in the following geographic directions:

- approximately 40% travelling south and west via Canal Road and The Princes Highway, south of Canal Road;
- approximately 35% travelling east via Ricketty Street east of Canal Road, and
- approximately 25% travelling north via Burrows Road north of Canal Road.

6.2.7 Car parking

There are two existing car parking areas for the site employees and visitors; a car park for the concrete plant in the southern most corner adjacent to the concrete plant with capacity for 40 cars, shown in Photograph 2.6, and a

smaller car park for the materials handling facility near the Burrows Road South exit which has capacity for 27 cars.

The two site car parks currently have adequate capacity for the combined site employee and visitor car parking demand for the combined site operations. In August 2017, the combined occupancy of both car parks was 52 vehicles, which represented 78% occupancy for the combined site car parking capacity of 67 cars.

6.2.8 Public transport

The site is located over 1 km walking distance from the nearest railway station at Sydenham. Public bus services in the St Peters area via Canal Road and Ricketty Street are provided by Sydney Buses route 418 which is a cross regional service operating from Bondi Junction to Burwood. The route 418 service has bus stops located on Canal Road and Ricketty Street near the intersection with Burrows Road South. These bus stops are within approximately 400 m walking distance from the site.

The bus route 418 journey times from the Canal Road locality of St Peters are approximately 40 minutes each way to or from Bondi Junction or 45 minutes each way to or from Burwood railway station. The route 418 bus service operates with 38 or 39 daily bus trips in each direction, which provides an approximate half hourly service in both directions through the major part of the day on weekdays, with some additional weekday peak hourly services between 7-9 am and 3-6 pm.

6.2.9 Pedestrian and cycling access

There are paved footpaths provided on both sides of Burrows Road South and Canal Road in the vicinity of the site

Pedestrian and cyclist access is generally feasible to and from the concrete plant and handling facility site via these roads. Bicycle use in the area is low due to the volume of traffic and percentage of heavy vehicles. Cyclists predominantly travel via the roadway along Burrows Road South, and then via the footpaths along Canal Road, due to the significantly higher car and truck traffic volumes on Canal Road.

6.2.10 Traffic safety

Traffic safety on major roads in urban areas, where the larger intersections are controlled by traffic signals, is generally good, in particular where the right turning traffic is controlled by traffic signals.

The major road traffic approaches at the two major Canal Road intersections are generally straight and reasonably level, (except for the Hump backed bridge over the canal on Ricketty Road) and there are therefore generally good sight lines for all approaching traffic to either proceed through or safely stop at these intersections.

6.2.11 Future St Peters locality road traffic changes following Westconnex

There are significant future road traffic changes predicted from all three stages of the Westconnex project on a number of roads in the Alexandria, St Peters and Mascot areas, where significantly increased road traffic volumes will be occurring on some routes (eg Euston Road) and significantly reduced road traffic volumes will be using other routes (eg Canal Road and Ricketty Street).

Both Canal Road and Ricketty Street, there will be a significant future daily traffic reduction of approximately 10,000 daily vehicle movements, immediately following the completion of the Westconnex Stages 1 and 2 projects in 2023, together with a further forecast daily traffic reduction of at least 5,000 daily vehicle movements, following the subsequent completion of the Westconnex Stage 3 project, in the years after 2023. (Roads and Maritime Services, 2017).

6.3 Traffic impact assessment

6.3.1 Proposed modification

Table 3.1 demonstrates that all the site daily and peak hourly truck movements for the proposed Modification 12 will remain essentially the same as what has been previously assessed and subsequently approved for Modification 11, although noting that no formal limit was actually specified for the peak hourly truck movements from the materials handling facility in the Modification 11 approval.

Both the approved Modification 11 and proposed Modification 12 traffic impact assessments are also potentially conservative in that both the am and pm peak hour truck movements have been considered to be the same, while in reality the site pm peak hourly truck movements are generally likely to be always lower than during the am peak hour, so the actual site traffic impacts during the pm peak hour will be generally much lower than the assessed traffic impacts in this report.

6.3.2 External traffic impact at intersections

The future peak hour intersection traffic impacts for the Modification 12 proposal are in effect identical to the impacts for the Modification 11 application, which are documented in this report in Table 6.4, Table 6.5 and Table 6.6 in terms of adjustments to the surveyed December 2012 baseline locality intersection traffic volumes, once the Modification 11 application is fully operational. The proposed future combined site peak hourly heavy vehicle movements (62 loads which is 124 heavy vehicle movements) is exactly the same in both applications.

6.3.3 External traffic impacts on the locality road network

Similar to the situation for the peak hourly traffic movements, the predicted average daily truck traffic generation which has been summarised in Table 3.1 for both the Modification 11 and Modification 12 applications, is effectively the same (1,230 daily truck movements for Modification 12 compared to 1,232 daily truck movements for Modification 11).

The effects of the proposed project daily traffic increases for the Modification 11 application, in comparison to the surveyed December 2017 baseline traffic for the locality roads, are summarised in detail in Section 6.2.4.

There will be minimal additional effect in terms of further daily traffic increases from the proposed Modification 12 application, in comparison to the Modification 11 application daily traffic increases which are now approved.

6.3.4 Safety and traffic management

The future potential road safety related traffic impacts from the modification have primarily been considered for Burrows Road South between the site and the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South.

The two existing site access driveways are well constructed with heavy duty concrete pavements, and have adequate width to accommodate all the proposed turning traffic movements by large trucks. The two driveways have good visibility of the approaching traffic in both directions on Burrows Road South and the proposed additional truck traffic movements would have minimal effects on the traffic safety at these driveways.

At the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South, the existing intersection visibility for left and right turning traffic from Burrows Road South is relatively good, as both Burrows Road and Burrows Road South are straight and level at the intersection. No additional traffic safety improvements will be required at this intersection to accommodate the proposed Modification 12 traffic movements.

6.3.5 Provision of car and truck parking

The current total provision of the site car parking (67 spaces) is more than adequate for the parking demand currently from the site employees and visitor traffic (52 cars were observed parked at the site in October 2015) which corresponds to 78% occupancy. An additional 19 car spaces are proposed for the proposed modification which will be to accommodate any future growth in the site employee or visitor car parking demand.

All the site car parking space dimensions and surfacing has been designed to comply with the requirements of the Australian Standard AS 2890.1.

The concrete agitator truck fleet is normally parked at the site during non-operational hours, with up to 40 trucks parked each evening and night. With the proposed modification, up to 20 additional concrete agitator trucks could also be based at the site, resulting in a future total of up 60 concrete agitator trucks requiring parking. In the future these additional agitator trucks would be parked either at the site or at the nearby adjacent Boral truck marshalling area which is located on Sydney Airports land.

6.3.6 Pedestrian, cycling and public transport access

The current arrangements for the site public transport, pedestrian and cyclist access to and from Burrows Road and Canal Road at St Peters are summarised in Sections 6.2.8 and 6.2.9. This access is generally adequate for the current site public transport, pedestrian and cyclist access demand.

The Boral St Peters concrete plant and materials handling facility sites will continue to provide adequate on-site car and truck parking for all the anticipated daily site travel demand by either site employees or visitors.

The future increased travel demand for persons either walking, cycling or travelling by public transport to and from the site will be minimal and will require no improvement to the locality public transport, pedestrian and cyclist access and services.

6.4 Conclusion

The road network and intersection traffic impacts of the additional traffic associated with the proposed Modification 12 application have been considered in the TIA with reference to the previously assessed and approved Modification 11 application for a different proposed combination of operations (of the concrete plant and materials handling facility) at the Boral St Peters site, which previously considered traffic impacts at the following three intersections:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road/Talbot Street (the Container Terminal Access); and
- Princes Highway, Canal Road and Mary Street.

However, as the proposed future combined site peak hourly heavy vehicle movements (62 loads which is 124 heavy vehicle movements) are exactly the same in both the Modification 11 and Modification 12 applications, the future peak hour intersection traffic impacts for the Modification 12 proposal are in effect identical to the assessed impacts for the Modification 11 application.

The additional daily traffic effects of the proposed project daily traffic increases for the Modification 12 application are exactly the same as the Modification 11 application daily traffic increases which are now approved.

There will be a negligible additional effect in terms of further daily traffic increases from the proposed Modification 12 application, in comparison to Modification 11. The future potential road safety related traffic

impacts from the modification have been reviewed for Burrows Road South between the site access gates and the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South. No additional traffic safety improvements will be required at the intersection to accommodate the proposed additional concrete plant site generated truck traffic movements.

The current and future proposed on site car and truck parking areas and the site's accessibility for walking, cycling and public transport users have also been reviewed in the TIA and found to be satisfactory for the anticipated levels of car and truck parking usage and/or travel by non car-based travel modes.

7 Air quality

7.1 Introduction

EMM has prepared an air quality impact assessment (AQIA) to assess the potential air quality impacts of the proposed modification. The air quality assessment is presented in Appendix C and the results are summarised in this chapter.

To ensure that the worst-case scenario is modelled regarding air quality impacts, an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa was assumed (as defined in Section 3.1), whilst correspondingly decreasing the concrete plant annual production to 650,000 m^3. The site combined traffic volume would still correspond to that contained in the Modification 11 environmental assessment.

The proposed modification includes no changes to the site layout, development footprint, consent area or operating hours.

7.2 Emissions estimation

In order to understand the implications for air pollutant emissions from the site arising from the proposed Modification 12 changes, the emissions inventory for Modification 11, as presented in the Modification 11 Air Quality Impact Assessment (MOD11 AQIA), has been modified. The same emissions factors and equations adopted in the MOD11 AQIA have been retained for Modification 12.

As was the case for Modification 11, the developed emissions inventory is based on the assumption of maximum site material throughputs and is therefore considered a conservative upper estimate of likely operational emissions at the site.

The annual emissions inventory for Modification 12 is presented in Table 7.1. Additionally, the change in annual emissions by source type from Modification 11 to Modification 12 is illustrated Figure 7.1, while the comparison of total annual emissions by grouped source categories in illustrated in Figure 7.2. The referenced table and figure highlight the following key points:

- sources associated with the concrete plant show a decrease in annual emissions under Modification 12;
- sources associated with the loading and dispatch of material from the handling facility (truck loading and the movement of trucks) show an increase in annual emissions relative to Modification 11;
- emissions from the tripper car transferring aggregate and sand to the handling facility have reduced significantly through the inclusion of a telescopic chute with water sprays and revised bunker design; and
- annual total site emissions for Modification 12 are lower than Modification 11.

7.2.1 Additional mitigation measures

The dispersion modelling completed for Modification 11 highlighted that a key contributing source of particulate matter emissions is the transfer of aggregate and sand material to the handling facility via the elevated conveyor and tripper car. In order to further control emissions from this area, Boral has incorporated some additional mitigation measures into the design of Modification 12, including:

- addition of a telescopic chute with water sprays at the tripper car to improve the capture of emissions from the unloading of material and lower the height of release to below the storage bunker walls; and

- revised design of the bunker walls, with the concrete side walls angled up towards the tripper car to provide improved shielding (see Figure 7.3 for cross-sectional illustration of the redesigned bunker walls).

To account for these additional mitigation measures, the following emission reduction factors have been applied to the emissions inventory calculations and reflected in the emission totals presented in Table 7.1:

- tripper car unloading - telescopic chute with water sprays – 75% reduction (Katestone 2011); and
- bunker storage area – increased wind shielding from redesigned bunker walls - 75% reduction for three side enclosure (Katestone 2011).

Table 7.1 Annual emissions inventory – proposed modification 12 operations

Operational area	Emissions source	Annual emissions (kg/year) by particle size		
		TSP	PM_{10}	$PM_{2.5}$
Concrete plant	Cement/admix delivery – paved	417.2	80.1	19.4
	Aggregate pre-silos conveyor transfer	325.1	153.8	23.3
	Sand pre-silos conveyor transfer	61.2	29.0	4.4
	Aggregate transfer to storage	442.1	209.1	31.7
	Sand transfer to storage	83.3	39.4	6.0
	Cement unloading to silos	120.3	40.9	4.1
	Aggregate transfer storage to weigh hopper	443.3	209.7	31.7
	Sand transfer storage to weigh hopper	95.2	45.0	6.8
	Weigh hopper loading	526.7	263.4	39.9
	Mixer loading (truck mixer)	1,344.4	372.8	60.1
	Agitator truck dispatch - paved	2,579.8	495.2	105.6
Handling facility	Aggregate truck unloading to stockpiles	9.6	4.5	0.7
	Sand truck unloading to stockpiles	17.2	8.1	1.2
	Aggregate unloading from train	769.4	363.9	55.1
	Sand unloading from train	182.8	86.5	13.1
	Aggregate elevated conveyor transfer	769.4	363.9	55.1
	Sand elevated conveyor transfer	213.3	100.9	15.3
	Aggregate tripper car to stockpiles	384.7	182.0	27.6
	Sand tripper car to stockpiles	91.4	43.2	6.5
	Sand to internal truck	6.1	2.9	0.4
	Aggregate/sand internal transport to new dump station	42.9	8.2	2.0
	Sand to new dump station	24.5	11.6	1.8
	Aggregate truck loading - sales	351.4	166.2	25.2
	Sand truck loading - sales	138.0	65.3	9.9
	Aggregate/sand delivery and dispatch - paved	1,271.4	244.0	58.6

Table 7.1 Annual emissions inventory – proposed modification 12 operations

Operational area	Emissions source	Annual emissions (kg/year) by particle size		
		TSP	PM_{10}	$PM_{2.5}$
	Wind erosion - storage bins	836.7	418.3	62.8
Diesel combustion	Diesel combustion – mobile plant	528.9	528.9	484.9
	Diesel combustion – trucks	132.0	132.0	121.0
	Diesel combustion - locomotive engines	885.0	885.0	858.4
Total		**13,100.0**	**5,560.5**	**2,138.6**
MOD11 AQIA total		**17,092.2**	**7,420.5**	**2,417.7**

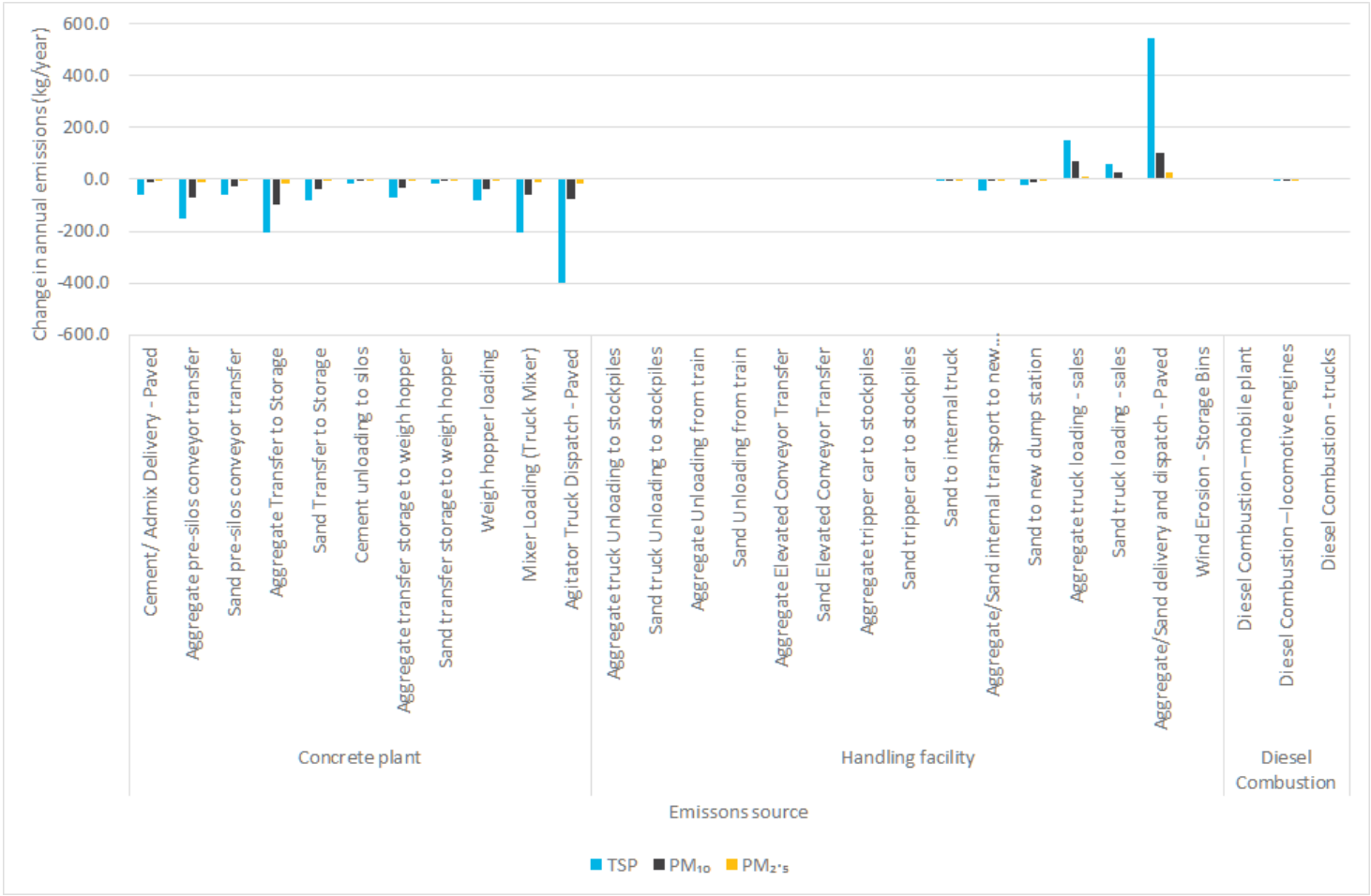


Figure 7.1 Changes in annual particulate matter emissions – Modification 12 from Modification 11

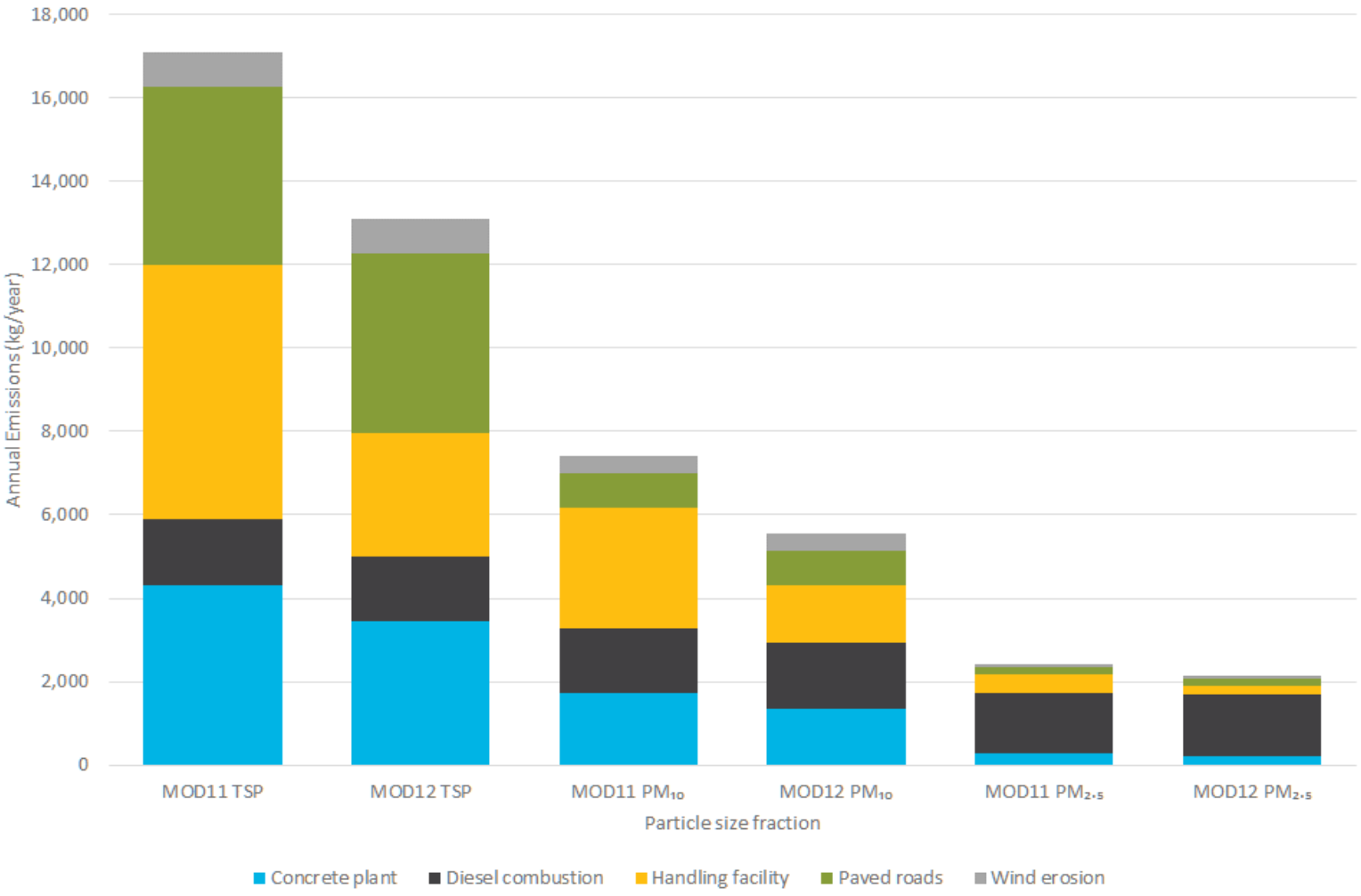


Figure 7.2 **Annual particulate matter emissions comparison – Modification 11 vs Modification 12**

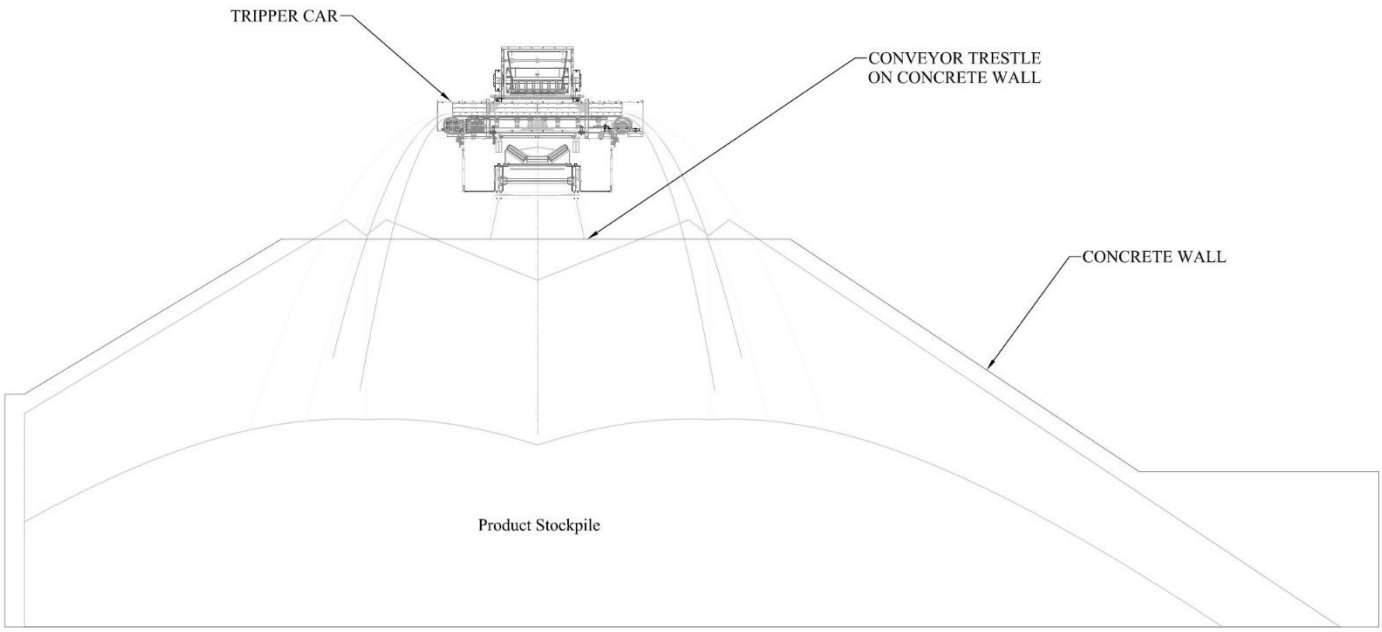


Figure 7.3 Cross-section of handling facility bunker – St Peters Terminal

Note: telescopic chute from tripper car not marked on drawing

7.3 Potential impacts – dispersion modelling results

Dispersion modelling of Modification 12 emissions was completed using the MOD11 AQIA model configuration for the site, using the amended emissions inventory discussed in Section 7.2. As was the case for MOD11 AQIA, two variations of the single Modification 12 emissions scenario have been developed:

- peak day emissions, based on maximum daily concrete agitator and aggregate truck movements; and
- average day emissions, based on average daily concrete agitator and aggregate truck movements.

The peak day emissions profile has been used to predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations, while the average day emissions profile has been used to predict annual average TSP, PM_{10}, $PM_{2.5}$ and dust deposition levels.

Predicted incremental TSP, PM_{10}, $PM_{2.5}$ concentration and dust deposition rates from the site under peak and average day Modification 12 operations are presented in Table 7.2 for each of the adopted assessment locations. The change in predicted incremental concentration or deposition rate from the Modification 12 emissions inventory relative to the results presented in the MOD11 AQIA are illustrated in Figure 7.4.

Table 7.2 Incremental particulate matter concentration and deposition results – proposed Modification 12 operations

Receptor	Incremental concentration (µg/m³) or deposition (g/m²/month) due to Modification 12					
	Annual TSP	24-hour PM_{10}	Annual PM_{10}	24-hour $PM_{2.5}$	Annual $PM_{2.5}$	Dust deposition
1	0.1	0.1	<0.1	0.1	<0.1	<0.1
2	0.1	0.2	<0.1	0.1	<0.1	<0.1

Table 7.2 Incremental particulate matter concentration and deposition results – proposed Modification 12 operations

Receptor	Incremental concentration (µg/m³) or deposition (g/m²/month) due to Modification 12					
	Annual TSP	**24-hour PM_{10}**	**Annual PM_{10}**	**24-hour $PM_{2.5}$**	**Annual $PM_{2.5}$**	**Dust deposition**
3*	1.7	3.4	0.7	0.9	0.3	1.2
4*	1.5	1.9	0.6	0.6	0.2	1.0
5*	0.5	0.6	0.2	0.3	0.1	0.3
6*	0.9	1.1	0.4	0.6	0.2	0.5
7*	1.2	1.8	0.7	1.0	0.4	0.6
8*	0.3	0.5	0.1	0.2	0.1	0.1
9*	0.1	0.3	0.1	0.1	<0.1	0.1
10*	1.5	2.7	0.6	0.6	0.2	1.1
11*	1.1	2.8	0.5	0.7	0.2	0.9
Criteria	**90**	**50**	**25**	**25**	**8**	**2**

Note *: industrial receptor

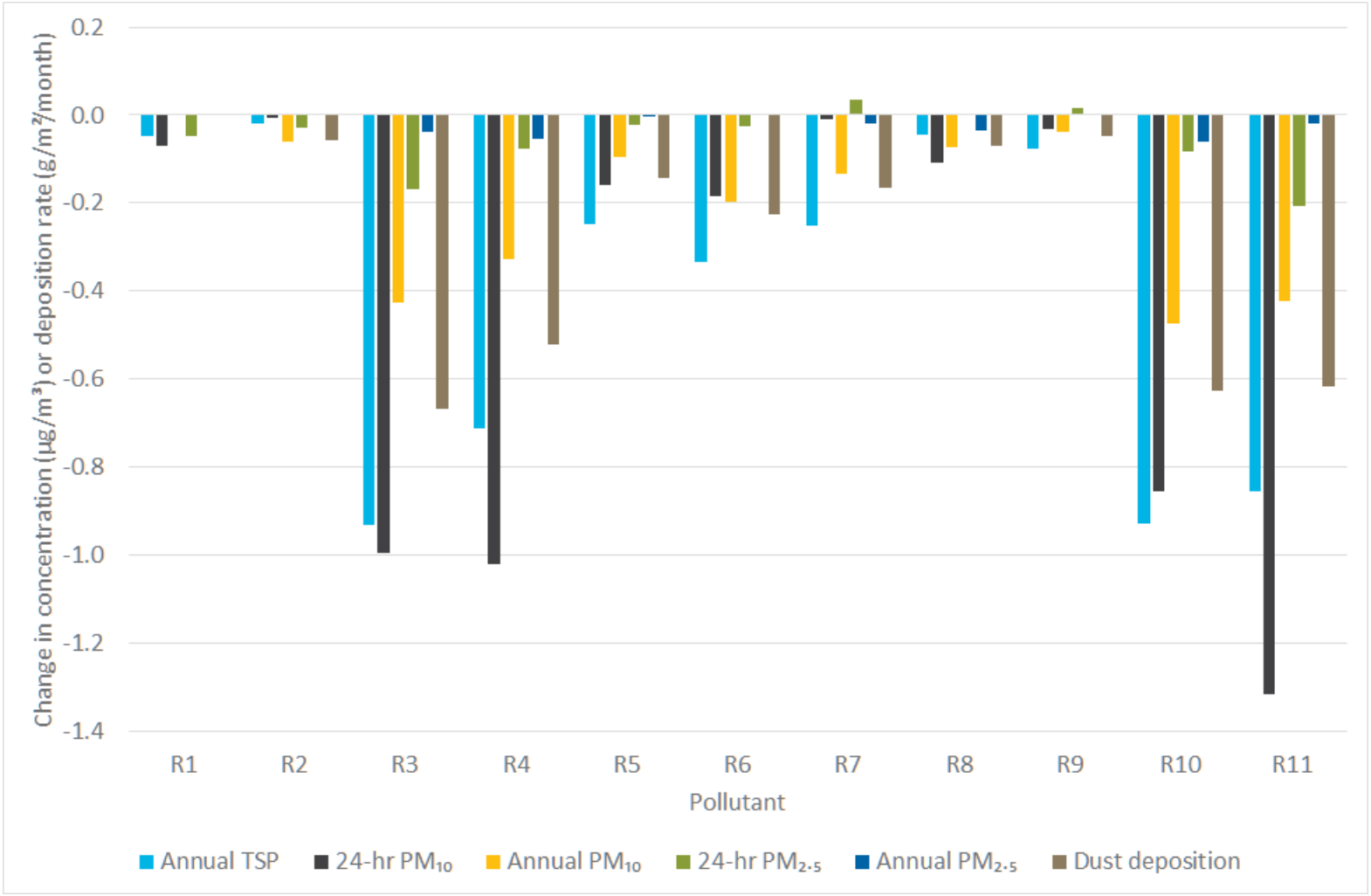


Figure 7.4 **Change in predicted concentration or deposition rate – Modification 12 vs Modification 11**

The results in Table 7.2 and Figure 7.4 highlight the following:

- the predicted change in concentrations and dust deposition rates at the two residential receptors (R1 and R2) are negligible to minor reduction relative to Modification 11;
- peak day PM_{10} and $PM_{2.5}$ and annual average dust deposition impacts at the immediately adjacent industrial receptors (R3, R4, R10 and R11) are predicted to decrease for Modification 12;
- when compared with the predicted cumulative 24-hour and annual average concentrations for TSP, PM_{10} and $PM_{2.5}$ presented in the MOD11 AQIA, any predicted increases for Modification 12 would not result in the exceedance of cumulative impact assessment criterion at any surrounding assessment location; and
- the predicted incremental dust deposition levels are predicted to be below the NSW EPA incremental impact assessment criterion of 2 g/m^2/month.

The results of the modelling completed indicate that the additional mitigation measures, namely the telescopic chute at the tripper car and the redesigned bunker wall, will improve the air quality performance of the site relative to Modification 11.

7.4 Mitigation and management measures

Mitigation measures specific to the telescopic chute with water sprays at the tripper car and revised bunker walls have been outlined in 7.2.1.

Additionally, it is noted that, as part of the Modification 11 conditions of consent, Boral have committed to the installation of a real-time particulate matter monitoring network at the boundary of the site. The proposed monitoring network is intended to assist Boral with the reactive management of particulate matter emissions from the site by alerting site personnel to periods of elevated site emissions and allow for the implementation of increased emission controls.

Dust deposition impacts are associated with total particulate matter emissions. It is therefore considered that the real-time monitoring network will assist Boral with controlling particulate matter emissions from the site and management of predicted impacts at surrounding industrial receptors.

7.5 Conclusion

EMM has completed an assessment of the potential changes in particulate matter emissions associated with the proposed Modification 12. The assessment utilised input data used for the assessment of Modification 11, completed by Ramboll (2018), which assumed maximum site material throughputs, and is therefore considered a conservative upper estimate.

The air quality assessment of Modification 12 made the following key findings:

- the proposed modification to site operations would result in a decrease in total site annual particulate matter emissions relative to Modification 11;
- the decrease in emissions is associated with a reduction in the concrete plant operations and improved particulate matter mitigation measures at the handling facility;
- the proposed telescopic chute at the tripper car and redesigned storage bunker walls will effectively reduce key emissions sources relative to Modification 11;

- the model predictions for Modification 12 showed a decrease in impacts at immediately adjacent industrial receptors;
- the predicted compliance with NSW EPA impact assessment criteria for cumulative annual average TSP, 24-hour average and annual average PM_{10} and $PM_{2.5}$ presented in the MOD11 AQIA would not change for Modification 12 operations;
- further afield, the change in predicted impacts at other representative assessment locations, including residential receptors, is considered negligible; and
- the proposed real-time particulate matter monitoring network will assist with the management of particulate matter impacts at neighbouring receptors.

8 Noise

8.1 Introduction

A noise and vibration impact assessment (NVIA) has been prepared by EMM to assess the potential noise impacts of the proposed modification. The NVIA is presented in Appendix D and the results are summarised in this chapter.

The NVIA has been prepared with reference to the following guidelines and policies:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPfI) 2017; and
- NSW Department of Climate Change and Water (DECCW), Road Noise Policy (RNP) 2011.

It is expected that all site (handling facility and concrete plant) daily and peak hourly truck movements for the proposed modification will remain the same as what was assessed and subsequently approved for Modification 11, as no formal limit was specified in the development consent for the peak hourly truck movements from the handling facility.

No changes to approved construction activities are proposed and hence no material changes in construction noise and construction vibration are anticipated as a result of the proposed modification. Therefore, the assessment of construction noise and construction vibration provided in the Modification 11 NVIA report remains applicable, and hence these matters are not discussed further in this section.

8.2 Existing environment

8.2.1 Assessment locations

The site is located within an industrial precinct and is immediately surrounded by other sites such as Boral's recycling facility, Visy's paper and cardboard warehouse, Maritime Container Services' terminal and various warehousing and storage facilities. The closest residences are approximately 600 m to the north-west of the site on the opposite (north) side of the Princes Highway. Otherwise surrounding land uses are industrial, with the site directly bounded by industrial premises. The site's location in its local context is shown in Figure 8.1.

It is considered that if the noise trigger levels (refer to Section 8.3) can be satisfied at the assessment locations, which are closest to the site, then noise trigger levels will be satisfied at noise-sensitive locations that are further from the site.

Nearest representative noise sensitive locations to the site have been identified and are provided in Table 8.1, hereafter referred to in this report as assessment locations. The assessment locations are shown in Figure 8.1.

Table 8.1 Assessment locations

ID	Receiver type[1]	Address
R1	Residential	10 Terry Street, Tempe
R2	Residential	383 Princes Highway, Sydenham (Cnr of Yelverton Street and Princes Highway)
R3	Commercial/Industrial	Bellevue Street, Tempe

Notes: 1. As defined in the NPfI (EPA 2017).

8.2.2 Background noise environment

Unattended and attended noise monitoring was previously conducted for the site as part of the noise assessment completed by EMM in 2016. The noise monitoring data was also used for the purpose of the NVIA (2018) for Modification 11. The EMM report *Noise and vibration impact assessment - Modification 11 | Boral St Peters* (2018) references the existing ambient noise environment surrounding the site. The noise monitoring data is considered valid and representative of existing noise levels and hence has been used for the purpose of this assessment.

The noise monitoring locations are shown in Figure 8.1.

Source: EMM (2018); DFSI (2017); LPI (2015)

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KEY

- Assessment location
- Attended noise monitoring location
- Unattended noise monitoring location
- Site location

Noise monitoring and assessment locations

Statement of Environmental Effects

Modification 12

Boral St Peters

Figure 8.1

EMM

8.3 Noise criteria

Noise from industrial sites or processes in NSW are regulated by the local council, the DPIE and/or the EPA. These limits are generally derived from operational noise trigger levels applied at assessment locations. They are based on the NPfI guidelines (EPA 2017) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

Noise criteria applicable for the proposed modification is outlined in Appendix D with certain aspects like noise trigger levels for the proposed modification is summarised further below.

8.3.1 Project noise trigger levels

To ensure noise criteria and noise policy objectives are met, the EPA provides two separate noise trigger levels: intrusiveness noise level and amenity noise level.

The project noise trigger level (PNTL) is the lower of the calculated intrusiveness or amenity noise levels. The PNTLs adopted for all assessment locations were referenced from the Modification 11 NVIA.

The PNTLs are provided in Table 8.2 for all assessment locations.

Table 8.2 PNTLs

Location	Intrusiveness $L_{Aeq,15min}$ noise level, dB			Amenity $L_{Aeq,15min}$ noise level[1], dB			PNTL $L_{Aeq,15min}$[2], dB		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1 – Residence	59	57	50	**58**	**48**	**43**	58	48	43
R2 – Residence	59	57	50	**58**	**48**	**43**	58	48	43
R3 – Commercial[3]	N/A	N/A	N/A	63 (when in use)			63 (when in use)		

Source: Modification 11 NVIA (EMM 2018).

Notes:
1. Project amenity noise level is the recommended amenity noise level minus 5 dB and $L_{Aeq,15min}$ is equal to $L_{Aeq,period}$ + 3 dB as per the NPfI (EPA 2017).
2. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.
3. The more stringent amenity noise level for commercial land zoning has been adopted.
4. Value in bold font and underlined is the lower of the intrusiveness and amenity noise levels for residences.

8.3.2 Sleep disturbance

The site operates during the night-time period (24 hours) and therefore the assessment of potential sleep disturbance from maximum noise events at residences is required in accordance with the NPfI. Sleep disturbance is defined as both awakenings and disturbance to sleep stages.

The NPfI provides the following sleep disturbance trigger levels for residences:

- $L_{Aeq,15min}$ 40 dB or the prevailing RBL plus 5 dB, whichever is the greater; and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB, whichever is the greater.

The sleep disturbance noise trigger levels adopted for the residential assessment locations were referenced from the Modification 11 NVIA and are shown in Table 8.3.

Table 8.3 Sleep disturbance noise trigger levels - residential assessment locations

Assessment location	Recommended sleep disturbance trigger level, dB		Adopted sleep disturbance trigger level, dB	
	$L_{Aeq,15min}$	L_{Amax}	$L_{Aeq,15min}$	L_{Amax}
	Standard/RBL +5	Standard/RBL +15		
R1	40/**50**	52/**60**	50	60
R2	40/**50**	52/**60**	50	60

Source: Modification 11 NVIA (EMM 2018)

Notes: 1. Value in bold font and underlined is the greater of the sleep disturbance noise levels.

8.3.3 Road traffic noise

The principle guidance for assessing the impact of road traffic noise on receivers is in the RNP.

The proposed modification will include an increase in road truck movements (the handling facility) and a decrease in concrete agitator movements on the transport route. The site is accessed via Burrows Road South, Canal Road and the Princes Highway. Table 8.4presents the road traffic noise assessment criteria for residences for the relevant road category, which have been reproduced from Table 3 of the RNP.

Table 8.4 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15hr}$ 60 (external)	$L_{Aeq,9hr}$ 55 (external)

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, after consideration of all feasible and reasonable noise mitigation and management measures.

8.4 Noise assessment

A semi-quantitative assessment of the potential change in site noise levels between currently approved (Modification 11) and proposed (Modification 12) operations was completed. Assumptions related to the overall site adopted in this assessment are generally consistent with the EMM reports prepared as part of the Modification 11 EIS and Response to Submissions.

8.4.1 Operational noise

The difference in operating noise levels between the current approved operations and the proposed modification has been assessed. Operational noise sources and associated sound power levels adopted for the Modification 11 NVIA and assessed as part of Modification 12 (additional quantity) are summarised in Table 8.5.

It is noted that although a reduction in the numbers of concrete agitators is anticipated as a result of Modification 12, the quantity of concrete agitators within a NPfI 15-minute assessment period in this assessment

has been assumed to be the same as that in the Modification 11 NVIA (2018), and therefore represents a worst-case assessment scenario.

Table 8.5 Operational plant and equipment sound power levels

Plant and equipment	Current quantity (Modification 11)	Additional quantity (Modification 12)	Sound power level[1] L_{Aeq}, dB
Concrete agitator	7	-	103
Concrete agitator slumping	7	-	111
Batching plant – Mixing bowl[2]	2	-	100
Cement tanker	1	-	110
Front-end loader (FEL)	1	-	105
Water truck	1	-	96
Train (loco idling)	1	-	103
Bobcat	1	-	100
Forklift	1	-	105
Aggregate truck	1	1	104
Aggregate truck idling	1	1	97
Articulated dump truck	1	-	108
concrete plant conveyor[3] – train to storage bins	1	-	78 (per metre)
concrete plant conveyor[3] – storage bins to batch plant	4	-	78 (per metre)
HF conveyor[3] – train to storage bins	1	-	78 (per metre)
HF conveyor[3] – storage bins to truck stand	1	-	78 (per metre)
HF conveyor[3] – storage bins to stockpiles	1	-	78 (per metre)
Aggregate incline conveyor[3]	1	-	78 (per metre)

Notes: 1. Sound power level listed is per unit. Doubling the quantity of plant/equipment increases the sound power level by 3 dB.
2. As the batching plant is enclosed loading facilities with automatic doors, it has been afforded a 10 dB emission reduction (ie 110-10=100 dB).
3. As the conveyors are enclosed, they have been afforded a 10 dB emission reduction (ie 88-10=78 dB).

Table 8.5 shows that in terms of numbers of onsite operational noise sources, the only additional sources are the increased road truck movements within the handling facility. The assessment identified that the $L_{Aeq,15min}$ noise levels from the proposed increase in road truck numbers would not measurably increase current site noise levels at all assessment locations. Therefore, no impact from site noise is anticipated from the proposed Modification 12 operations.

8.4.2 Sleep disturbance assessment

Sleep disturbance from proposed operations during the night period has been considered. The highest predicted maximum noise levels ($L_{Aeq,15min}$ and L_{Amax}) from site would not measurably increase and would remain well below the NPfI trigger noise levels. Therefore, proposed night-time operations for Modification 12 are unlikely to cause sleep disturbance at residential assessment locations.

8.4.3 Road traffic noise assessment

The nearest residences potentially affected by an increase in road traffic volumes as a result of the proposed modification are located on the Princes Highway.

Assessed traffic movements have been based on average daily volumes for the site. Modification 12 will result in an additional 138 average daily truck movements (from the handling facility) on the public road network.

The traffic assessment (EMM 2018) for Modification 11 estimated that site related traffic would increase daily traffic movements on the Princes Highway by 0.4% (south of Canal Road) and 0.7% (north of Canal Road). Given the latter and the relatively small increase in proposed road traffic movements from the handling facility for Modification 12, there would be a negligible increase in road traffic noise levels at the nearest residential locations. Therefore, the impact of road traffic noise associated with the proposed Modification 12 is predicted to be negligible and within the 2 dB allowable increase for land use developments in accordance with the RNP.

8.5 Conclusion

EMM has assessed potential noise and vibration impacts from the proposed Modification 12, the NVIA is included in Attachment D.

No changes to construction noise and construction vibration are anticipated as a result of the proposed modification.

The assessment has shown that onsite operational noise levels from the proposed modification are not predicted to change from current approved operations. Proposed night-time operations for Modification 12 are unlikely to cause sleep disturbance at residential assessment locations.

Road traffic noise generated by the proposed modification is not expected to result in any noticeable increase in road traffic noise levels at the nearest residential locations on the transport route and therefore will satisfy the relevant RNP assessment requirements.

9 Surface water

9.1 Existing environment

9.1.1 External drainage

i Alexandra Canal

The site is located adjacent to the Alexandra Canal, a concrete lined channel which conveys runoff from the suburbs of Alexandria, Rosebery, Erskineville, Beaconsfield, Zetland, Waterloo, Redfern, Newtown, Surry Hills and Moore Park.

The Alexandra Canal Flood Study (WMA, 2017) indicates the site, Burrows Road and low-lying land to the north of the site are prone to flooding in the 1% AEP and lower magnitude events. Most of the site is affected by flooding in the probable maximum flood event.

A Flood Emergency Response Plan (FERP) that provides practical information to site personnel to assist a safe and structure response to a flooding event has been prepared as part of the Water Management Plan (EMM, 2019).

ii Other drainage

Burrows Road, located to the east of the site, drains into the Alexandra Canal via a piped drainage system to the east of the site.

At the south-western portion of the site, a large culvert that receives runoff from the industrial area to the north of the site drains runoff to the Alexandra Canal.

9.1.2 Site water management

The water management system is comprised of the following key components:

- Process water system – receives all concrete washout and any other water produced from the cementitious areas. The system is bunded to prevent stormwater ingress and comprises several continuously stirred tanks that holds process water prior to use in concrete production. The process water is topped up by stormwater (when available) and mains water.

- Stormwater system – incudes two first flush capture pits ad stormwater drainage. Water captured in the first flush pits is used to top up the process water system, reducing discharge volumes and frequency.

The site water management system was assessed in detail for Modification 11. As part of the modification, Boral committed to upgrading the surface water management system.

The objectives of the upgraded stormwater management system are:

- where practical, separate stormwater and cementitious areas of the site;

- improve the management of return concrete;

- improve site drainage to prevent the discharge of untreated stormwater from the site during frequently occurring rainfall events;

- provide water quality treatment of all site runoff to meeting the pollutant load reductions recommended in the Botany Bay & Catchment Water Quality Improvement Plan (SMCMA, 2011); and
- increase stormwater harvesting to reduce stormwater discharge and potable water consumption.

9.2 Potential impacts

The amendments proposed by Modification 12 are to consolidate the allowable truck volumes and reconfigure truck movements around the site. Based on the following aspects of the proposed amendments, Modification 12 is not expected to impact the surface water system:

- there are no proposed changes to the site layout or development footprint;
- the currently approved concrete production limit of 750,000m^3 per annum is not proposed to be increased; and
- approved upgrades to the water management system will remain unaffected.

10 Justification and conclusion

10.1 Need for the modification

The proposed modification is needed to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/through put, the other business can subsequently reduce their operations. This will allow greater flexibility within the site and between the two entities so that Boral can respond to the current market efficiently.

10.2 Objects of the Environmental Planning and Assessment Act 1979

The EP&A Act provides the framework for environmental planning and assessment in NSW. The objects of the EP&A Act are listed in section 1.3 of the Act and are as follows:

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;

(c) to promote the orderly and economic use and development of land;

(d) to promote the delivery and maintenance of affordable housing;

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);

(g) to promote good design and amenity of the built environment;

(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants;

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State; and

(j) to provide increased opportunity for community participation in environmental planning and assessment.

There are four objects of the EP&A Act relevant to the modification, being:

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,

The concrete plant and materials handling facility would continue to facilitate the distribution of bulk construction materials and concrete to the building and construction market. The site is ideally located with access to rail infrastructure which enables efficient delivery of quarry products to the site. The proposed modification allows

for greater flexibility for the materials throughput and concrete production, allowing for Boral to respond to changes in demand more efficiently.

(c) to promote the orderly and economic use and development of land,

The modification provides further flexibility for traffic movements between the concrete plant and throughput of the materials handling facility. The ongoing use of both facilities is a more economically efficient use compared with developing a new concrete plant or materials handling facility.

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

The modification would not result in impacts to native animals and plants, and would operate in a manner that generally avoids or minimises impacts to the environment.

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

The proposal is consistent with the four ESD principles described in the EP&A Regulation. This is discussed further in Section 10.3.

10.3 Principles of ecologically sustainable development

Schedule 2, Part 3, Clause 4 of the EP&A Regulation describes the four principles of ESD. Table 10.1 demonstrates how the modification is consistent with these four principles.

Table 10.1 Compliance with ESD principles

Principle	Application	Compliance
The precautionary principle	If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: • careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and • an assessment of the risk-weighted consequences of various options.	The proposed modification avoids serious and irreversible environmental damage through the efficient use of an existing site, requiring no additional land disturbance. Potential environmental impacts from the proposed modification would be managed to an acceptable level. Detailed modelling and assessments used leave little doubt as to the expected impacts of the proposed modification.
Inter-generational equity	The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	Potential environmental impacts from the proposed modification would be managed to an acceptable level, thereby maintaining health, diversity and productivity of the environment of future generations.
Conservation of biological diversity and ecological integrity	The conservation of biological diversity and ecological integrity should be a fundamental consideration.	The proposed modification would not result in impacts to biodiversity or ecological integrity. There would be no disturbance to native vegetation.

Table 10.1 Compliance with ESD principles

Principle	Application	Compliance
Improved valuation, pricing and incentive mechanisms	Environmental factors should be included in the valuation of assets and services, such as: • polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement; • the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and • environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	This SEE has considered environmental factors and demonstrated that potential environmental impacts from the modification would be managed to an acceptable level.

10.4 Conclusion

Boral's St Peters concrete plant and materials handling facility has been operating in accordance with its existing consent since 1996. It is a major supplier of construction materials in the Sydney region. It receives bulk construction materials (aggregate, sand and cement) predominantly by rail from Boral's Peppertree and Dunmore quarries and Berrima Cement Works. These construction materials are used to make concrete, or are temporarily stored for later distribution t within the Sydney metropolitan area. Concrete and construction materials are despatched by road.

Housing and infrastructure construction are continuing to drive demands in the Sydney construction materials market and the site's location makes it an ideal site for ensuring there is efficiency and production. Therefore, an application under section 4.55(1A) of the EP&A Act is proposed to modify the site's development consent to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11.

This document focussed on investigating any potential environmental impacts from reconfiguring the traffic movements for the site. This included the potential effects on traffic, air quality, noise, and surface water. In addition to the proposed and existing environmental mitigation, management and monitoring measures applied at the site, the proposed modification would result in minimal environmental impact, therefore complying with an application under section 4.55(1A) of the EP&A Act.

11 References

EMM 2018, Boral St Peters concrete plant and materials handling facility – Modification 11: Surface water assessment, prepared for Boral Resources (NSW) Pty Ltd

EMM 2019, Boral St Peters concrete plant and materials handling facility: Water management plan, prepared for Boral Resources (NSW) Pty Ltd

Roads and Traffic Authority (2002) Guide to Traffic Generating Developments.

Roads and Maritime Services (2017) M4-M5 Link, Environmental Impact Statement, Technical Working Paper, Traffic and Transport.

WMAwater 2017, Alexandra Canal Draft Flood Study, prepared for Inner West Council

Appendix A

Existing Development Consent No. DA 14/96

Modification of Minister's Approval

Section 75W of the *Environmental Planning and Assessment Act 1979*

As delegate for the Minister for Planning, under the Instrument of Delegation executed on 11 October 2017, I approve the modification of the development consent referred to in Schedule 1, subject to the Conditions outlined in Schedule 2.

Anthea Sargeant
Executive Director
Key Sites and Industry Assessments

Sydney 31 January 2019

SCHEDULE 1

Development Consent (DA 14/96), granted by the former Minister for Planning on 10 September 1996 for the development of a concrete batching plant, an asphalt plant and associated materials handling facility at Burrows Road South, St Peters in the Inner West local government area.

SCHEDULE 2

1) Delete the heading "Schedule A" and replace it with the heading "Schedule 1"

2) Delete all references to 'WorkCover Authority' and replace with "SafeWork NSW"

3) Delete the definitions for "Act", "construction", "Regulation" and "Secretary" in the definitions in the new Schedule 1

4) Insert the following definitions in the new Schedule 1 in alphabetical order:

CEMP	Construction Environmental Management Plan
construction	the demolition and removal of buildings or works, the carrying out of works for the purpose of the development, including bulk earthworks, and erection of buildings and other infrastructure permitted by this consent.
DoI	Department of Industry
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
MOD 11	Modification 11 to this consent, as described in Condition 2o)
PA	Means a planning agreement within the meaning of the term in section 7.4 of the EP&A Act.
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
waste	has the same meaning as the definition of the term in the Dictionary to the POEO Act
year	a period of 12 consecutive months

5) Insert a new heading immediately after the definitions as follows:

SCHEDULE 2
PART A: ADMINISTRATIVE CONDITIONS

6) Insert the letter "A" in front of Condition numbers 1 to 5.

7) Delete the words "Environmental Planning and Assessment Act, 1979" in Condition A1 and replace with "EP&A Act".

8) Insert the following clauses immediately after clause n) in Condition A2:

   o) modification request DA 14/96 Mod 11, and supporting documents, including the reports titled '*Boral St Peters concrete plant and materials handling facility, Environmental Assessment, Modification 11*' dated 13 July 2018, prepared by EMM, and '*Response to Submissions, St Peters concrete plant and materials handling facility – Modification 11'*, dated 11 September 2018, prepared by EMM and a letter dated 12 October 2018 from EMM;
   p) the development layout in Appendix 1.

9) Delete the numbers "280,000" and "750,000" in Condition A5 and replace with "750,000" and "one million", respectively.

10) Immediately after Condition A5 insert new Conditions A6 to A15 as follows:

A6. The Applicant must:

(a) ensure the maximum hourly truck movements during the morning peak (7 am to 9 am) and afternoon peak (4 pm to 6 pm) do not exceed the limits outlined in Table 1 below; and

Table 1: *Maximum hourly heavy vehicle movements from concrete batching plant*

Period	Hourly Two-way Movements
7 am – 9 am	88
4 pm – 6 pm	88

(b) prepare and submit a quarterly report on heavy vehicle truck movements during the morning and afternoon peak periods to Council and the Planning Secretary until the completion of WestConnex Stage 3, unless otherwise agreed to by the Planning Secretary.

EASEMENTS

Maintenance of Water Management System

A7. Within 12 months after the determination of MOD 11, a positive covenant under section 88E of the *Conveyancing Act 1919* must be registered on the title of the site that provides for the ongoing management and maintenance of the on-site water management system. The covenant must name Council as the prescribed authority, and can only be revoked, varied or modified with the consent of the Council.

PLANNING AGREEMENT

A8. Within six months after the date of commencement of construction of MOD 11 works, or other timeframe agreed by the Planning Secretary, the Applicant must enter into a PA with the Council in accordance with:

(a) Division 7.1 of Part 7 of the EP&A Act; and

(b) the terms of the offer in the letter dated 18 December 2018 from Boral Resources (NSW) Pty Limited to the Council, which has been accepted by the Council.

EVIDENCE OF CONSULTATION

A9. Where Conditions of this consent require consultation with an identified party, the Applicant must:

(a) consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval; and

(b) provide details of the consultation undertaken including:

(i) the outcome of that consultation, matters resolved and unresolved; and

(ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

DEMOLITION

A10. All demolition must be carried out in accordance with *Australian Standard AS 2601-2001 The Demolition of Structures* (Standards Australia, 2001).

STRUCTURAL ADEQUACY

A11. All new buildings and structures, and any new alterations or additions to existing buildings and structures, that are part of the development, must be constructed in accordance with the relevant requirements of the BCA.

COMPLIANCE

A12. The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the Conditions of this consent relevant to activities they carry out in respect of the development.

OPERATION OF PLANT AND EQUIPMENT

A13. All plant and equipment used on site, or to monitor the performance of the development, must be:
(a) maintained in a proper and efficient Condition; and
(b) operated in a proper and efficient manner.

APPLICABILITY OF GUIDELINES

A14. References in the Conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this consent.

A15. However, consistent with the Conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, when issuing directions under this consent in respect of ongoing monitoring and management obligations, require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.

11) Immediately after new Condition A15 insert new Advisory Note AN1 as follows:

ADVISORY NOTES

AN1. All licences, permits, approvals and consents as required by law must be obtained and maintained as required for the development. No Condition of this consent removes any obligation to obtain, renew or comply with such licences, permits, approvals and consents.

12) Insert a new heading immediately after new Advisory Note AN1 as follows:

PART B: SPECIFIC ENVIRONMENTAL CONDITIONS

13) Delete all Conditions and Condition headings from Condition 6 to Condition 48 and insert new Conditions B1 to Condition C14 as follows:

ROADS, TRAFFIC AND PARKING

Construction Traffic Management Plan

B1. Prior to the commencement of construction of MOD 11 works, the Applicant must prepare a Construction Traffic Management Plan for the development to the satisfaction of the Planning Secretary. The plan must form part of the CEMP required by Condition C2 and must:
(a) be prepared by a suitably qualified and experienced person(s)
(b) be prepared in consultation with Council
(c) detail the measures that are to be implemented to ensure road safety and network efficiency during construction;
(d) detail heavy vehicle routes, access and parking arrangements;
(e) include a Driver Code of Conduct to:
(i) minimise the impacts of earthworks and construction on the local and regional road network;
(ii) minimise conflicts with other road users;
(iii) minimise road traffic noise; and
(iv) ensure truck drivers use specified routes;
(f) include a program to monitor the effectiveness of these measures; and
(g) if necessary, detail procedures for notifying residents and the community (including local schools), of any potential disruptions to routes.

B2. The Applicant must:

(a) not commence construction until the Construction Traffic Management Plan required by Condition B1 is approved by the Planning Secretary; and

(b) implement the most recent version of the Construction Traffic Management Plan approved by the Planning Secretary for the duration of construction.

Roadworks and Access

B3. Heavy vehicles travelling inbound or outbound from the site must not utilise Mary Street, St Peters.

B4. The Applicant must comply with the requirements of the RMS and Council regarding the use and any routes of 'B-Double' trucks.

B5. The Applicant must meet the full cost of any works required to be carried out by Council, DPI, Sydney Water or the RMS in connection with drainage, crossing, alterations to kerb and guttering, footpaths and roads that may be needed as a result of the development in addition to any such works specified in other Conditions.

Operational Conditions

B6. Prior to the commencement of operation of any of the new infrastructure approved under MOD 11 the Applicant must update the existing Traffic Management Plan for the development. The plan must be incorporated into the updated EMMP required by Condition C5 of this consent and must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) be prepared in consultation with Council and the RMS;

(c) detail vehicle routes, access and parking arrangements;

(d) include details of driver training awareness to minimise noise, in particular from reversing alarms and compression braking;

(e) include as Driver Code of Conduct to:

(i) minimise conflicts with other road users;

(ii) minimise road traffic noise;

(iii) ensure truck drivers use specified routes;

(iv) ensure no queuing or parking on the local road or footpaths;

(v) ensure adherence to all on-site and off-site speed limits;

(vi) require all loading and unloading to be undertaken on site; and

(vii) require all vehicles to enter and exit the site in a forward direction;

(f) include a Heavy Vehicle Management Plan to the satisfaction of Council; and

(g) include a program to monitor the effectiveness of these measures.

B7. The Applicant must:

(a) not commence operation of any new infrastructure approved under MOD 11 until the operational Traffic Management Plan required by Condition B6 is approved by the Planning Secretary; and

(b) implement the most recent version of the operational Traffic Management Plan approved by the Planning Secretary for the duration of the development.

B8. The Applicant must provide sufficient parking facilities on-site, including for heavy vehicles and for site personnel, to ensure that traffic associated with the development does not utilise public and residential streets or public parking facilities.

B9. For all new works approved under MOD 11, the Applicant must ensure:

(a) internal roads, driveways and parking (including grades, turn paths, sight distance requirements, aisle widths, aisle lengths and parking bay dimensions) associated with the development are constructed and maintained in accordance with the latest version of AS 2890.1:2004 Parking facilities Off-street car parking (Standards Australia, 2004) and AS 2890.2:2002 Parking facilities Off-street commercial vehicle facilities (Standards Australia, 2002);

(b) the swept path of the longest vehicle entering and exiting the site, as well as manoeuvrability through the site, is in accordance with the relevant AUSTROADS guidelines;

(c) the development does not result in any vehicles queuing on the public road network;

(d) heavy vehicles associated with the development are not parked on local roads or footpaths in the vicinity of the site;

(e) all vehicles are wholly contained on site before being required to stop;

(f) all loading and unloading of materials is carried out on-site;

(g) all trucks entering or leaving the site with loads have their loads covered and do not track dirt onto the public road network

B10. All vehicles exiting the site must pass through an operational and efficient wheel wash and/or vibration grid.

B11. Within three months of the determination of MOD 11, the Applicant must investigate and submit a proposal to the Bayside Traffic Committee that recommends the extension of the 'No Stopping' zone along Burrows Road South from the intersection of Burrows Road South and Canal Road toward the development. Evidence of this must be provided to the Planning Secretary within four months of the determination of MOD 11.

AIR QUALITY

Dust Minimisation

B12. The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent.

B13. During construction, the Applicant must ensure that:

(a) exposed surfaces and stockpiles are suppressed by regular watering;

(b) all trucks entering or leaving the site with loads have their loads covered;

(c) trucks associated with the development do not track dirt onto the public road network;

(d) public roads used by these trucks are kept clean; and

(e) land stabilisation works are carried out progressively on site to minimise exposed surfaces.

Air Quality Management Plan

B14. Within three months of the determination of MOD 11, the Applicant must prepare an Air Quality Management Plan (AQMP) to the satisfaction of the Planning Secretary. The AQMP must form part of the updated EMMP required by Condition C5. The AQMP must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) detail and rank all emissions from all sources of the development, including particulate emissions;

(c) identify the control measures that that will be implemented for each emission source;

(d) describe a program that can evaluate the performance of the operation and determine compliance with key performance indicators;

(e) identify trigger levels for particulates for the real-time off-site dust monitors and response procedures;

(f) include all existing dust deposition monitoring and criteria as described in the 'Environmental Management and Monitoring Plan' prepared by EMM dated 28 November 2017 for the site;

(g) include historical data from existing dust monitoring gauges;

(h) nominate the following for each of the proposed control measures for each emission source:
  (i) key performance indicator;
  (ii) monitoring method;
  (iii) location, frequency and duration of monitoring;
  (iv) record keeping;
  (v) complaints register;
  (vi) response procedures;
  (vii) compliance monitoring; and

(i) describe a program for reviewing dust management practices on site to ensure continual improvement in dust management practices and implementation of best practice dust management measures.

B15. The Applicant must:

(a) not commence operation of any of the new infrastructure approved under MOD 11 until the Air Quality Management Plan required by Condition B13 is approved by the Planning Secretary; and

(b) implement the most recent version of the Air Quality Management Plan approved by the Planning Secretary for the duration of the development.

Dust management

B16. Prior to any increase in production at the concrete batching plant (as approved under MOD 11 to this consent) the Applicant must review and improve existing dust control measures on the site to ensure:

(a) the premises is maintained in a condition that minimizes the emission of dust and silt loading on paved surfaces; and

(b) all reasonable and feasible best practice measures are implemented to minimise dust generated during operations.

Evidence of this review and details of any improvements must be submitted to the Secretary for approval prior to any increase in production at the concrete batching plant (as approved under MOD 10 to this consent).

B17. No stockpile on site should exceed a height of 4m above ground level or the combined height of the concrete barrier and green mesh fencing, whichever is the lesser.

B18. Within six months of the determination of MOD 11, unless otherwise agreed to by the Planning Secretary, the Applicant must install a wheel wash system at the eastern site entrance.

Dust Monitoring

B19. Prior to the operation of any new infrastructure approved under MOD 11 the Applicant must establish up to three off-site real-time dust monitors in the vicinity of sensitive receptors R3 and R4 (as identified in Figure 7.1 of the Environmental Assessment for MOD 11). The monitors must:

(a) allow for upwind and downwind measurements;

(b) monitor real-time particulate matter concentrations; and

(c) be sited in a suitable location agreed to by the Planning Secretary.

Monitoring requirements, response trigger criteria and response procedures must be incorporated into the AQMP required by Condition B13.

B20. Within two months of the determination of MOD 11, the Applicant must submit all historical data from the existing depositional dust gauges to the EPA.

NOISE AND VIBRATION

Hours of Work

B21. The Applicant must comply with the hours detailed in Table 2, unless otherwise agreed in writing by the Planning Secretary.

Table 2: *Hours of Work*

Activity	Day	Time
Earthworks and construction	Monday – Friday Saturday	7 am to 6 pm 8 am to 1 pm
Operation	Monday – Sunday	24 hours

B22. Works outside of the hours identified in Condition B20 may be undertaken in the following circumstances:

(a) works that are inaudible at the nearest sensitive receivers;

(b) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or

(c) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

Noise Limits

B23. The development must be constructed to achieve the construction noise management levels detailed in the *Interim Construction Noise Guideline* (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented throughout construction.

B24. The Applicant must ensure that operational noise from the development does not exceed the noise limits presented in Table 3.

Table 3: *Development Noise Limits (dBA)*

Day and Night $LA_{eq\ (15\ minute)}$	**Location**
42	Bellevue Street
44	Yelverton Street

Notes:
Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological Conditions), of the NSW Noise Policy for Industry (2017).

Vibration Criteria

B25. Vibration caused by construction at any residence or structure outside the site must be limited to:

(a) for structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and

(b) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006) (as may be updated or replaced from time to time).

RAIL QUARRY PRODUCT DELIVERY

B26. The Applicant must maximise the use of rail freight for quarry product delivery wherever reasonably practicable.

B27. The Department may require, at the Applicant's expense, an independent audit of rail use for quarry product delivery if it considers that rail use has not been used wherever reasonably practicable.

B28. The Applicant must ensure that the rail siding and ancillary works are maintained to a standard which facilitates their use for materials handling and transport at all times.

SOILS, WATER QUALITY AND HYDROLOGY

Erosion and Sediment Control

B29. Prior to the commencement of any construction or other surface disturbance the Applicant must install and maintain suitable erosion and sediment control measures on-site, in accordance with the relevant requirements of the *Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book* (Landcom, 2004) guideline and the Erosion and Sediment Control Plan included in the CEMP required by Condition C2.

Stormwater Management

B30. The Applicant must ensure all roof and surface stormwater from the site and any catchment external to the site that presently drains into the site is collected in a system of pits and pipelines/channels and major storm event surface flow paths and discharged to a Sydney Water controlled stormwater drainage system.

B31. Prior to the commencement of operation of MOD 11 works the Applicant must design, install and operate the upgraded stormwater management system for the development. The system must:

(a) be designed by a suitably qualified and experienced person(s);

(b) be generally in accordance with the conceptual design in the MOD 11 EA;

(c) be in accordance with applicable Australian Standards; and

(d) ensure that the system capacity has been designed in accordance with Australian Rainfall and Runoff (Engineers Australia, 2016).

Surface Water Management Plan

B32. Prior to the commencement of operation of infrastructure works approved under MOD 11, the Applicant must prepare a Surface Water Management Plan to the satisfaction of the Planning Secretary. The Plan must form part of the updated EMMP required by Condition C5 and must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) describe the surface water management system;

(c) be consistent with the surface water management system described in the 'Surface Water Assessment' prepared by EMM on behalf of Boral Resources (NSW) Pty Ltd dated 28 June 2018 (Appendix G of the MOD 11 Environmental Assessment)..

(d) include a program to monitor:

(i) surface water flows and quality;

(ii) surface water storage and use; and

(iii) sediment basin and bioretention system operation;

(e) surface water impact assessment criteria, including trigger levels for investigating and potential adverse surface water impacts; and

(f) a protocol for the investigation and mitigation of identified exceedances of the surface water impact assessment criteria; and

(g) a maintenance program for all surface water management infrastructure.

Flood Management

B33. Prior to the commencement of operation of infrastructure works approved under MOD 11, the Applicant must update the Flood Emergency Response Plan to the satisfaction of the Planning Secretary. The Plan must form part of the updated EMMP required by Condition C5 and must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) address the provisions of the Floodplain Risk Management Guideline (OEH, 2007);

(c) include details of:

(i) the flood emergency responses for both construction and operation phases of the development;

(ii) predicted flood levels;

(iii) flood warning time and flood notification;

(iv) assembly points and evacuation routes;

(v) evacuation and refuge protocols; and

(vi) awareness training for employees and contractors.

B34. The Applicant must:

(a) not commence operation until the Flood Emergency Response Plan required by Condition B31 is approved by the Planning Secretary; and

(b) implement the most recent version of the Flood Emergency Response Plan approved by the Planning Secretary for the duration of the development.

B35. Buildings, plant and equipment including material storage areas must be set at a minimum height of 500mm above the 1 % Annual Exceedance Probability (AEP) flood event for Alexandra Canal. Details of existing and proposed site levels and means of providing 500mm freeboard above the 1% AEP flood event must be submitted to Council. Variations below 500mm must only be with the written agreement of Council's Director, Technical Services.

Groundwater Management

B36. Within one month of the completion of construction of MOD 11 works the Applicant must prepare a Dewatering Report for the development. The plan must detail the volume of groundwater taken and include details of any impacts (and associated mitigation measures) that have occurred as a result of groundwater take. The report must be submitted to the DoI Lands and Water Division.

Impacts on Alexandra Canal

B37. Any new works, including additional car parks, within 40 metres of the top of the bank of Alexandra Canal, must consider the requirements of the *Guidelines for Riparian Corridors on Waterfront Land* (DPI, 2018).

WASTE MANAGEMENT

B38. Garbage must be stored in a location approved by the Council and be disposed of in an approved manner. All liquid wastes, (other than stormwater) must be discharged to the sewer in accordance with the requirements of the Sydney Water Corporation.

B39. All waste materials associated with the operation of the proposal must be stored in suitably constructed and enclosed containers or similar facilities on the premises in a neat and tidy manner and at all times.

Construction and Demolition Waste Management

B40. Prior to the commencement of construction, the Applicant must prepare a Construction and Demolition Waste Management Plan for the development to the satisfaction of the Planning Secretary. The Plan must form part of a CEMP in accordance with Condition C2 and must:

(a) detail the quantities of each waste type generated during construction and the proposed reuse, recycling and disposal locations; and

(b) be implemented for the duration of construction works.

B41. The Applicant must:

(a) not commence construction until the Construction and Demolition Waste Management Plan is approved by the Planning Secretary.

(b) implement the most recent version of the Construction and Demolition Waste Management Plan approved by the Planning Secretary.

CONTAMINATION

B42. All wash down areas, the truck washing facility and all other areas likely to be contaminated must be isolated from the stormwater drainage system in accordance with the 'Surface Water Assessment' prepared by EMM for Boral Resources (NSW) Pty Ltd dated 28 June 2018 (Appendix G of the MOD 11 Environmental Assessment)..

B43. Prior to any increase in production at the concrete batching plant (as approved under MOD 10 to this consent) the Applicant must submit to the Secretary for approval evidence of best practice refuelling procedures for the refuelling of site-based mobile plant to ensure appropriate containment and management of spills.

HAZARD AND RISK

B44. The Applicant must ensure that the quantities of Dangerous Goods present on-site or transported to and from the development are below the screening threshold quantities listed in the Department of Planning's *Applying SEPP 33 Guidelines* (2011) at all times.

B45. The Applicant must store all chemicals, fuels and oils used on-site in accordance with:

(a) the requirements of all relevant Australian Standards; and

(b) the NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook* if the chemicals are liquids.

In the event of an inconsistency between the requirements listed from (a) to (b) above, the most stringent requirement prevails to the extent of the inconsistency.

LANDSCAPING

B46. The landscaping of the site must be maintained at all times, to the satisfaction of Council. This includes suitable perimeter landscaping adjacent to Burrows Road South and a 10 metre wide landscaped buffer strip adjacent to the Alexandra Canal.

LIGHTING

B47. Lighting at the site must not cause hazard to aircraft using Sydney Kingsford Smith airport. Any change in lighting at the site must be undertaken in consultation with and to the approval of Sydney Airport Corporation Limited.

PART C: ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Management Plan Requirements

C1. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

(a) details of:

(i) the relevant statutory requirements (including any relevant approval, licence or lease Conditions);

(ii) any relevant limits or performance measures and criteria; and

(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(b) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;

(c) a program to monitor and report on the:

(i) impacts and environmental performance of the development; and

(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;

(d) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;

(e) a program to investigate and implement ways to improve the environmental performance of the development over time;

(f) a protocol for managing and reporting any:

(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);

(ii) complaint;

(iii) failure to comply with statutory requirements; and

(g) a protocol for periodic review of the plan.

Note: *The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans*

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

C2. The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of Condition C1 and to the satisfaction of the Planning Secretary.

C3. As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:

(a) Construction Traffic Management Plan (see Condition B1);

(b) Erosion and Sediment Control Plan;

(c) the 'Vibration Monitoring Plan, Modification 11, Boral St Peters', prepared by EMM, dated 27 November 2018;

(d) Construction and Demolition Waste Management Plan (see Condition B38);

(e) Noise Management;

(f) Dewatering Management; and

(g) Community Consultation and Complaints Handling.

C4. The Applicant must:

(a) not commence construction of the new infrastructure approved under MOD 11 until the CEMP is approved by the Planning Secretary; and

(b) carry out the construction of the development in accordance with the CEMP approved by the Planning Secretary and as revised and approved by the Planning Secretary from time to time.

Environmental Management and Monitoring Plan

C5. Prior to the commencement of operation of any infrastructure works approved under MOD 11, the Applicant must update the existing Environmental Management and Monitoring Plan (EMMP) for the site. The updated Plan must show how dust, noise, vibration, traffic and water quality impacts will be measured, monitored, managed and mitigated. The Plan is to include, but not be limited to, the following:

(a) a description of the role, responsibility, authority and accountability of key personnel involved in the environmental management of the development;

(b) a description of the procedures that would be implemented to:

(i) keep the local community and relevant agencies informed about the operation and environmental performance of the development;

(ii) receive, handle, respond to, and record complaints;

(iii) resolve any disputes that may arise;

(iv) respond to any non-compliance;

(v) respond to emergencies; and

(c) baseline background dust, noise and water quality data;

(d) a contingency plan to manage any unpredicted impacts and their consequences
(e) refuelling procedures for site-based mobile plant; and
(f) the following management plans:
    (i) Traffic Management Plan (see Condition B6);
    (ii) Air Quality Management Plan (see Condition B13);
    (iii) Surface Water Management Plan (see Condition B30); and
    (iv) Flood Emergency Response Plan (see Condition B31).

C6. The Applicant must:
(a) not commence operation of any MOD 11 infrastructure works until the updated EMMP is approved by the Planning Secretary; and
(b) operate the development in accordance with the updated EMMP approved by the Planning Secretary (and as revised and approved by the Planning Secretary from time to time).

REVISION OF STRATEGIES, PLANS AND PROGRAMS

C7. Within three months of:
(a) the submission of an Annual Review under Condition xx;
(b) the submission of an incident report under Condition xx;
(c) the approval of any modification of the conditions of this consent; or
(d) the issue of a direction of the Planning Secretary,

the strategies, plans and programs required under this consent must be reviewed.

C8. If necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review.

Note: *This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.:*

ANNUAL REVIEW

C9. Within 12 months of the approval of MOD 10, and each subsequent year, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:
(a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;
(b) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:
    (i) the relevant statutory requirements, limits or performance measures/criteria;
    (ii) requirements of any plan or program required under this consent;
    (iii) the monitoring results of previous years; and
    (iv) the relevant predictions in the EIS and/or subsequent modifications;
(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
(d) identify any trends in the monitoring data over the life of the development;
(e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
(f) describe what measures will be implemented over the next year to improve the environmental performance of the development.

REPORTING AND AUDITING

Incident Notification, Reporting and Response

C10. The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one), and set out the location and nature of the incident. Subsequent notification requirements must be given and reports submitted in accordance with the requirements set out in Appendix 2.

Non-Compliance Notification

C11. The Department must be notified in writing to compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of any non-compliance.

C12. A non-compliance notification must identify the development and the application number for it, set out the Condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

C13. A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

ACCESS TO INFORMATION

C14. At least 48 hours before the commencement of construction until the completion of all works under this consent the Applicant must:

(a) make the following information and documents (as they are obtained or approved) publicly available on its website:

(i) all current statutory approvals for the development;

(ii) all approved strategies, plans and programs required under the Conditions of this consent;

(iii) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the Conditions of this consent;

(iv) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any Conditions of this consent, or any approved plans and programs;

(v) contact details to enquire about the development or to make a complaint;

(vi) a complaints register, updated monthly;

(vii) the Compliance Report of the development;

(viii) audit reports prepared as part of any Independent Audit of the development and the Applicant's response to the recommendations in any audit report;

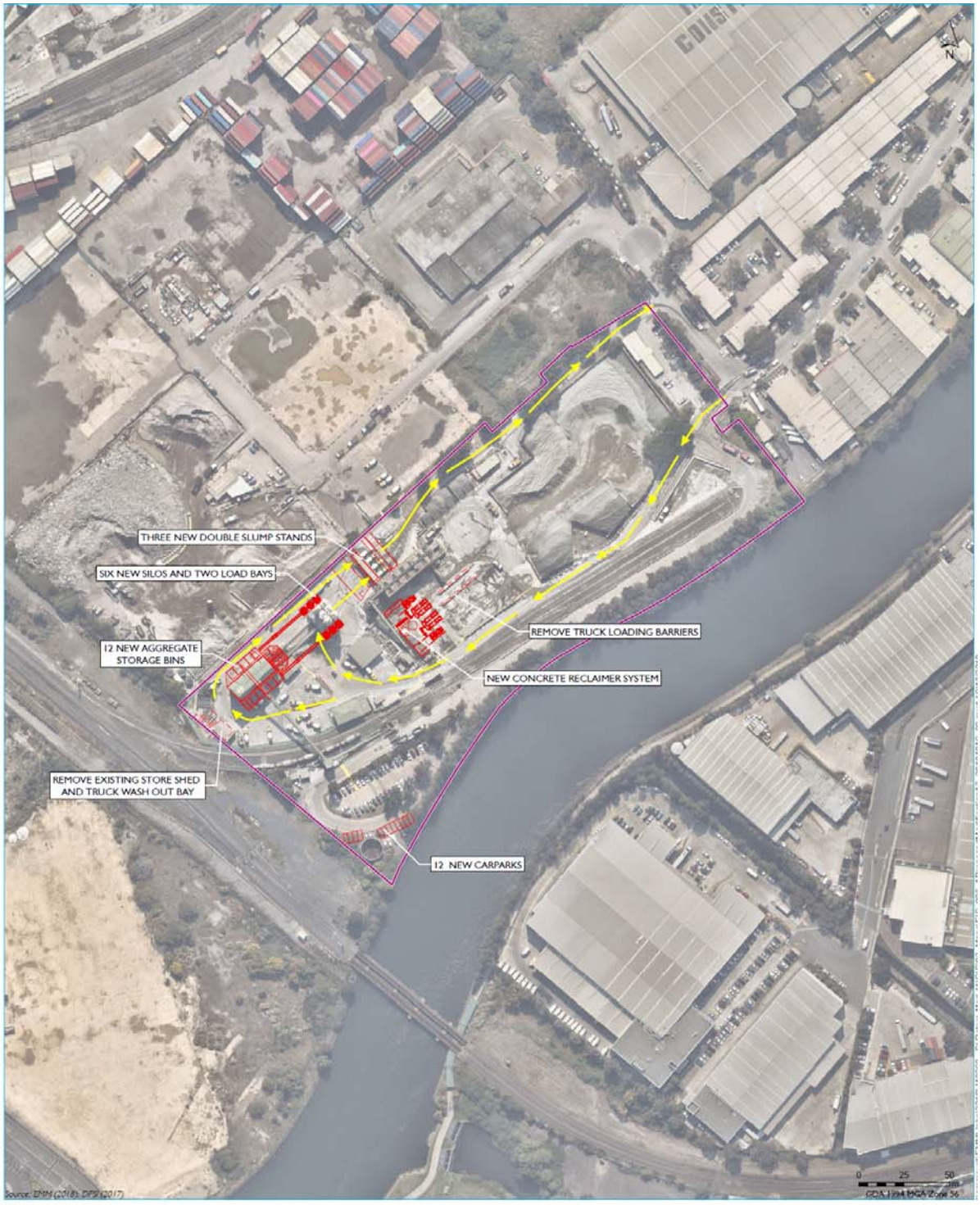
(ix) any other matter required by the Planning Secretary; and

(b) keep such information up to date, to the satisfaction of the Planning Secretary.

14) Delete the advisory notes on the final page of the consent.

15) Immediately after Condition C14 insert new Appendices 1 and 2 as follows:

APPENDIX 1: DEVELOPMENT LAYOUT



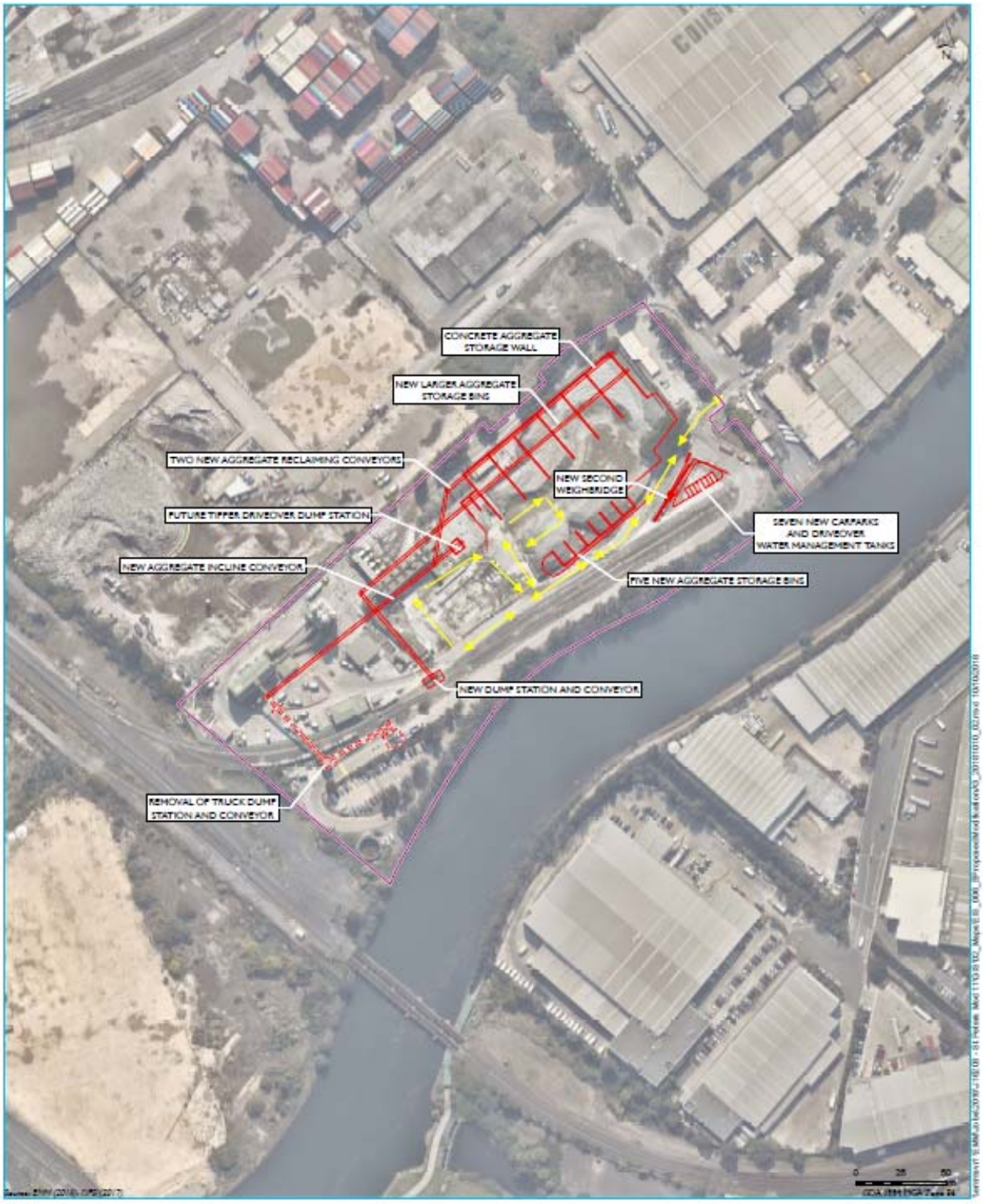
KEY

- Site location
- Concrete plant feature
- Structure to be removed
- Direction of traffic circulation

Proposed concrete plant modification

Response to submissions
Modification 11
Boral St Peters
Figure 3.1 A

EMM
creating opportunities



KEY

- Site location
- Material handling plant
- Structure to be removed
- Direction of traffic circulation

Proposed material handling facility modifications

Response to submissions
Modification 11
Boral St Peters
Figure 3.1 B

EMM

APPENDIX 2: INCIDENT NOTIFICATION AND REPORTING REQUIREMENTS

WRITTEN INCIDENT NOTIFICATION REQUIREMENTS

1. A written incident notification addressing the requirements set out below must be emailed to the Department at the following address: compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of an incident. Notification is required to be given under this Condition even if the Applicant fails to give the notification required under Condition C10 or, having given such notification, subsequently forms the view that an incident has not occurred.

2. Written notification of an incident must:
   a) identify the development and application number;
   b) provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
   c) identify how the incident was detected;
   d) identify when the applicant became aware of the incident;
   e) identify any actual or potential non-compliance with Conditions of consent;
   f) describe what immediate steps were taken in relation to the incident;
   g) identify further action(s) that will be taken in relation to the incident; and
   h) identify a project contact for further communication regarding the incident.

INCIDENT REPORT REQUIREMENTS

3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Applicant must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.

4. The Incident Report must include:
   a) a summary of the incident;
   b) outcomes of an incident investigation, including identification of the cause of the incident;
   c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
   d) details of any communication with other stakeholders regarding the incident.

END OF DA 14/96 MOD 11

Appendix B

Traffic impact assessment

Traffic impact assessment

Modification 12 | Boral, St Peters

Prepared for Boral Resources (NSW) Pty Limited
August 2019

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
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Traffic impact assessment

Modification 12 | Boral, St Peters

Report Number

J190375 RP1

Client

Boral Resources (NSW) Pty Limited

Date

17 September 2019

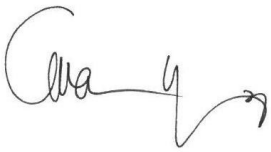
Version

v2 Final

Prepared by

Tim Brooker
Associate Transport Planner
17 September 2019

Approved by



Allan Young
National Technical Leader, Urban and Regional Planning
17 September 2019

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

Table of Contents

Appendices

Tables

Figures

1 Introduction

Boral Resources (NSW) Pty Ltd (Boral) owns and operates a concrete batching plant (concrete plant) and construction materials handling facility at 25 Burrows Road South, St Peters (the site). The site location and the surrounding regional road network are shown in Figure 1.1.

The site receives raw materials including bulk construction materials (aggregate, sand and cement) predominantly by rail. All concrete and construction materials are despatched from the site by truck.

The approved production limit for concrete at the site is 750,000 cubic metres (m3) per annum and throughput of the handling facility is 1 million tonnes per annum (Mtpa). Potential environmental impacts, including traffic, were assessed for the previous modification (Modification 11). Development consent Condition A6 was inserted to provide limits on peak hourly traffic movements for the concrete plant, which were defined separately to the other site traffic movements relating to the handling facility.

Boral is proposing to modify the site's development consent (Modification 12 or the proposed modification) to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can concurrently reduce their operations, so that the combined site daily and maximum peak hourly traffic movements do not exceed those that are approved under Modification 11.

This future site operations scenario will allow an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa, whilst correspondingly decreasing the site traffic volumes associated with the concrete plant production. The combined site maximum daily and peak hourly traffic volume would both still correspond to the volumes previously assessed in the Modification 11 environmental assessment.

The proposed Modification 12 includes no changes to the site layout, development footprint, consent area or operating hours.

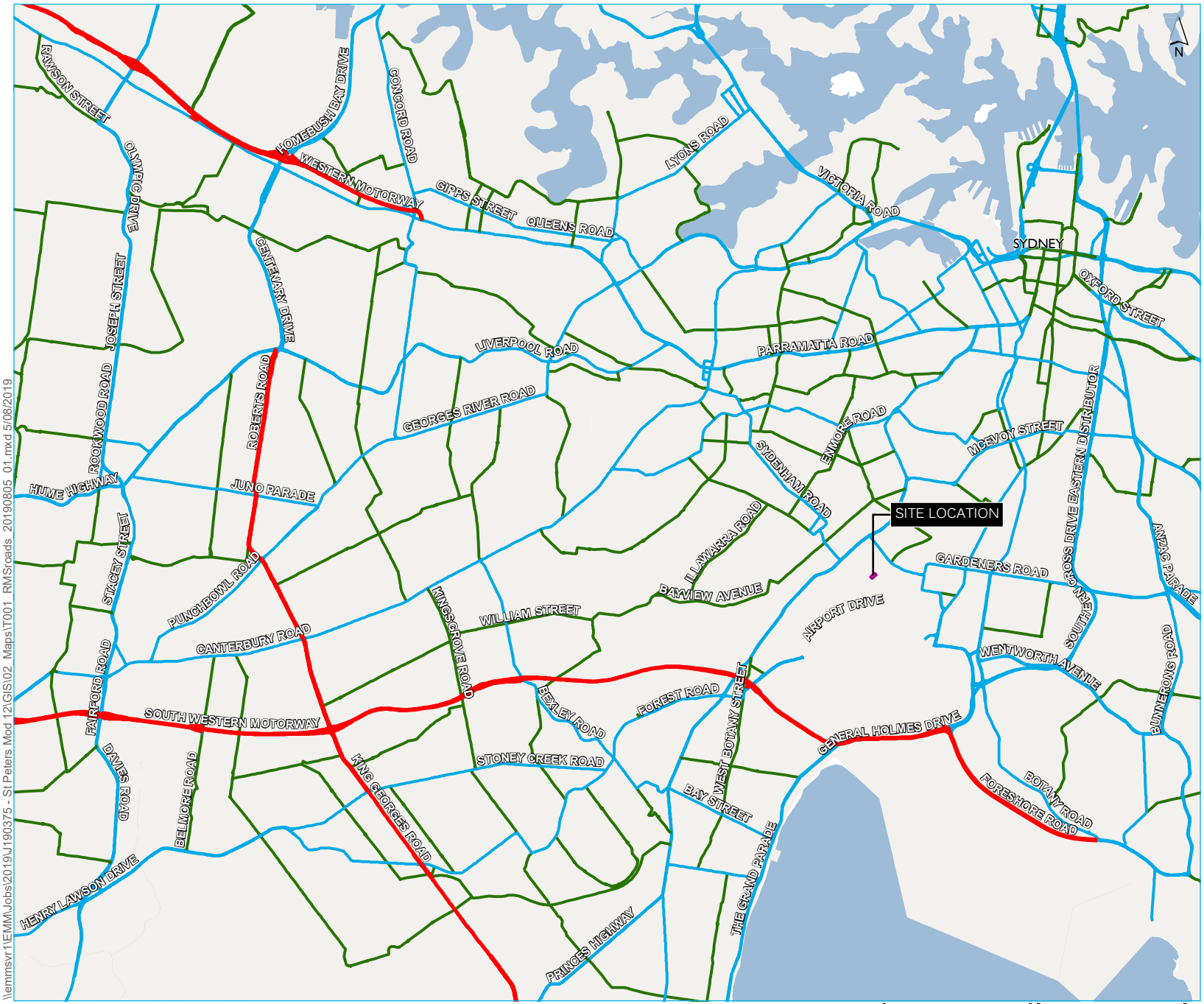
This traffic impact assessment has been prepared in accordance with the Roads and Traffic Authority (RTA) - now Roads and Maritime Services (RMS) - *Guide to Traffic Generating Developments* (RTA 2002), to assess the impact of the proposed modification on the surrounding road network.

The assessment documents the additional daily traffic movements associated with the proposed modification on the surrounding locality road network, including Burrows Road, Burrows Road South, Canal Road, Ricketty Street and the Princes Highway route through St Peters.

Also at the following three intersections, the future peak hourly daily traffic volumes are identified and assessed for the future maximum daily and peak hourly concrete production and bulk construction materials traffic:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road/Talbot Street (the Container Terminal Access); and
- Princes Highway, Canal Road and Mary Street.

It is also noted in the assessment that the future effects of the new road network capacity from the Westconnex project in the St Peters and Mascot/Alexandria areas will substantially relieve the existing daily and peak hourly traffic movements using the Canal Road and Ricketty Street route, by additional bridge crossings over the Alexandra Canal at both the Campbell Road and Gardeners Road extensions. This additional traffic capacity will provide significant traffic congestion relief benefits to the St Peters area, when Westconnex Stage 3 is completed.



Source: EMM (2017); DFSI (2017); RMS (2016)

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Site location

Traffic impact assessment
Modification 12
Boral St Peters

Figure 1.1

EMM

2 Existing conditions

2.1 Site location and access

The Boral site is approximately 7 kilometres (km) south-west of the Sydney CBD. The site access is via Burrows Road South, approximately 300 metres (m) south of the intersection with Canal Road and Ricketty Street. The Princes Highway is approximately 570 m further to the west via Canal Road. Between these two intersections, approximately 320 m to the west of Burrows Road, is the entry to the St Peters Container Terminal (Talbot Street) from Canal Road. The Boral site's location in relation to the surrounding road networks is shown on Figure 2.1. Additional internal site details including the general traffic circulation paths and car parking are discussed in further detail in Section 2.6.

The speed limit on Burrows Road South is 50 kilometres per hour (km/hr). On the external major roads in the locality, Canal Road, Ricketty Street and the Princes Highway, the speed limit is generally higher (60 km/hr).

Views of Burrows Road South at the site frontage, Burrows Road in the vicinity of the Canal Road and Ricketty Street intersection, Ricketty Street and Kent Road looking north towards Ricketty Street are shown in Photographs 2.1 to 2.4. The other additional future locality road connections which are either approved and/or proposed to be constructed in the St Peters and Mascot localities as part of the Westconnex project, are shown on Figure 2.2. Burrows Road South is identified by Roads and Maritime Services (RMS) as a suitable B Double truck access route.

2.2 Road network

The road routes which will generally be used by most site traffic are:

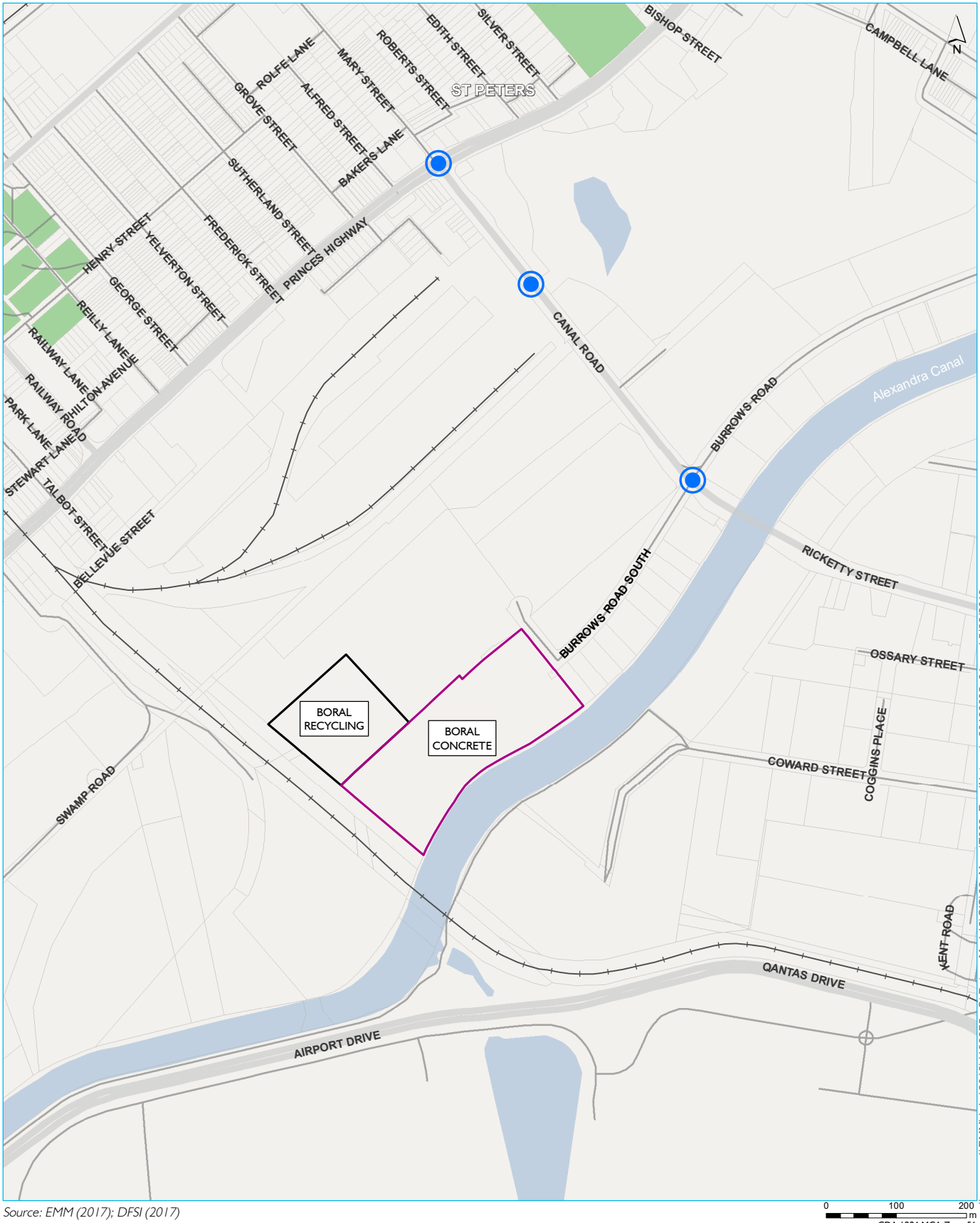
- Burrows Road and Burrows Road South – local industrial roads, having two traffic lanes (one in each direction) with parking permitted away from the major intersections;
- Canal Road and Ricketty Street – a significant arterial road route which connects the Princes Highway to Mascot. It is between four to six lanes wide between Kent Road (at Mascot) and the intersection with the Princes Highway (at St Peters); and
- The Princes Highway – a significant arterial road, which is generally at least six lanes wide. The road has peak hourly tidal flow arrangements south and east of the intersection with Canal Road, which change the direction of the central traffic lane on The Princes Highway, south of the intersection, with a corresponding closure of the kerbside lane at times on Canal Road west-bound.

The roads carrying largest proportion of the site traffic are Burrows Road South, Canal Road and the Princes Highway.

2.3 Intersections

The three intersections which will be used by most of the site traffic, as shown on Figure 2.1, are:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road at the St Peters Container Terminal access (Talbot Street); and
- The Princes Highway, Canal Road and Mary Street.



Source: EMM (2017); DFSI (2017)

KEY

- Site location
- Intersections potentially affected by site traffic
- Main road
- Local road
- Rail line
- Watercourse
- Waterbody
- Cadastral boundary
- Parks and recreation

Road network and intersections near the site

Traffic impact assessment
Modification 12
Boral St Peters

Figure 2.1

EMM

Source: EMM (2017); DFSI (2017)

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KEY

- Site location
- Rail line
- Main road
- Local road
- 25/26m B-Double route
- Approved route (with travel conditions)

Westconnex

- St Peters interchange surface road (Stage 2)
- St Peters interchange tunnel (Stage 2)
- M4-M5 link mainline tunnel (Stage 3)
- Future Sydney Airport Gateway
- Watercourse
- Waterbody
- Parks and recreation

Future locality road network including Westconnex

Traffic impact assessment
Modification 12
Boral St Peters

Figure 2.2

EMM

Photograph 2.1 Burrows Road South looking into the site near Gate 1

Photograph 2.2 Burrows Road South looking north towards the Canal Road intersection

Photograph 2.3 Ricketty Street showing the bridge over the Alexandria Canal looking west

Photograph 2.4 Kent Road looking north towards the Ricketty Street intersection

Approximately 40% of the total site truck traffic leaving the Burrows Road area travels to and from the west. The other truck traffic proportions which travel via Burrows Road north of Canal Road and via Ricketty Street east of Canal Road are approximately 25% and 35% respectively.

Site employee and other visitor light vehicle traffic also use these routes, but have a slightly higher proportion (approximately 50%) travelling via the Canal Road and Princes Highway routes.

The operating performance of the existing peak hourly traffic volumes at the existing major road intersections are assessed in Section 2.5, based on the existing peak hourly traffic volumes which are summarised in Section 2.4.

2.4 Daily Traffic volumes

The previous locality background daily traffic volumes using the road network in the Burrows Road locality of St Peters were estimated from peak hourly traffic surveys at the main intersections in December 2017, prior to the preparation of the site Modification 11 Traffic Impact Assessment.

These surveyed/estimated daily traffic volumes and heavy vehicle traffic proportions are summarised in Table 2.1, and the corresponding adjusted locality daily traffic volumes, including the approved Boral St Peters Modification 11 daily traffic movements are summarised in Table 2.2.

Table 2.1 Previous baseline locality daily traffic volumes in December 2017

Road	Intersection survey location	Morning peak hour volume	Afternoon peak hour volume	Estimated daily traffic*	Average weekday heavy vehicles*	% heavy vehicles
Burrows Road South	South of Canal Road	217	210	2,600	840	32.7
Burrows Road	North of Canal Road	489	542	6,200	950	15.4
Ricketty Street	East of Canal Road	2,816	2,891	34,200	1,670	4.9
Canal Road	West of Ricketty Street	2,846	2,915	34,600	2,010	5.8
Canal Road	East of Talbot Street	2,848	2,726	33,400	1,540	4.6
Canal Road	West of Talbot Street	2,851	2,704	33,300	1,400	4.2
Canal Road	East of Princes Highway	2,847	2,691	33,200	1,300	3.9
Talbot Street	South of Canal Road	47	52	600	470	78.4
Princes Highway	South of Canal Road	4,181	4,806	53,900	1,830	3.4
Princes Highway	North of Canal Road	2,055	2,966	30,100	900	3.0
Mary Street	West of Princes Highway	441	464	5,400	0	0.0

Notes: *Average daily traffic is estimated as 12 times the average peak hourly traffic for all roads. Daily heavy vehicle numbers and their % have been extrapolated from the am and pm peak hourly heavy vehicle traffic proportions.

In December 2017, the proportions of heavy vehicle traffic on Burrows Road South and Burrows Road were respectively 33% and 15% of all traffic. These high proportions are a reflection of the industrial nature of the land uses in this area. The proportion of trucks using Talbot Street (78.4%) was very high due to this being the entrance to a shipping container terminal.

On the other major traffic routes in the locality (Canal Road, Ricketty Street and the Princes Highway) the proportions of heavy vehicle traffic in December 2017 were much closer to the normal range for major roads and were 3.0% and 3.4% respectively for the Princes Highway north and south of Canal Road, and 3.9% to 5.8% at various locations on Canal Road and 4.9% on Ricketty Street. On Mary Street, west of the Princes Highway, the heavy vehicle traffic proportion was effectively zero due to the load limit restricting heavy vehicle access.

Table 2.2 Adjusted baseline locality daily traffic movements including Modification 11 traffic

Road	Survey location	December 2017 weekday baseline daily traffic*	Boral Modification 11 daily traffic movements (on an average production day)	Boral Modification 11 daily traffic movements (on a maximum production day)	Adjusted weekday average daily traffic volumes including Boral Modification 11 traffic
Burrows Road South	South of Canal Road	2,600	723	1,116	3,323- 3,716
Canal Road	West of Ricketty Street	34,600	294	451	34,894-35,051
Ricketty Street	East of Canal Road	34,200	248	385	34,428-34.585
Burrows Road	North of Canal Road	6,200	181	280	6,381-6,480
Canal Road	East of Talbot Street	33,400	294	451	33,694-33,851
Talbot Street	South of Canal Road	600	0	0	600
Canal Road	West of Talbot Street	33,300	294	451	33,594-33,751
Canal Road	East of Princes Highway	33,200	294	451	33,494-33,651
Princes Highway	South of Canal Road	53,900	147	225	54,047-54,125
Princes Highway	North of Canal Road	30,100	147	225	30,247-30,325
Mary Street	West of Princes Highway	5,400	0	0	5,400

Notes: *Existing daily vehicle numbers have been determined from the am and pm peak period heavy vehicle traffic proportions.

The Boral Modification 11 daily traffic volumes on an average and a maximum production day are an additional 337-533 daily truck loads (673-1,066 additional daily truck movements) and approximately 50 additional daily car or other light vehicle movements, all travelling via Burrows Road South and then distributed onto a range of other traffic routes via the Canal Road, Ricketty Street, Burrows Road and Burrows Road South intersection.

The adjustment for the Boral Modification 11 daily traffic increases on a maximum production day is most noticeable on Burrows Road South, where the additional daily traffic would result in up to +43% increased daily traffic. On Canal Road and Ricketty Street, the percentage increases are much more moderate at up to +1.4% daily traffic increases and on the Princes Highway route north and south of St Peters, the percentage daily traffic daily traffic increases are even lower at up to +0.7%.

2.5 Intersection performance

The December 2017 baseline and adjusted baseline (including Boral Modification 11) traffic movements and the corresponding morning and afternoon peak hourly levels of service at the three nearby major road intersections have been assessed using the SIDRA intersection traffic model.

The SIDRA intersection program measures the intersection capacity and performance by calculating parameters such as average vehicle delay, maximum queue length, degree of saturation and level of service, based on the

RTA/RMS Guide to traffic generating developments standards (Roads and Traffic Authority, 2002) which were developed from the international Highway Capacity Manual standards. The intersection levels of service (LoS) for the morning and afternoon peak hour periods are reported according to RMS defined ranges (Table 2.3) which range from A (best) to F (worst).

Table 2.3 LoS definitions

Description	LoS	Average vehicle delay (sec)
Very good	A	<14.5
Good	B	14.5 to ≤28.5
Satisfactory	C	28.5 to ≤42.5
Near capacity	D	42.5 to ≤56.5
At capacity	E	56.5 to ≤70.5
Over capacity	F	≥70.5

Source RTA/RMS Guide to Traffic Generating Developments, 2002

The detailed SIDRA intersection analysis results are included in Appendix A and a summary of the results for each intersection is provided in Table 2.4, Table 2.5 and Table 2.6.

The future intersection traffic performances are summarised in each table for the morning and afternoon peak hour traffic periods for December 2017 baseline traffic (based on actual intersection traffic surveys) and for the adjusted baseline traffic including the Boral Modification 11 peak hourly traffic.

In comparison to the surveyed December 2017 baseline traffic, the additional peak hourly Boral Modification 11 traffic is an additional 34 truck loads (68 additional heavy vehicle movements) at the Canal Road, Ricketty Street, Burrows Road and Burrows Road South intersection and an additional 14 truck loads (28 additional heavy vehicle movements) at the Canal Road, Princes Highway and Mary Street and Canal Road, Container Terminal access intersections.

Table 2.4 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at the Canal Road/Ricketty Street/ Burrows Road and Burrows Road South intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.15 to 8.15 am	3,352	20.1	B	0.851	172 (Canal Road W)
	3.00 to 4.00 pm	3,452	43.4	D	1.265	283 (Ricketty Street)
Including Boral Modification 11 Traffic	7.15 to 8.15 am	3,423	36.2	C	1.191	179 (Canal Road W)
	3.00 to 4.00 pm	3,523	77.9	F	1.909	284 (Burrows Road N)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

Table 2.5 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at the Canal Road/Container Terminal access intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.30 to 8.30 am	3,065	4.2	A	0.579	108 (Canal Road W)
	5.00 to 6.00 pm	3,161	4.9	A	0.635	89 (Canal Road W)
Including Boral Modification 11 Traffic	7.30 to 8.30 am	3,095	3.8	A	0.531	99 (Canal Road W)
	5.00 to 6.00 pm	3,191	4.8	A	0.631	87 (Canal Road W)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

Table 2.6 December 2017 baseline and adjusted future baseline including Boral Modification 11 traffic at Princes Highway/Canal Road/Mary Street intersection

Situation	Peak hour	Traffic demand flow (vehicles)[1]	Average delay (seconds)	Level of service (LoS)	Degree of saturation	Maximum queue length (m)
December 2017 Baseline Traffic	7.30 to 8.30 am	5,013	69.1	E	1.061	474 (Princes Highway S)
	5.00 to 6.00 pm	5,735	48.2	D	0.964	210 (Princes HighwayN)
Including Boral Modification 11 Traffic	7.30 to 8.30 am	5,042	108.2	F	1.210	554 (Princes Highway S)
	5.00 to 6.00 pm	5,763	65.7	E	1.153	234 (Princes Highway S)

Note 1: The SIDRA intersection program automatically adds 5% to all surveyed intersection traffic volumes as a contingency measure

The adjustments to the surveyed baseline December 2017 traffic in Table 2.4, Table 2.5 and Table 2.6. as a result of the additional Boral Modification 11 traffic, show some changes to the peak hour traffic signal operations at two of the three assessed intersections.

Under the adjusted baseline traffic conditions, both the Canal Road/Burrows Road/Ricketty Street intersection and the Princes Highway/Canal Road/Mary Street intersection are now operating at borderline over capacity levels of service C/F and F/E during the morning and afternoon peak hours respectively, with average peak hour intersection delays of 36/78 and 108/66 seconds per vehicle during the peak hour periods.

The highest peak hour traffic queues at these two intersections were calculated as follows:

- At Burrows Road/Burrows Road South, Canal Road has a traffic queue in the east bound direction of 179 m during the morning peak hour and Burrows Road has a traffic queue in the southbound direction of 284 m in the afternoon peak hour; and

- At the Canal Road/Princes Highway intersection, Princes Highway has a traffic queue in the northbound direction of 554 m during the morning peak hour and also a queue travelling northbound of 234 m during the afternoon peak hour.

2.6 Existing site daily and peak hourly traffic

Table 2.7 summarised the total site daily and peak hourly traffic numbers which were prepared for and documented in the environmental assessment reports and responses to submissions for St Peters Modification 11, for an increase to 750,000 cubic metres (m^3) for the concrete plant and an increase of up to 1 Mtpa for the materials handling facility.

Table 2.7 also presents the maximum peak hourly movements stipulated in the consent conditions for Modification 11, dated 31 January 2019.

Table 2.7 St Peters Modification 11 total daily and peak hourly traffic movements - 750,000 cum annual production for the concrete plant and 1 Million tpa throughput for the materials handling facility

Truck Generation Source	Assessed total daily traffic movements (average day)	Assessed total daily traffic movements (maximum day)	Assessed peak hourly traffic movements*	Approved** maximum peak hourly movements
Concrete plant	524 in +524 out (1,046 total)	667 in +667 out (1,334 total)	52 in +52 out (104 total)	44 in +44 out (88 total)
Materials handling facility	92 in +92 out (184 total)	145 in +145 out (290 total)	9 in +9 out (18 total)	
All Site Truck Movements	616 in +616 out (1,232 total)	812 in +812 out (1,628 total)	62 in +62 out*** (124 total)	

Note:
*Peak hourly movements were assessed in the Mod 11 analysis for both the am and pm peak hours as 10% of total daily site traffic movements for the average daily site concrete production or materials handling facility throughput
**In the conditions of consent dated 31 January 2019, the Department of Planning and Environment specified the maximum peak hourly traffic movements for the concrete plant to be reduced to 88 total movements (44 in and 44 out).
*** There is a rounding error when you take 10% of the assessed total daily movements for the separate entities (104 total + 18 total does not equal 124 total), however the 62 in and out (124 total) is the correct number as it is 10% of assessed total daily movements for all site traffic.

A default assumption of ten percent of all daily traffic movements possibly travelling in either the am or pm commuter traffic peak hours has been assumed to apply to the average daily traffic movements for both the concrete plant and materials handling facility operations.

Also there are normally relatively few car traffic movements at the site during these peak hour periods. The site employee shift start and finish times are either earlier or later than the normal commuter peak traffic hours when the site traffic is normally all heavy vehicle traffic travelling in the following geographic directions:

- approximately 40% travelling south and west via Canal Road and The Princes Highway, south of Canal Road;
- approximately 35% travelling east via Ricketty Street east of Canal Road, and
- approximately 25% travelling north via Burrows Road north of Canal Road.

2.7 Car parking

There are two existing car parking areas for the site employees and visitors; a car park for the concrete plant in the southern most corner adjacent to the concrete plant with capacity for 40 cars, shown in Photograph 2.6, and a

The two site car parks currently have adequate capacity for the combined site employee and visitor car parking demand for the combined site operations. In August 2017, the combined occupancy of both car parks was 52 vehicles, which represented 78% occupancy for the combined site car parking capacity of 67 cars.

2.8 Public transport

The site is located over 1 km walking distance from the nearest railway station at Sydenham. Public bus services in the St Peters area via Canal Road and Ricketty Street are provided by Sydney Buses route 418 which is a cross regional service operating from Bondi Junction to Burwood. The route 418 service has bus stops located on Canal Road and Ricketty Street near the intersection with Burrows Road South. These bus stops are within approximately 400 m walking distance from the site.

The bus route 418 journey times from the Canal Road locality of St Peters are approximately 40 minutes each way to or from Bondi Junction or 45 minutes each way to or from Burwood railway station. The route 418 bus service operates with 38 or 39 daily bus trips in each direction, which provides an approximate half hourly service in both directions through the major part of the day on weekdays, with some additional weekday peak hourly services between 7-9 am and 3-6 pm.

2.9 Pedestrian and cycling access

There are paved footpaths provided on both sides of Burrows Road South and Canal Road in the vicinity of the site

Pedestrian and cyclist access is generally feasible to and from the concrete plant and handling facility site via these roads. Bicycle use in the area is low due to the volume of traffic and percentage of heavy vehicles. Cyclists predominantly travel via the roadway along Burrows Road South, and then via the footpaths along Canal Road, due to the significantly higher car and truck traffic volumes on Canal Road.

2.10 Traffic safety

Traffic safety on major roads in urban areas, where the larger intersections are controlled by traffic signals, is generally good, in particular where the right turning traffic is controlled by traffic signals.

The major road traffic approaches at the two major Canal Road intersections are generally straight and reasonably level, (except for the Hump backed bridge over the canal on Ricketty Road) and there are therefore generally good sight lines for all approaching traffic to either proceed through or safely stop at these intersections.

2.11 Future St Peters locality road traffic changes following Westconnex

There are significant future road traffic changes predicted from all three stages of the Westconnex project on a number of roads in the Alexandria, St Peters and Mascot areas, where significantly increased road traffic volumes will be occurring on some routes (eg Euston Road) and significantly reduced road traffic volumes will be using other routes (eg Canal Road and Ricketty Street).

Both Canal Road and Ricketty Street, there will be a significant future daily traffic reduction of approximately 10,000 daily vehicle movements, immediately following the completion of the Westconnex Stages 1 and 2 projects in 2023, together with a further forecast daily traffic reduction of at least 5,000 daily vehicle movements, following the subsequent completion of the Westconnex Stage 3 project, in the years after 2023. (Roads and Maritime Services, 2017).

3 The proposed modification

3.1 Changes to site traffic movements

The modification (Modification 12) to the site's development consent is proposed to provide more flexibility to the site by combining the site's overall traffic volume limits, to allow for an increase in production volumes/throughput at one of the site's operations, while correspondingly reducing production/throughput at the other operation.

The worst-case for this scenario is an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa whilst correspondingly decreasing the concrete plant production to maintain the same average daily and peak hourly combined traffic volumes for the concrete plant and the handling facility.

Taking the assessed average daily (Modification 11) traffic movements outlined in Table 2.7 as a starting point, the following breakdown is now proposed as summarised in Table 3.1 for the concrete plant production and the materials handling facility to produce the same combined site peak hourly and average daily traffic movements with the proposed Modification 12 application, as was previously assessed and approved for Modification 11.

Table 3.1 Proposed average daily and peak hourly traffic movements for Modification 12

	Modification 11 - 750,000 m^3 annual production for the concrete plant and 1 Mtpa throughput for materials handling facility			Proposed Modification 12 - 650,000 m^3 annual production for the concrete plant and 1.75 Mtpa throughput for materials handling facility	
Truck Generation Source	**Assessed total daily movements**	**Assessed peak hourly movements**	**Approved maximum peak hourly movements**	**Proposed total daily movements**	**Proposed maximum peak hourly movements**
Concrete plant	524 in +524 out (1,046 total)	52 in +52 out (104 total)	44 in +44 out (88 total)	454 in +454 out (908 total)	44 in +44 out (88 total)
Materials handling facility	92 in +92 out (184 total)	9 in +9 out (18 total)		161 in +161 out (322 total)	18 in + 18 out (36 total)
All Site Truck Movements	616 in +616 out (1,232 total)	62 in +62 out (124 total)*		615 in +615 out (1,230 total)	62 in +62 out (124 total)

* There is a rounding error when you take 10% of the assessed total daily movements for the separate entities (104 total + 18 total does not equal 124 total), however the 62 in and out (124 total) is the correct number as it is 10% of assessed total daily movements for all site.

Previously, the environmental assessment for Modification 11 assessed 1 Mtpa throughput for the materials handling facility, which corresponds to 184 average daily truck movements, with approximately 18 (9 in and 9 out) occurring in either the am or pm peak hours for the Canal Road and Ricketty Street traffic.

The proposed increase to the materials handling facility throughput to 1.75 Mtpa corresponds to 322 average daily truck movements, which is an extra 138 average daily truck movements, of which potentially 14 (7 in and 7 out) could occur in the am and pm peak hours for the Canal Road and Ricketty Street traffic. However, to be conservative a potential future maximum of 36 (18 in and 18 out) peak hourly truck movements is proposed to apply under Modification 12, for the materials handling facility traffic in the am or pm peak hours.

Conversely, the proposed modification will require a corresponding reduction of 138 daily truck movements in the concrete plant operations (compared to the 1,046 average daily truck movements which was assessed for Modification 11). This 13.2% daily traffic reduction would reduce the approved annual production to 650,000 m^3 and 908 average daily truck movements. However, the maximum peak hourly truck movements for the concrete plant is proposed to remain the same (88 = 44 in and 44 out) as stipulated in the current approval.

Under this analysis it is proposed that all site (handling facility and concrete plant) average daily and peak hourly truck movements for the proposed Modification 12 will remain exactly the same as what was assessed and subsequently approved for Modification 11, although noting that no formal limit was actually specified in the Modification 11 development consent for the peak hourly truck movements from the handling facility.

Under the proposed Modification 12 it is now proposed that the materials handling facility will have 322 average daily truck movements, with a potential hourly maximum of 36 (18 in and 18 out) truck movements which could occur in either the am or pm peak hours for the Canal Road and Ricketty Street traffic.

4 Traffic impact assessment

4.1 Proposed modification

In Table 3.1 it is demonstrated that all the site daily and peak hourly truck movements for the proposed Modification 12 will remain essentially the same as what has been previously assessed and subsequently approved for Modification 11, although noting that no formal limit was actually specified for the peak hourly truck movements from the materials handling facility in the Modification 11 approval.

Both the approved Modification 11 and proposed Modification 12 traffic impact assessments are also potentially conservative in that both the am and pm peak hour truck movements have been considered to be the same, while in reality the site pm peak hourly truck movements are generally likely to be always lower than during the am peak hour, so the actual site traffic impacts during the pm peak hour will be generally much lower than the assessed traffic impacts in this report.

4.2 External traffic impact at intersections

EMM consulted with the RMS regarding the Secretary's Environmental Assessment (SEARs) requirements for the project. In a letter dated 11 October 2016, the RMS advised that the future traffic conditions associated with the proposed development should be examined / modelled at the following four intersections.

- Canal Road/Ricketty Street/Burrows Road/Burrows Road South;
- Canal Road/Talbot Street (the Container Terminal Access);
- Princes Highway/Canal Road/Mary Street; and
- Kent Road/Ricketty Street (entry to the Mascot Residential Precinct).

At the first three intersections, the future traffic increases resulting from the additional project traffic are directly assessed using the SIDRA 8 intersection analysis program. At the fourth intersection (Kent Road/Ricketty Street), which is in a different locality (Mascot) on the eastern side of the Alexandria Canal, the detailed SIDRA 8 intersection analysis is not considered to be necessary as the majority of the future site generated traffic is unlikely to be travelling in that direction from the site.

The future peak hour intersection traffic impacts for the Modification 12 proposal are in effect identical to the impacts for the Modification 11 application, which are documented in this report in Table 2.4, Table 2,5 and Table 2.6 in terms of adjustments to the surveyed December 2012 baseline locality intersection traffic volumes, once the Modification 11 application is fully operational. The proposed future combined site peak hourly heavy vehicle movements (62 loads which is 124 heavy vehicle movements) is exactly the same in both applications.

4.3 External traffic impacts on the locality road network

Similarly to the situation for the peak hourly traffic movements, the predicted average daily truck traffic generation which has been summarised in Table 3.1 for both the Modification 11 and Modification 12 applications, is effectively the same (1,230 daily truck movements for Modification 12 compared to 1,232 daily truck movements for Modification 11).

The effects of the proposed project daily traffic increases for the Modification 11 application, in comparison to the surveyed December 2017 baseline traffic for the locality roads, are summarised in detail in Table 2.1 and Table 2.2.

There will be minimal additional effect in terms of further daily traffic increases from the proposed Modification 12 application, in comparison to the Modification 11 application daily traffic increases which are now approved.

4.4 Safety and traffic management

The future potential road safety related traffic impacts from the modification have primarily been considered for Burrows Road South between the site and the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South.

The two existing site access driveways are well constructed with heavy duty concrete pavements, and have adequate width to accommodate all the proposed turning traffic movements by large trucks. The two driveways have good visibility of the approaching traffic in both directions on Burrows Road South and the proposed additional truck traffic movements would have minimal effects on the traffic safety at these driveways.

At the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South, the existing intersection visibility for left and right turning traffic from Burrows Road South is relatively good, as both Burrows Road and Burrows Road South are straight and level at the intersection. No additional traffic safety improvements will be required at this intersection to accommodate the proposed Modification 12 traffic movements.

4.5 Provision of car and truck parking

The current total provision of the site car parking (67 spaces) is more than adequate for the parking demand currently from the site employees and visitor traffic (52 cars were observed parked at the site in October 2015) which corresponds to 78% occupancy. An additional 19 car spaces are proposed for the proposed modification which will be to accommodate any future growth in the site employee or visitor car parking demand.

All the site car parking space dimensions and surfacing has been designed to comply with the requirements of the Australian Standard AS 2890.1.

The concrete agitator truck fleet is normally parked at the site during non-operational hours, with up to 40 trucks parked each evening and night. With the proposed modification, up to 20 additional concrete agitator trucks could also be based at the site, resulting in a future total of up 60 concrete agitator trucks requiring parking. In the future these additional agitator trucks would be parked either at the site or at the nearby adjacent Boral truck marshalling area which is located on Sydney Airports land.

4.6 Pedestrian, cycling and public transport access

The current arrangements for the site public transport, pedestrian and cyclist access to and from Burrows Road and Canal Road at St Peters are summarised in Sections 2.8 and 2.9. This access is generally adequate for the current site public transport, pedestrian and cyclist access demand.

The Boral St Peters concrete plant and materials handling facility sites will continue to provide adequate on-site car and truck parking for all the anticipated daily site travel demand by either site employees or visitors.

The future increased travel demand for persons either walking, cycling or travelling by public transport to and from the site will be minimal and will require no improvement to the locality public transport, pedestrian and cyclist access and services.

5 Summary and conclusions

This report has assessed the traffic impacts of the proposed Modification 12 for the Boral St Peters concrete plant and related materials handling facility

The future site daily truck traffic movements would all continue to use the primary haulage route which is via Burrows Road South, north of the site, continuing to Canal Road, from where this traffic generally travels in the following proportions:

- to and from the west via Canal Road and The Princes Highway (40%);
- north via Burrows Road (25%); or
- east via Ricketty Street (35%).

Trucks from the site cannot use Mary Street, west of the Princes Highway due to the load limit restrictions on this route.

The road network and intersection traffic impacts of the additional traffic associated with the Proposed Modification 12 application have been considered in this report with reference to the previously assessed and approved Modification 11 application for a different proposed combination of operations of the concrete plant and materials handling facility at the Boal St Peters site, which previously considered traffic impacts at the following three intersections:

- Canal Road, Ricketty Street, Burrows Road and Burrows Road South;
- Canal Road/Talbot Street (the Container Terminal Access); and
- Princes Highway, Canal Road and Mary Street.

However, as the proposed future combined site peak hourly heavy vehicle movements (62 loads which is 124 heavy vehicle movements) are exactly the same in both the Modification 11 and Modification 12 applications, the future peak hour intersection traffic impacts for the Modification 12 proposal are in effect identical to the assessed impacts for the Modification 11 application.

These are documented in this report in Table 2.4, Table 2,5 and Table 2.6 in respect to the most recent versions of the SIDRA intersection analysis for the three linked intersections which was undertaken under RMS direction in December 2018 at the response to submissions stage for the Modification 11 application. These later intersection assessment results are significantly different to the earlier intersection assessment results which were presented in the June 2018 TIA report for the Modification 11 application and show generally lower and therefore more acceptable project related traffic impacts at the three assessed intersections.

Similarly to the situation for peak hourly traffic movements, the proposed future site average daily truck traffic movements which are summarised in Table 3.1 for both the Modification 11 and Modification 12 applications, are effectively exactly the same (1,230 daily truck movements for Modification 12 compared to 1,232 daily truck movements for Modification 11).

Therefore the additional daily traffic effects of the proposed project daily traffic increases for the Modification 12 application are exactly the same as the Modification 11 application daily traffic increases which are now approved. These daily traffic increases are summarised in detail in Table 2.1 and Table 2.2, in comparison to the surveyed December 2017 baseline traffic for the locality roads.

There will be a negligible additional effect in terms of further daily traffic increases from the proposed Modification 12 application, in comparison to Modification 11. The future potential road safety related traffic impacts from the modification have been reviewed for Burrows Road South between the site access gates and the intersection of Canal Road, Ricketty Street, Burrows Road and Burrows Road South. No additional traffic safety improvements will be required at the intersection to accommodate the proposed additional concrete plant site generated truck traffic movements.

The current and future proposed on site car and truck parking areas and the site's accessibility for walking, cycling and public transport users have also been reviewed in this assessment and found to be satisfactory for the anticipated levels of car and truck parking usage and/or travel by non car-based travel modes.

References

Roads and Traffic Authority (2002) Guide to Traffic Generating Developments.

Roads and Maritime Services (2017) M4-M5 Link, Environmental Impact Statement, Technical Working Paper, Traffic and Transport.

Appendix A

SIDRA intersection analysis results

USER REPORT FOR NETWORK SITE

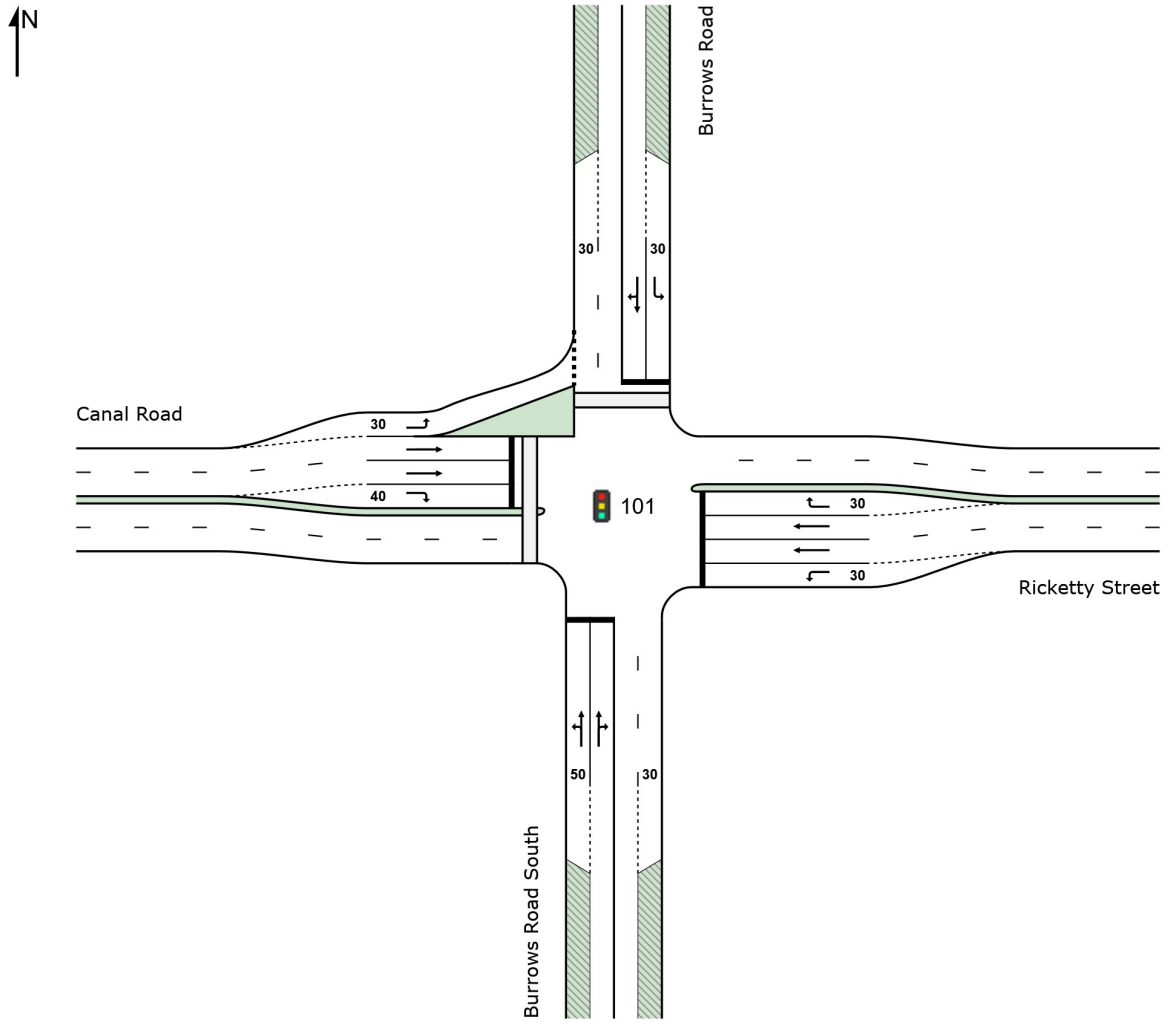
Project: SIDRA_Networks_St_Peters_MOD11_2018_12_02 **Template: EMM**

Site: 101 [Canal Road/Burrows Road/Ricketty Street 2017 AM Peak] Network: 6 [2017 AM_Peak]

Four way traffic signal controlled intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, F
Output Phase Sequence: A, D, F

Site Layout


N
Burrows Road
30
30
Canal Road
30
40
101
30
30
Ricketty Street
50
30
Burrows Road South

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burrows Road South														
1	L2	35	51.5	35	51.5	0.145	55.4	LOS D	1.4	14.0	0.85	0.73	0.85	21.8
2	T1	34	56.3	34	56.3	0.530	65.9	LOS E	2.6	27.5	0.97	0.77	0.97	28.2
3	R2	34	59.4	34	59.4	0.530	75.2	LOS F	2.6	27.5	1.00	0.77	1.00	26.8
Approach		102	55.7	102	55.7	0.530	65.4	LOS E	2.6	27.5	0.94	0.75	0.94	26.1
East: Ricketty Street														
4	L2	40	28.9	40	28.9	0.039	14.3	LOS A	0.6	4.9	0.36	0.65	0.36	46.7
5	T1	895	4.6	895	4.6	0.533	11.6	LOS A	13.2	95.7	0.51	0.46	0.51	43.6
6	R2	105	11.0	105	11.0	0.476	27.4	LOS B	3.0	23.3	0.90	0.83	0.90	40.4
Approach		1040	6.2	1040	6.2	0.533	13.3	LOS A	13.2	95.7	0.54	0.50	0.54	43.2
North: Burrows Road														
7	L2	114	3.7	114	3.7	0.251	50.6	LOS D	3.8	27.4	0.84	0.77	0.84	32.2
8	T1	29	39.3	29	39.3	0.851	79.7	LOS F	4.1	39.4	1.00	0.97	1.39	25.4
9	R2	59	42.9	59	42.9	0.851	85.7	LOS F	4.1	39.4	1.00	0.97	1.39	16.4
Approach		202	20.3	202	20.3	0.851	65.1	LOS E	4.1	39.4	0.91	0.86	1.08	26.5
West: Canal Road														
10	L2	174	13.3	165	13.6	0.189	15.9	LOS B	2.2	17.4	0.51	0.69	0.51	44.5
11	T1	1777	2.8	1684	2.8	0.794	16.7	LOS B	24.0	172.3	0.73	0.67	0.73	44.8
12	R2	57	9.3	54	9.4	0.138	13.8	LOS A	0.6	4.7	0.55	0.69	0.55	45.3
Approach		2007	3.9	1902[N1]	4.0	0.794	16.5	LOS B	24.0	172.3	0.70	0.67	0.70	44.8
All Vehicles		3352	7.2	3247[N1]	7.4	0.851	20.1	LOS B	24.0	172.3	0.67	0.63	0.68	41.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

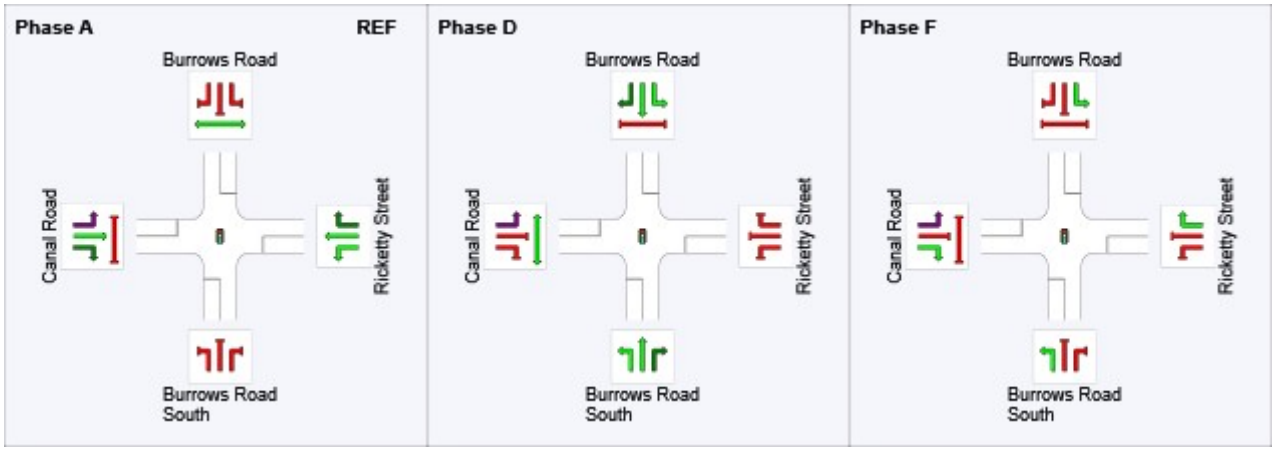
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

Phase	A	D	F
Phase Change Time (sec)	0	99	123
Green Time (sec)	93	18	11
Phase Time (sec)	99	24	17
Phase Split	71%	17%	12%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

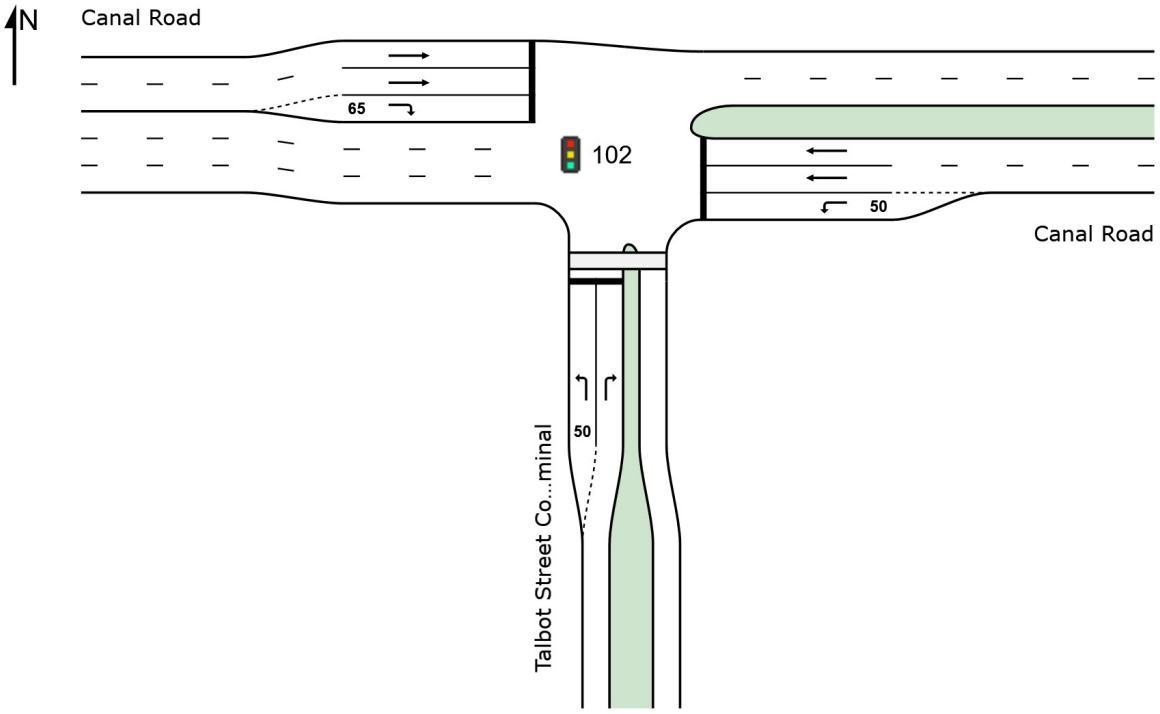
Site: 102 [Canal Road/Container Terminal 2017 AM Peak]

Network: 6 [2017 AM_Peak]

Existing Three Way intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout



Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Talbot Street Container Terminal														
1	L2	14	92.3	14	92.3	0.095	66.3	LOS E	0.5	6.5	0.91	0.70	0.91	19.3
3	R2	21	95.0	21	95.0	0.444	85.0	LOS F	1.0	12.2	1.00	0.72	1.00	16.2
Approach		35	93.9	35	93.9	0.444	77.6	LOS F	1.0	12.2	0.97	0.71	0.97	17.3
East: Canal Road														
4	L2	9	77.8	9	77.8	0.009	7.3	LOS A	0.0	0.3	0.08	0.58	0.08	47.9
5	T1	979	7.8	979	7.8	0.336	1.7	LOS A	3.3	24.9	0.11	0.10	0.11	55.1
Approach		988	8.5	988	8.5	0.336	1.7	LOS A	3.3	24.9	0.11	0.10	0.11	54.9
West: Canal Road														
11	T1	2025	2.8	1918	2.8	0.579	3.5	LOS A	15.0	107.5	0.40	0.38	0.40	48.8
12	R2	17	12.5	16	12.5	0.218	77.9	LOS F	0.7	5.2	0.97	0.69	0.97	21.8
Approach		2042	2.8	1934[N1]	2.8	0.579	4.1	LOS A	15.0	107.5	0.41	0.38	0.41	47.4
All Vehicles		3065	5.7	2957[N1]	5.9	0.579	4.2	LOS A	15.0	107.5	0.31	0.29	0.31	48.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

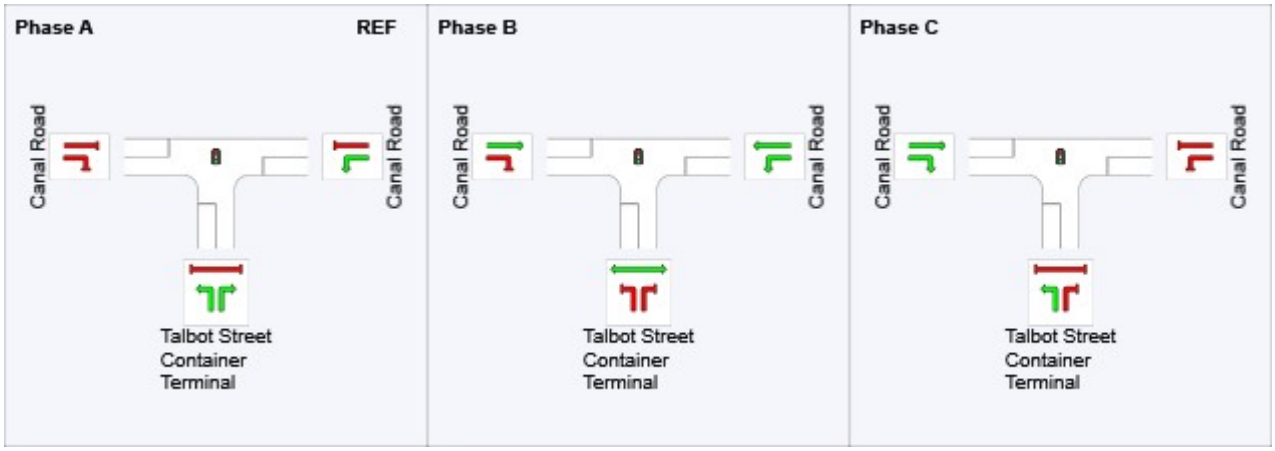
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

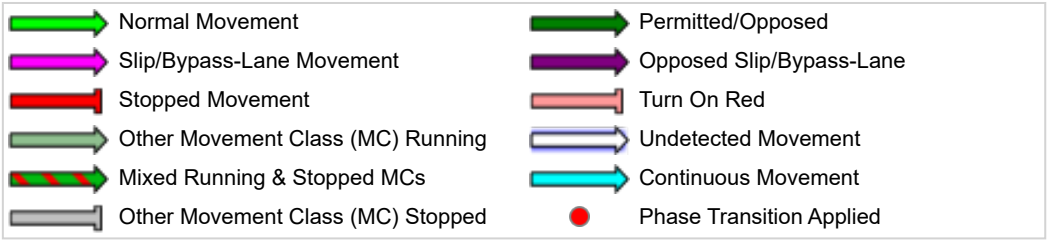
Phase	A	B	C
Phase Change Time (sec)	0	12	128
Green Time (sec)	6	110	6
Phase Time (sec)	12	116	12
Phase Split	9%	83%	9%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



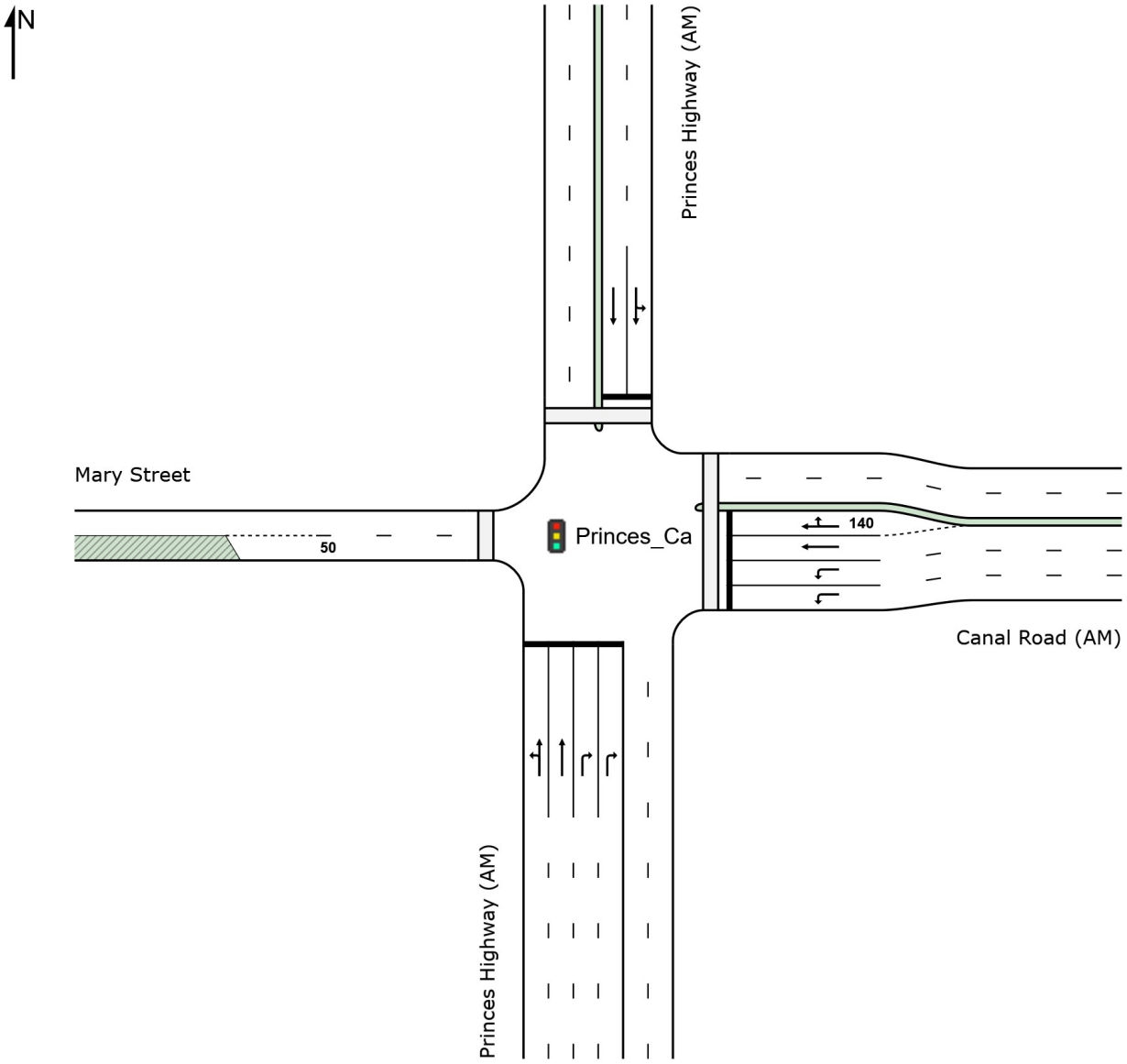
Site: Princes_Ca [Princes Highway/Canal Road 2017 AM Peak]

Network: 6 [2017 AM_Peak]

Existing Four Way Intersection with Tidal Flow
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout


N
Princes Highway (AM)
Mary Street
50
Princes_Ca
140
Canal Road (AM)
Princes Highway (AM)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Princes Highway (AM)														
1	L2	91	0.0	91	0.0	0.554	15.0	LOS B	14.5	103.0	0.50	0.50	0.50	50.3
2	T1	1441	2.3	1441	2.3	0.554	9.5	LOS A	14.5	103.7	0.50	0.48	0.50	51.7
3	R2	1879	2.6	1879	2.6	1.061	135.7	LOS F	66.2	473.8	1.00	1.22	1.65	11.1
Approach		3411	2.4	3411	2.4	1.061	79.2	LOS F	66.2	473.8	0.78	0.89	1.14	21.5
East: Canal Road (AM)														
4	L2	506	16.2	506	16.2	0.211	7.8	LOS A	1.1	8.9	0.10	0.60	0.10	48.9
5	T1	374	0.0	374	0.0	0.897	48.9	LOS D	14.1	100.3	0.92	0.84	1.02	28.7
6	R2	75	8.5	75	8.5	0.897	58.6	LOS E	14.1	100.3	1.00	0.96	1.14	26.9
Approach		955	9.3	955	9.3	0.897	27.9	LOS B	14.1	100.3	0.49	0.72	0.54	36.5
North: Princes Highway (AM)														
7	L2	163	5.2	163	5.2	0.910	81.3	LOS F	15.4	113.5	1.00	1.03	1.29	17.0
8	T1	484	7.2	484	7.2	0.910	75.5	LOS F	15.7	116.5	1.00	1.05	1.29	26.7
Approach		647	6.7	647	6.7	0.910	77.0	LOS F	15.7	116.5	1.00	1.05	1.29	24.7
All Vehicles		5013	4.3	5013	4.3	1.061	69.1	LOS E	66.2	473.8	0.75	0.88	1.04	23.8

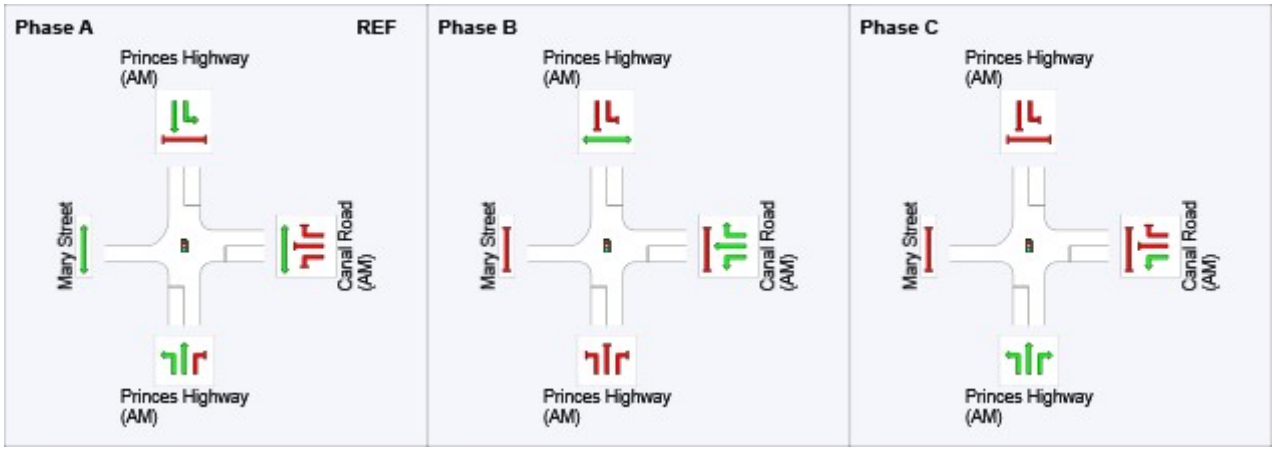
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	33	66
Green Time (sec)	27	27	68
Phase Time (sec)	33	33	74
Phase Split	24%	24%	53%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

USER REPORT FOR NETWORK SITE

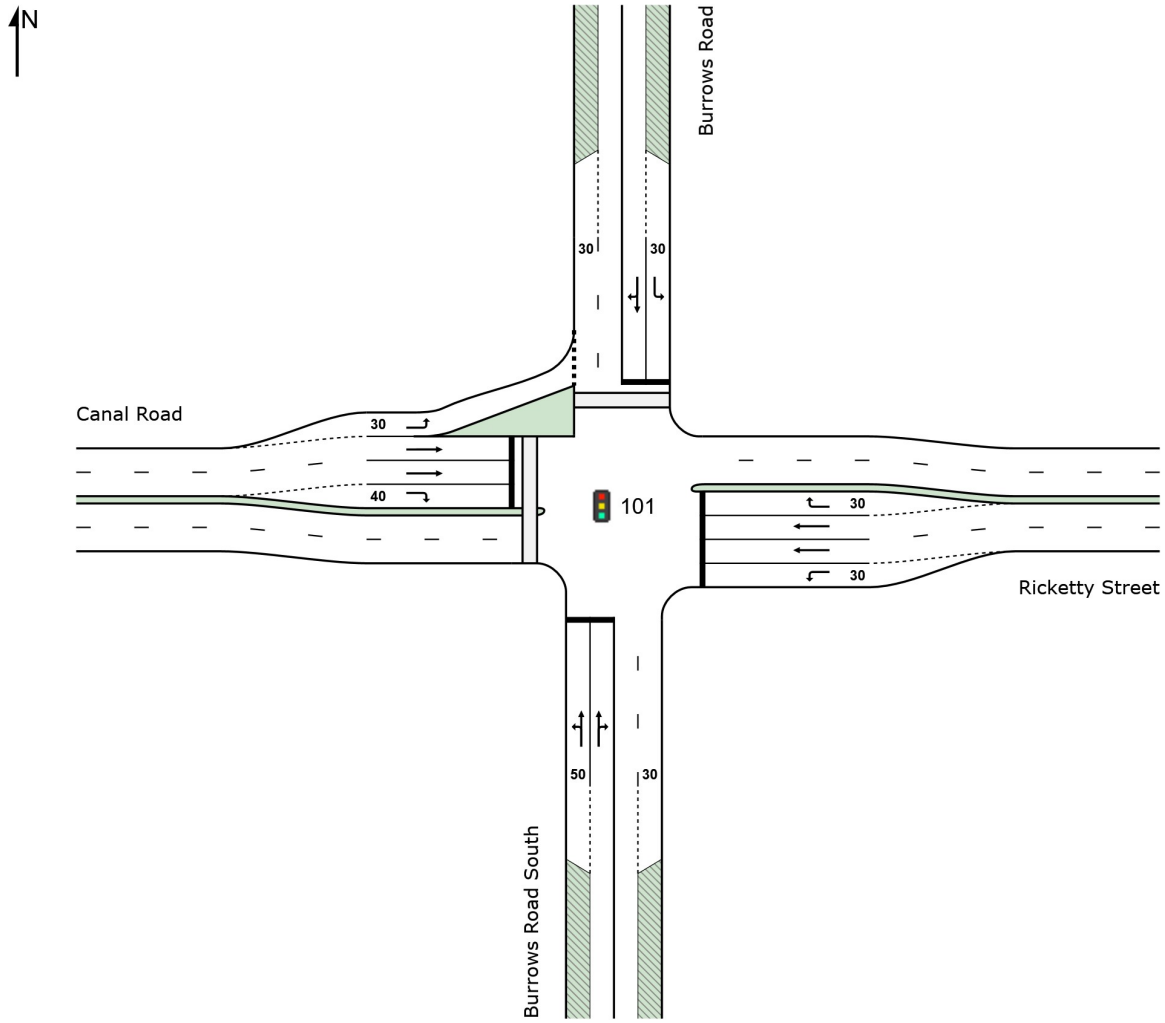
Project: SIDRA_Networks_St_Peters_MOD11_2018_12_02 **Template: EMM**

Site: 101 [Canal Road/Burrows Road/Ricketty Street Future AM Peak] Network: 1 [Future AM_Peak]

Four way traffic signal controlled intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D*, F
Output Phase Sequence: A, D*, F
(* Variable Phase)

Site Layout


N
Burrows Road
30
30
Canal Road
30
40
101
30
30
Ricketty Street
50
30
Burrows Road South

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burrows Road South														
1	L2	49	66.0	49	66.0	0.226	47.5	LOS D	2.7	29.4	0.80	0.71	0.80	24.7
2	T1	42	65.0	42	65.0	0.830	48.8	LOS D	2.7	29.4	0.84	0.75	0.91	32.3
3	R2	46	70.5	46	70.5	0.830	89.4	LOS F	2.6	28.7	1.00	0.93	1.41	23.9
Approach		138	67.2	138	67.2	0.830	62.0	LOS E	2.7	29.4	0.88	0.80	1.04	26.7
East: Ricketty Street														
4	L2	53	46.0	53	46.0	0.069	22.1	LOS B	1.0	10.0	0.50	0.68	0.50	42.2
5	T1	895	4.6	895	4.6	0.659	21.5	LOS B	17.4	127.0	0.69	0.61	0.69	35.4
6	R2	105	11.0	105	11.0	0.496	27.0	LOS B	2.2	16.9	0.86	0.79	0.86	40.6
Approach		1053	7.3	1053	7.3	0.659	22.1	LOS B	17.4	127.0	0.69	0.63	0.69	36.7
North: Burrows Road														
7	L2	114	3.7	114	3.7	0.169	36.8	LOS C	3.1	22.7	0.71	0.74	0.71	36.7
8	T1	38	52.8	38	52.8	1.191	251.1	LOS F	8.7	85.1	1.00	1.44	2.50	11.2
9	R2	59	42.9	59	42.9	1.191	257.1	LOS F	8.7	85.1	1.00	1.44	2.50	6.3
Approach		211	23.5	211	23.5	1.191	137.1	LOS F	8.7	85.1	0.84	1.06	1.53	16.1
West: Canal Road														
10	L2	174	13.3	149	14.0	0.174	11.9	LOS A	1.1	9.0	0.32	0.63	0.32	47.3
11	T1	1777	2.8	1517	2.9	0.907	32.6	LOS C	25.0	179.1	0.70	0.72	0.80	36.0
12	R2	72	27.9	62	29.2	0.241	21.1	LOS B	0.8	7.2	0.59	0.70	0.59	40.2
Approach		2022	4.6	1729 N1	4.8	0.907	30.4	LOS C	25.0	179.1	0.66	0.71	0.75	36.9
All Vehicles		3423	9.1	3130 N1	10.0	1.191	36.2	LOS C	25.0	179.1	0.69	0.71	0.80	32.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

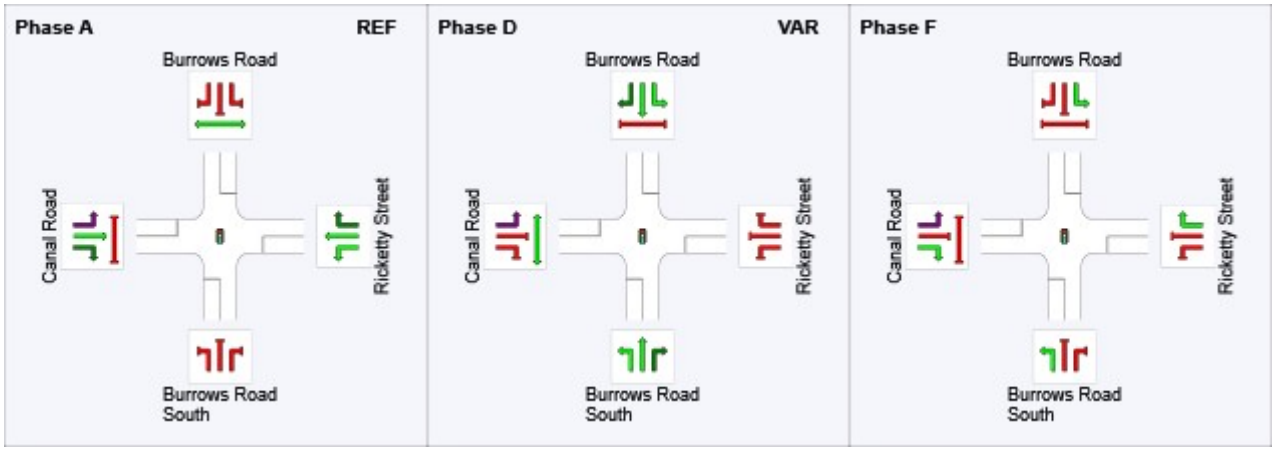
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

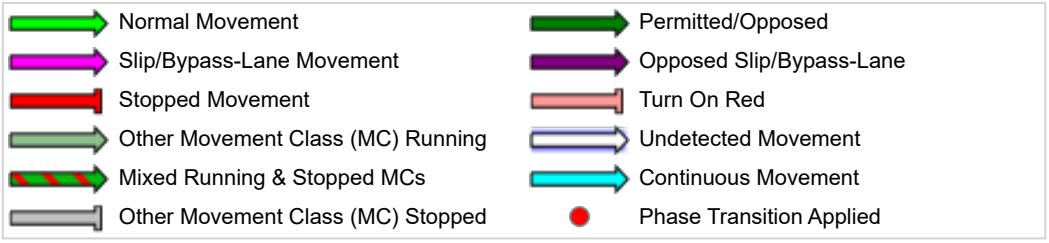
Phase	A	D	F
Phase Change Time (sec)	0	82	124
Green Time (sec)	76	36	10
Phase Time (sec)	82	42	16
Phase Split	59%	30%	11%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



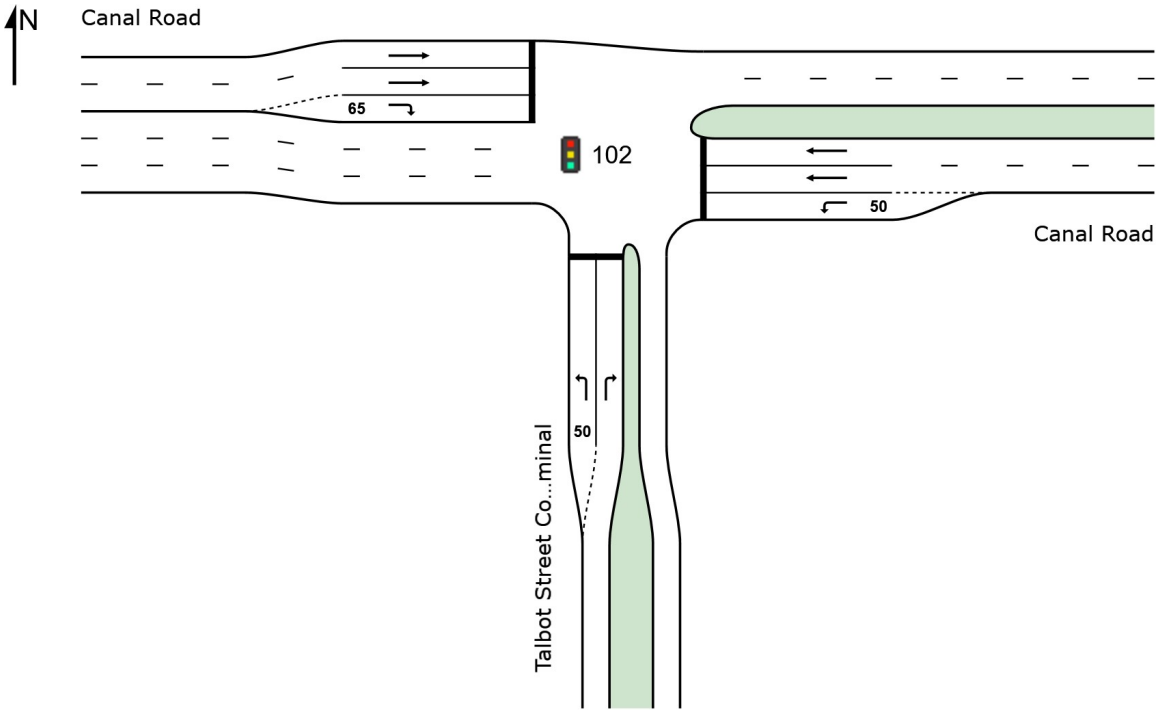
Site: 102 [Canal Road/Container Terminal Future AM Peak]

Network: 1 [Future AM_Peak]

Existing Three Way intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase C
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout



Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Talbot Street Container Terminal														
1	L2	14	92.3	14	92.3	0.095	66.3	LOS E	0.5	6.5	0.91	0.70	0.91	19.3
3	R2	21	95.0	21	95.0	0.444	85.0	LOS F	1.0	12.2	1.00	0.72	1.00	16.2
Approach		35	93.9	35	93.9	0.444	77.6	LOS F	1.0	12.2	0.97	0.71	0.97	17.3
East: Canal Road														
4	L2	9	77.8	9	77.2	0.009	7.0	LOS A	0.0	0.2	0.06	0.57	0.06	48.1
5	T1	994	9.2	985	8.9	0.340	1.5	LOS A	3.0	22.5	0.10	0.09	0.10	55.5
Approach		1003	9.9	994[N1]	9.5	0.340	1.6	LOS A	3.0	22.5	0.10	0.09	0.10	55.3
West: Canal Road														
11	T1	2040	3.5	1715	3.6	0.531	3.6	LOS A	13.8	99.4	0.41	0.38	0.41	48.6
12	R2	17	12.5	14	12.8	0.036	9.6	LOS A	0.2	1.5	0.41	0.64	0.41	47.8
Approach		2057	3.5	1729[N1]	3.6	0.531	3.6	LOS A	13.8	99.4	0.41	0.38	0.41	48.6
All Vehicles		3095	6.6	2757[N1]	7.4	0.531	3.8	LOS A	13.8	99.4	0.30	0.28	0.30	49.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

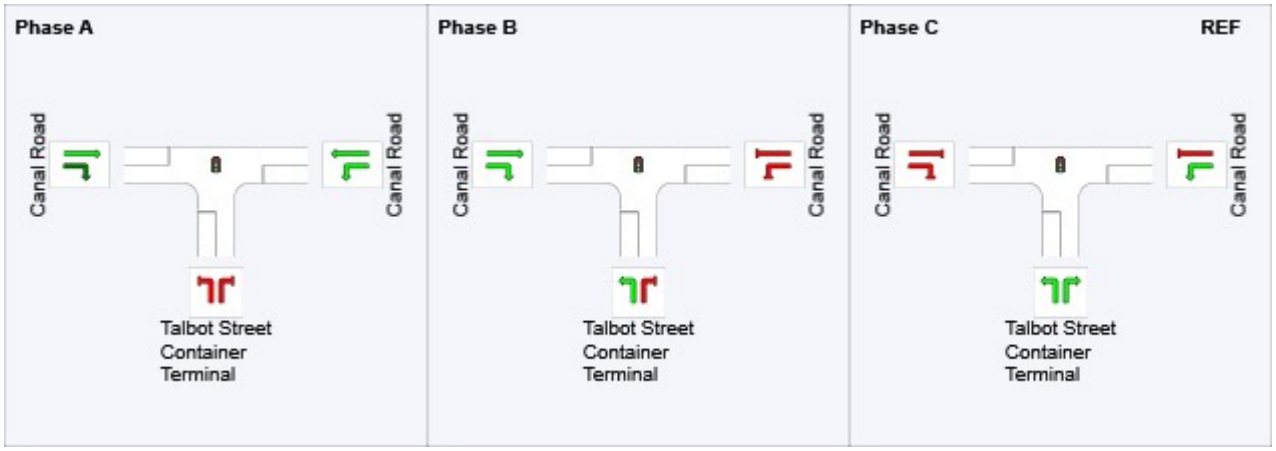
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

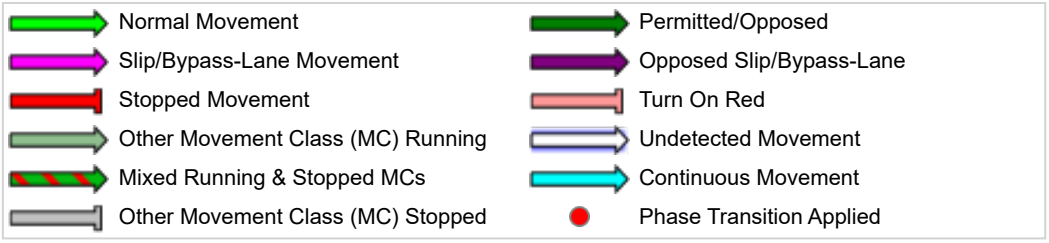
Phase	A	B	C
Phase Change Time (sec)	12	128	0
Green Time (sec)	110	6	6
Phase Time (sec)	116	12	12
Phase Split	83%	9%	9%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



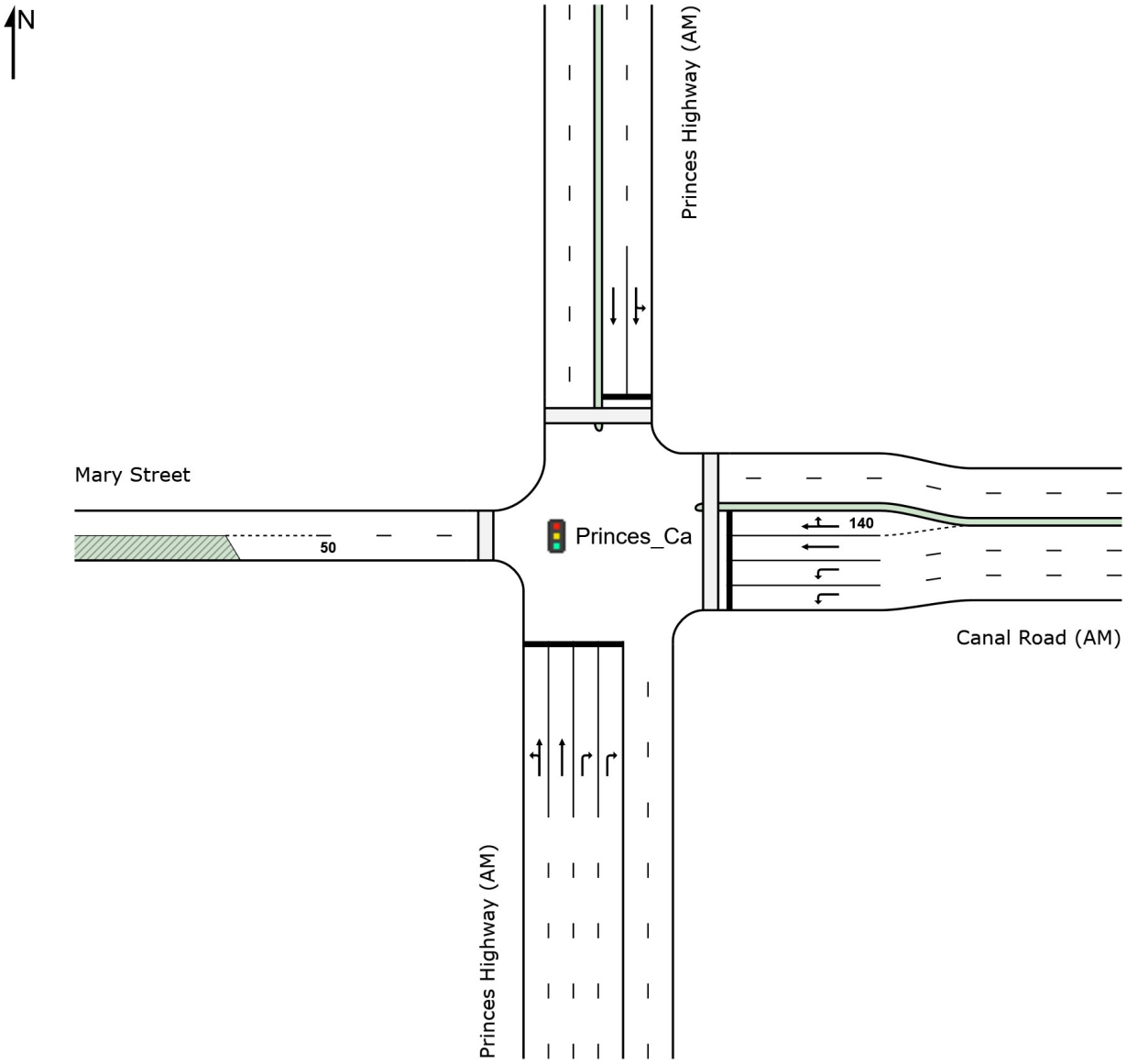
Site: Princes_Ca [Princes Highway/Canal Road Future AM Peak]

Network: 1 [Future AM_Peak]

Existing Four Way Intersection with Tidal Flow
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Site Layout


N
Princes Highway (AM)
Mary Street
50
Princes_Ca
140
Canal Road (AM)
Princes Highway (AM)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Princes Highway (AM)														
1	L2	91	0.0	91	0.0	0.559	15.5	LOS B	14.8	105.7	0.52	0.51	0.52	49.9
2	T1	1441	2.3	1441	2.3	0.559	10.0	LOS A	14.9	106.3	0.52	0.49	0.52	51.4
3	R2	1886	3.0	1886	3.0	1.210	242.2	LOS F	77.2	554.4	1.00	1.47	2.31	6.2
Approach		3418	2.6	3418	2.6	1.210	138.3	LOS F	77.2	554.4	0.78	1.03	1.50	13.6
East: Canal Road (AM)														
4	L2	514	17.4	514	17.4	0.218	7.5	LOS A	0.9	7.2	0.08	0.60	0.08	49.2
5	T1	374	0.0	374	0.0	0.890	44.3	LOS D	13.6	98.5	0.90	0.79	0.95	30.2
6	R2	82	16.7	82	16.7	0.890	53.0	LOS D	13.6	98.5	0.99	0.90	1.06	28.3
Approach		969	10.6	969	10.6	0.890	25.5	LOS B	13.6	98.5	0.47	0.70	0.50	37.7
North: Princes Highway (AM)														
7	L2	171	9.3	171	9.3	0.894	78.0	LOS F	15.1	113.2	1.00	1.01	1.25	17.6
8	T1	484	7.2	484	7.2	0.894	72.0	LOS F	15.6	115.8	1.00	1.03	1.25	27.4
Approach		655	7.7	655	7.7	0.894	73.6	LOS F	15.6	115.8	1.00	1.02	1.25	25.3
All Vehicles		5042	4.8	5042	4.8	1.210	108.2	LOS F	77.2	554.4	0.75	0.97	1.28	16.8

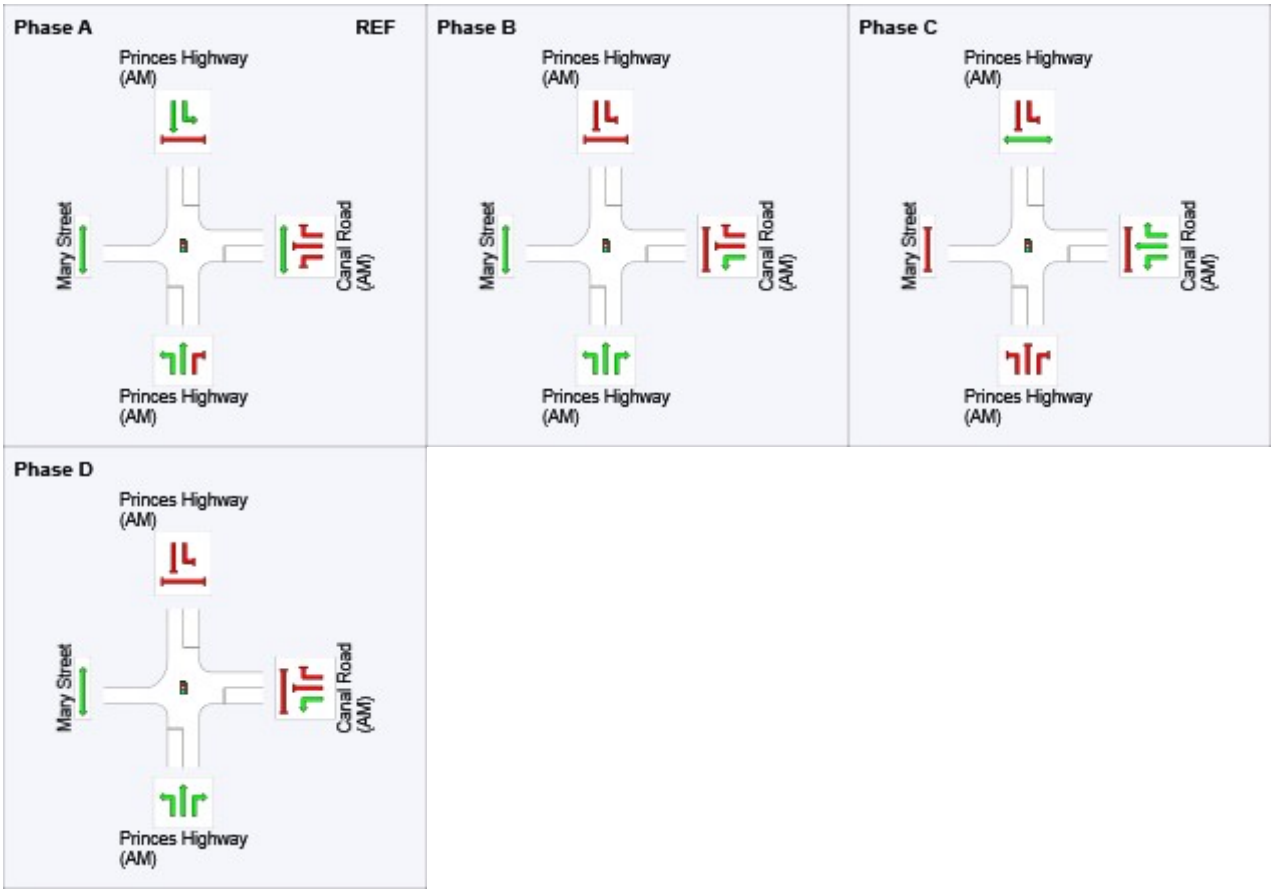
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	34	46	80
Green Time (sec)	28	6	28	54
Phase Time (sec)	34	12	34	60
Phase Split	24%	9%	24%	43%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

USER REPORT FOR NETWORK SITE

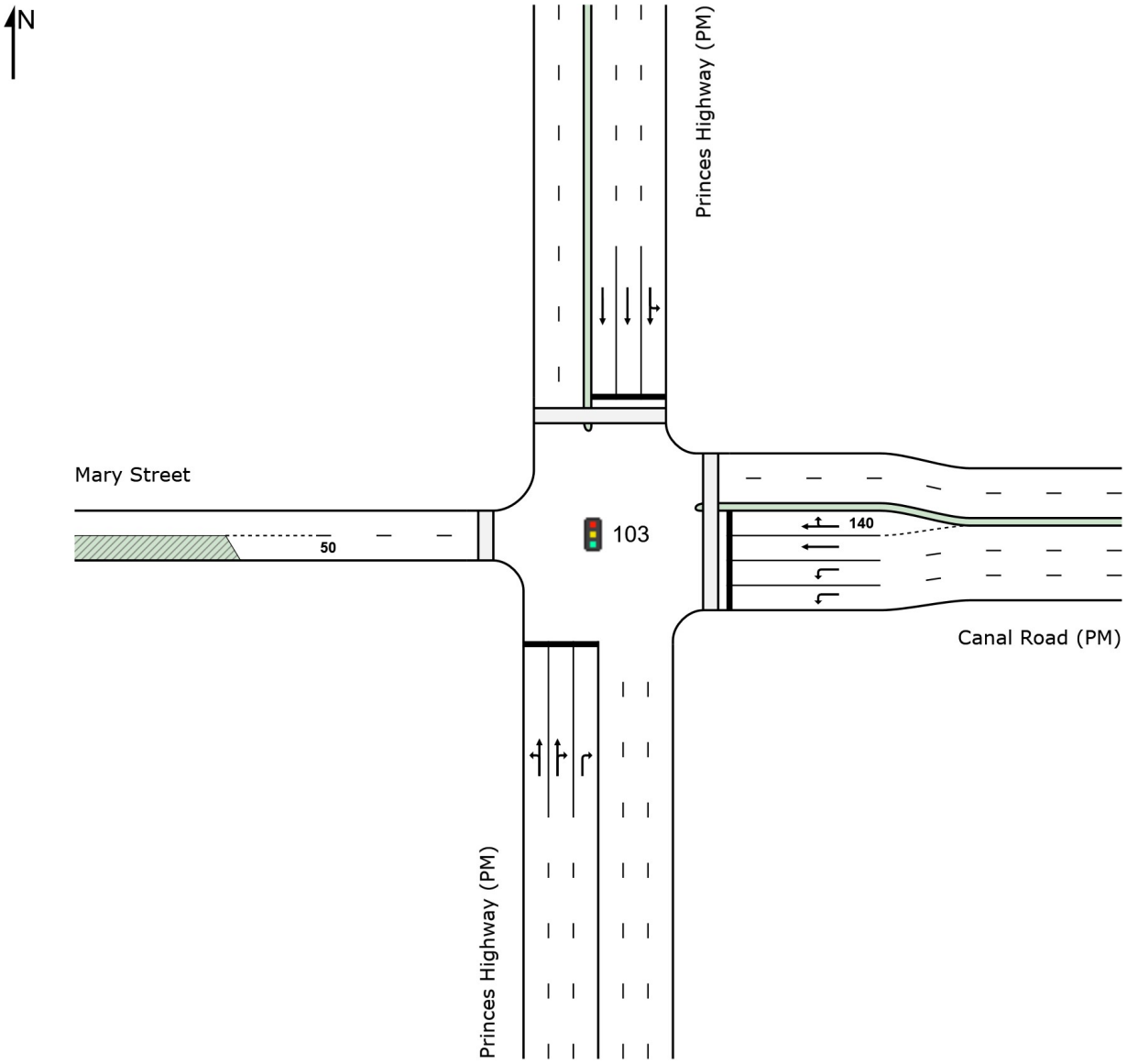
Project: SIDRA_Networks_St_Peters_MOD11_2018_12_02 **Template: EMM**

Site: 103 [Princes Highway/Canal Road 2017 PM Peak] Network: 7 [2017 PM_Peak]

Existing Four Way Intersection with Tidal Flow
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout


N
Princes Highway (PM)
Mary Street
50
103
140
Canal Road (PM)
Princes Highway (PM)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Princes Highway (PM)														
1	L2	109	0.0	109	0.0	0.781	19.1	LOS B	28.4	200.8	0.71	0.68	0.71	47.7
2	T1	964	1.4	964	1.4	0.781	13.6	LOS A	28.4	200.8	0.71	0.68	0.71	48.7
3	R2	974	3.4	974	3.4	0.964	91.7	LOS F	26.2	188.7	1.00	1.06	1.37	15.3
Approach		2047	2.3	2047	2.3	0.964	51.0	LOS D	28.4	200.8	0.85	0.86	1.02	28.8
East: Canal Road (PM)														
4	L2	1183	4.1	1162	4.0	0.617	27.1	LOS B	14.7	106.4	0.64	0.79	0.64	36.6
5	T1	379	0.0	373	0.0	0.901	63.6	LOS E	15.7	109.8	0.94	0.89	1.08	24.8
6	R2	100	0.0	98	0.0	0.901	75.3	LOS F	15.7	109.8	1.00	1.00	1.20	23.2
Approach		1662	2.9	1633[N1]	2.8	0.901	38.3	LOS C	15.7	109.8	0.73	0.82	0.77	32.0
North: Princes Highway (PM)														
7	L2	197	1.1	197	1.1	0.893	58.5	LOS E	29.4	207.8	1.00	0.99	1.12	21.9
8	T1	1828	1.3	1828	1.3	0.893	52.7	LOS D	29.7	210.3	1.00	1.00	1.12	32.1
Approach		2025	1.2	2025	1.2	0.893	53.3	LOS D	29.7	210.3	1.00	1.00	1.12	31.4
All Vehicles		5735	2.1	5706[N1]	2.1	0.964	48.2	LOS D	29.7	210.3	0.87	0.90	0.99	30.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

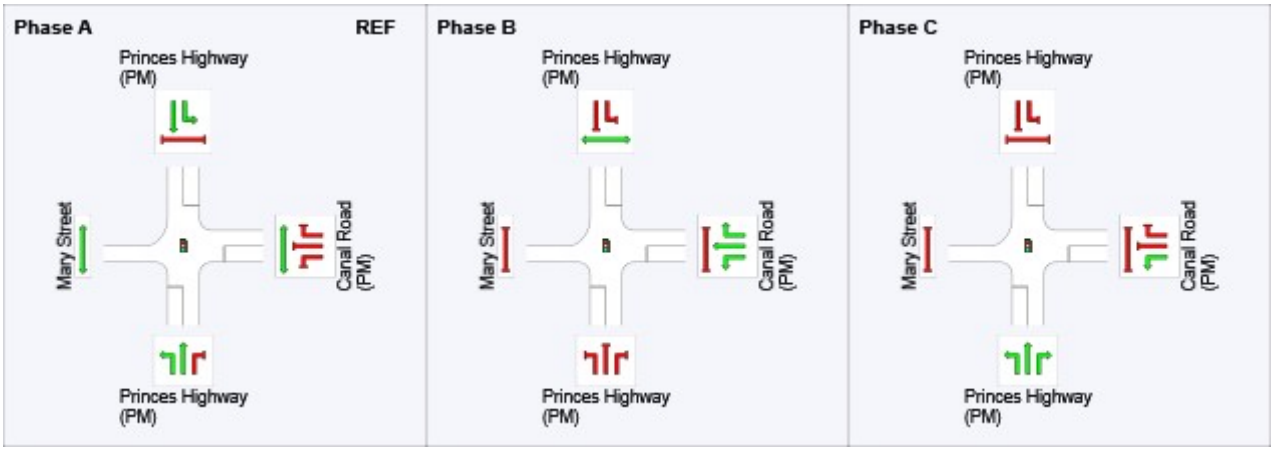
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	61	95
Green Time (sec)	55	28	39
Phase Time (sec)	61	34	45
Phase Split	44%	24%	32%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

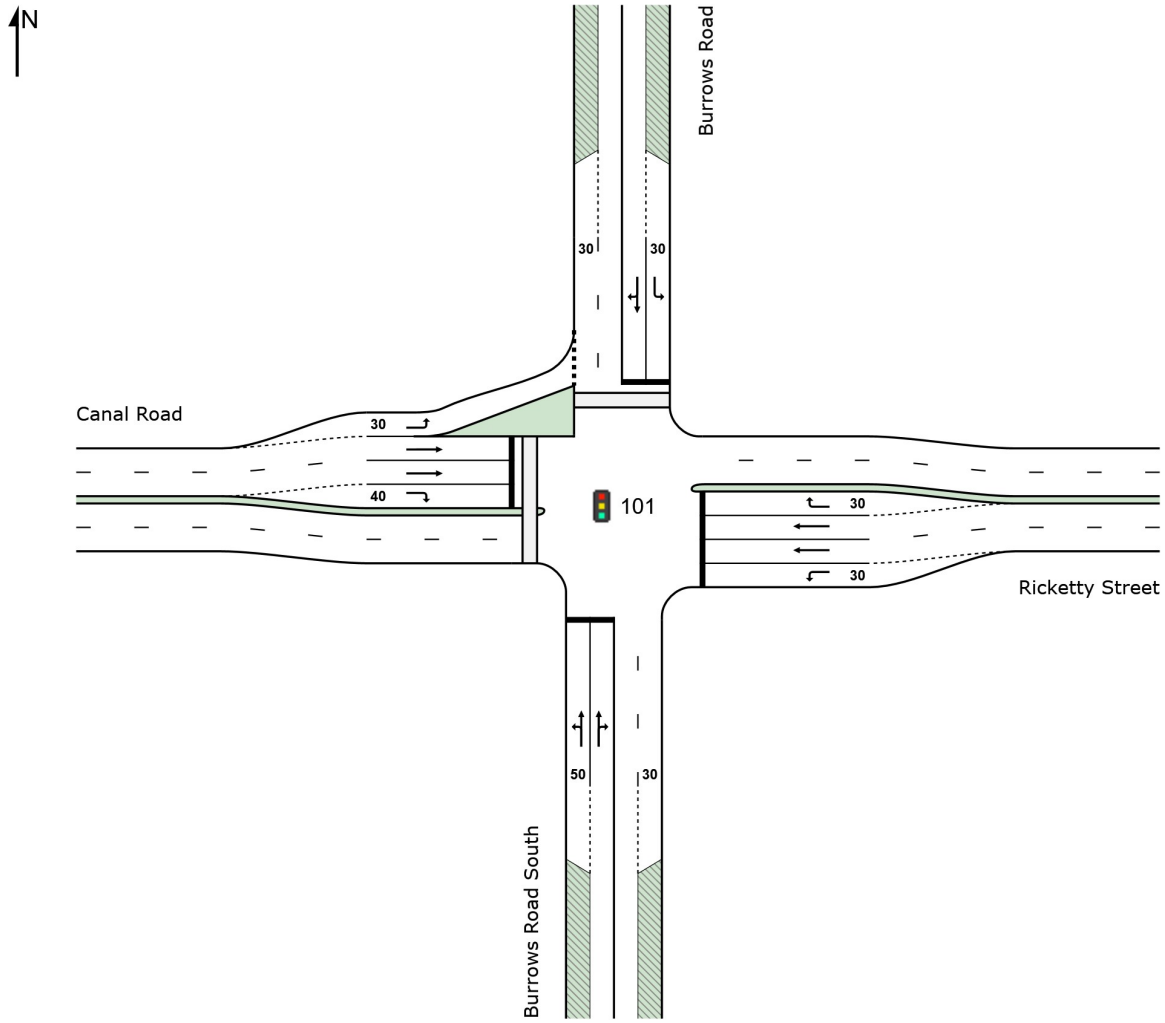
Site: 101 [Canal Road/Burrows Road/Ricketty Street 2017 PM Peak]

Network: 7 [2017 PM_Peak]

Four way traffic signal controlled intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, F
Output Phase Sequence: A, D, F

Site Layout


N
Burrows Road
30
30
Canal Road
30
40
101
30
30
Ricketty Street
50
30
Burrows Road South

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burrows Road South														
1	L2	56	22.6	56	22.6	0.109	41.3	LOS C	1.6	13.6	0.74	0.73	0.74	25.8
2	T1	23	22.7	23	22.7	0.295	58.6	LOS E	2.1	18.6	0.93	0.75	0.93	29.9
3	R2	33	32.3	33	32.3	0.295	64.6	LOS E	2.1	18.6	0.93	0.75	0.93	29.3
Approach		112	25.5	112	25.5	0.295	51.7	LOS D	2.1	18.6	0.83	0.74	0.83	28.2
East: Ricketty Street														
4	L2	34	25.0	34	25.0	0.036	18.2	LOS B	0.6	4.8	0.44	0.66	0.44	44.6
5	T1	1707	4.4	1707	4.4	0.907	36.0	LOS C	39.0	283.0	0.83	0.86	0.94	27.8
6	R2	91	2.3	91	2.3	0.251	14.8	LOS B	1.3	9.3	0.49	0.68	0.49	47.2
Approach		1832	4.7	1832	4.7	0.907	34.6	LOS C	39.0	283.0	0.81	0.84	0.91	29.2
North: Burrows Road														
7	L2	178	4.7	178	4.7	0.455	43.8	LOS D	5.6	40.5	0.80	0.78	0.80	34.3
8	T1	25	58.3	25	58.3	1.265	313.5	LOS F	19.9	163.7	1.00	1.68	2.69	9.3
9	R2	169	14.9	169	14.9	1.265	319.3	LOS F	19.9	163.7	1.00	1.68	2.69	5.2
Approach		373	13.0	373	13.0	1.265	187.4	LOS F	19.9	163.7	0.90	1.25	1.79	11.7
West: Canal Road														
10	L2	84	17.5	84	17.5	0.067	6.6	LOS A	0.3	2.6	0.19	0.59	0.19	51.5
11	T1	1001	5.0	1001	5.0	0.459	8.1	LOS A	5.7	41.8	0.29	0.26	0.29	51.5
12	R2	51	20.8	51	20.8	0.327	42.1	LOS C	1.5	12.3	1.00	0.79	1.00	31.4
Approach		1136	6.7	1136	6.7	0.459	9.5	LOS A	5.7	41.8	0.32	0.31	0.32	50.1
All Vehicles		3452	6.9	3452	6.9	1.265	43.4	LOS D	39.0	283.0	0.66	0.71	0.81	28.5

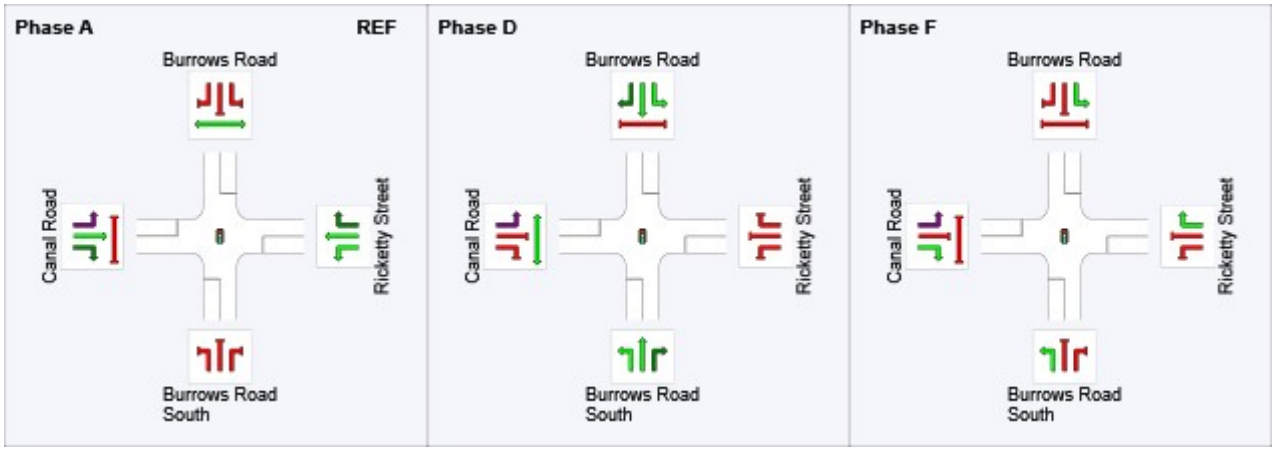
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Phase Timing Summary

Phase	A	D	F
Phase Change Time (sec)	0	89	126
Green Time (sec)	83	31	8
Phase Time (sec)	89	37	14
Phase Split	64%	26%	10%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

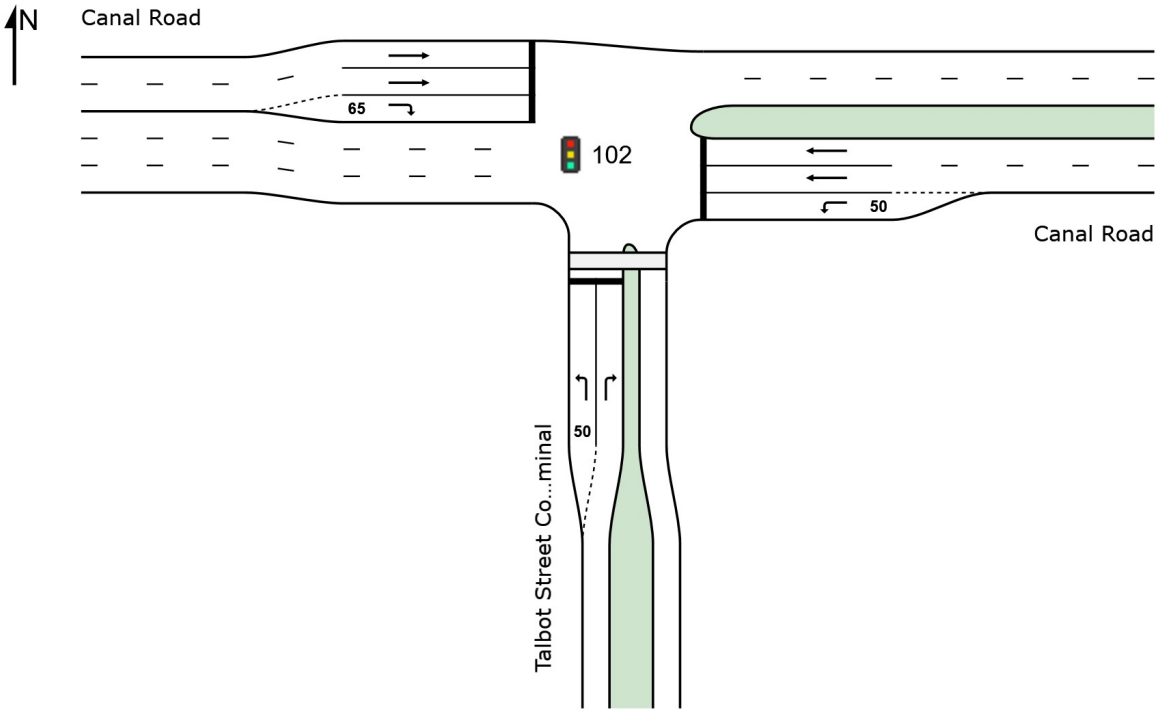
Site: 102 [Canal Road/Container Terminal 2017 PM Peak]

Network: 7 [2017 PM_Peak]

Existing Three Way intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout



Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Talbot Street Container Terminal														
1	L2	16	73.3	16	73.3	0.091	63.7	LOS E	0.6	6.7	0.90	0.70	0.90	19.8
3	R2	40	94.7	40	94.7	0.631	83.9	LOS F	1.8	23.1	1.00	0.81	1.14	16.3
Approach		56	88.7	56	88.7	0.631	78.2	LOS F	1.8	23.1	0.97	0.78	1.07	17.2
East: Canal Road														
4	L2	37	97.1	35	97.1	0.037	7.5	LOS A	0.1	1.4	0.08	0.58	0.08	47.1
5	T1	1896	4.1	1862	4.0	0.635	2.4	LOS A	9.5	68.8	0.17	0.15	0.17	53.1
Approach		1933	5.9	1897[N1]	5.7	0.635	2.5	LOS A	9.5	68.8	0.16	0.16	0.16	52.8
West: Canal Road														
11	T1	1171	3.0	1171	3.0	0.358	5.1	LOS A	12.4	88.9	0.51	0.46	0.51	45.0
12	R2	2	50.0	2	50.0	0.036	73.0	LOS F	0.1	0.8	0.90	0.61	0.90	22.4
Approach		1173	3.1	1173	3.1	0.358	5.2	LOS A	12.4	88.9	0.51	0.46	0.51	44.8
All Vehicles		3161	6.3	3126[N1]	6.4	0.635	4.9	LOS A	12.4	88.9	0.31	0.29	0.31	47.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

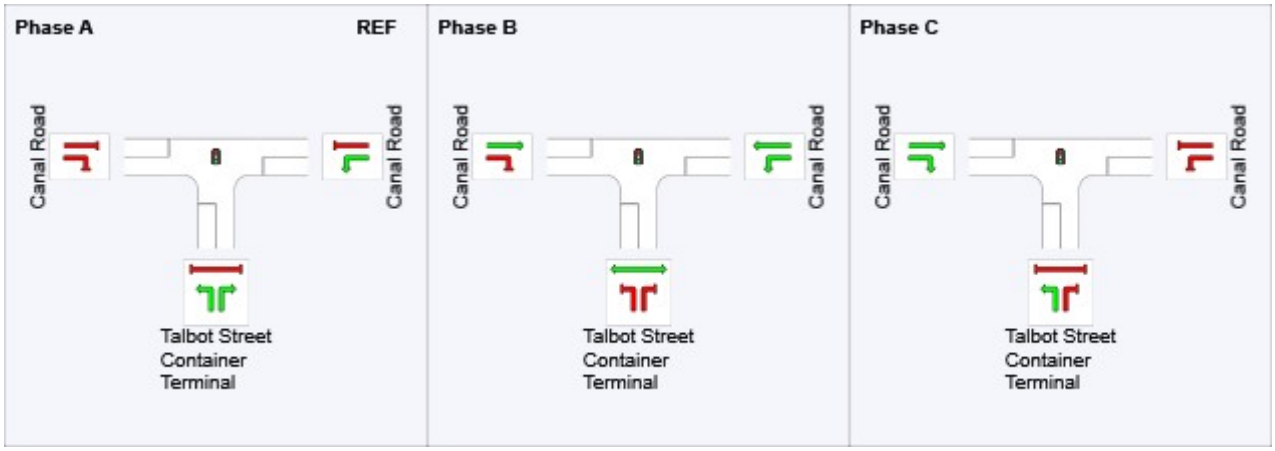
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

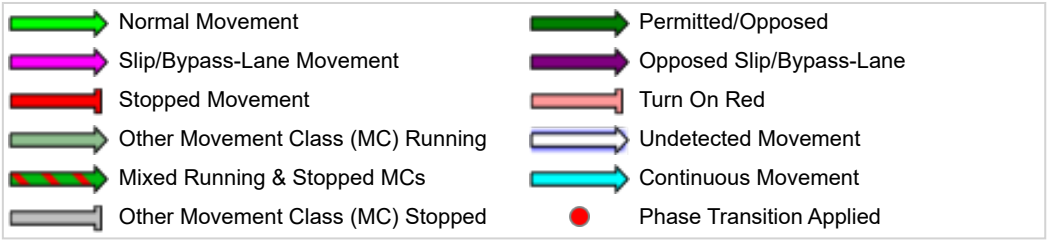
Phase	A	B	C
Phase Change Time (sec)	0	14	128
Green Time (sec)	8	108	6
Phase Time (sec)	14	114	12
Phase Split	10%	81%	9%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



USER REPORT FOR NETWORK SITE

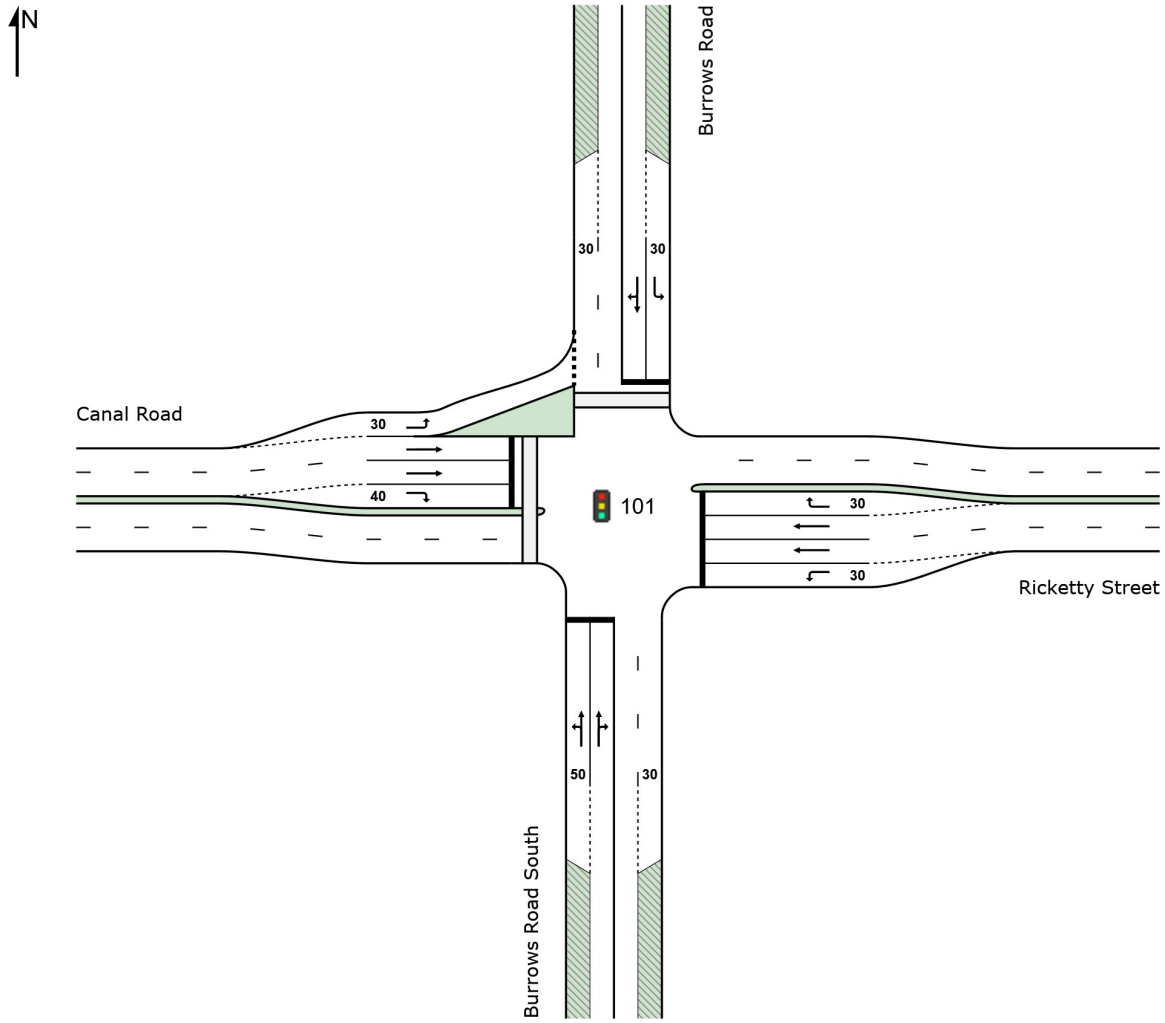
Project: SIDRA_Networks_St_Peters_MOD11_2018_12_02 **Template: EMM**

Site: 101 [Canal Road/Burrows Road/Ricketty Street Future PM Peak] Network: 2 [Future PM_Peak]

Four way traffic signal controlled intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, D, F*
Output Phase Sequence: A, D, F*
(* Variable Phase)

Site Layout


N
Burrows Road
30
30
Canal Road
30
40
101
30
30
Ricketty Street
50
30
Burrows Road South

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Burrows Road South														
1	L2	71	38.8	71	38.8	0.179	44.9	LOS D	2.4	22.3	0.78	0.74	0.78	24.8
2	T1	32	43.3	32	43.3	0.656	64.6	LOS E	3.1	30.4	0.95	0.81	1.03	28.3
3	R2	45	51.2	45	51.2	0.656	77.8	LOS F	3.1	30.4	1.00	0.83	1.10	26.3
Approach		147	43.6	147	43.6	0.656	59.2	LOS E	3.1	30.4	0.88	0.78	0.93	26.3
East: Ricketty Street														
4	L2	46	45.5	46	45.5	0.056	18.7	LOS B	0.8	7.7	0.44	0.67	0.44	43.9
5	T1	1707	4.4	1707	4.4	0.900	34.0	LOS C	36.6	265.6	0.82	0.83	0.92	28.6
6	R2	91	2.3	91	2.3	0.225	14.5	LOS A	1.3	9.3	0.46	0.68	0.46	47.4
Approach		1844	5.4	1844	5.4	0.900	32.7	LOS C	36.6	265.6	0.80	0.82	0.88	30.2
North: Burrows Road														
7	L2	178	4.7	178	4.7	0.516	43.8	LOS D	5.6	40.5	0.80	0.77	0.80	34.3
8	T1	34	68.8	34	68.8	1.909	870.1	LOS F	33.7	284.3	1.00	2.30	4.24	3.8
9	R2	169	14.9	169	14.9	1.909	875.8	LOS F	33.7	284.3	1.00	2.30	4.24	2.0
Approach		381	14.9	381	14.9	1.909	486.9	LOS F	33.7	284.3	0.91	1.59	2.63	5.2
West: Canal Road														
10	L2	84	17.5	76	18.3	0.078	9.3	LOS A	0.5	4.1	0.20	0.59	0.20	49.2
11	T1	1001	5.0	894	5.3	0.406	8.2	LOS A	4.9	36.1	0.29	0.26	0.29	51.4
12	R2	65	38.7	59	40.1	0.424	43.7	LOS D	1.8	17.2	1.00	0.80	1.00	30.6
Approach		1151	7.9	1029[N1]	8.3	0.424	10.3	LOS A	4.9	36.1	0.32	0.31	0.32	49.3
All Vehicles		3523	8.8	3402[N1]	9.1	1.909	77.9	LOS F	36.6	284.3	0.67	0.75	0.91	20.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

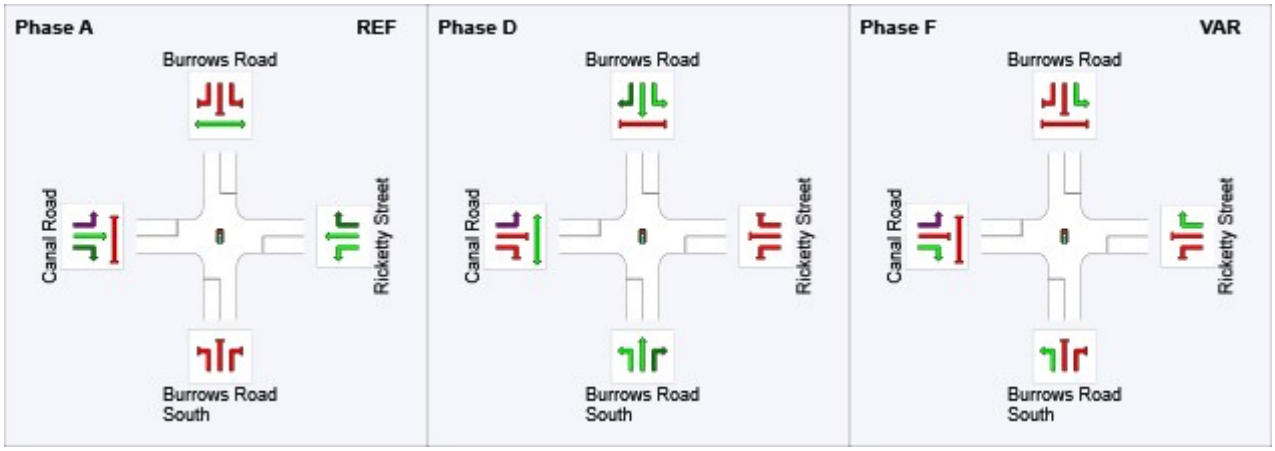
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

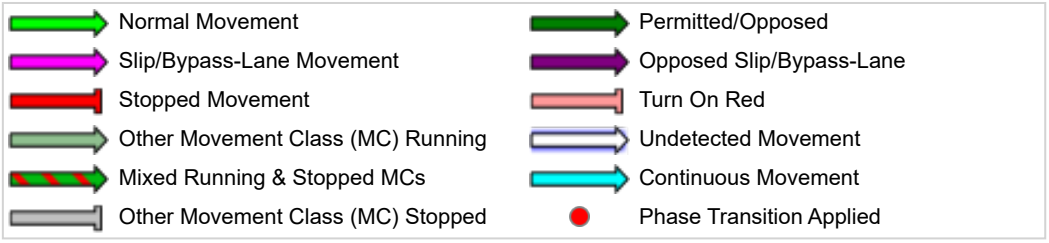
Phase	A	D	F
Phase Change Time (sec)	0	89	126
Green Time (sec)	83	31	8
Phase Time (sec)	89	37	14
Phase Split	64%	26%	10%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



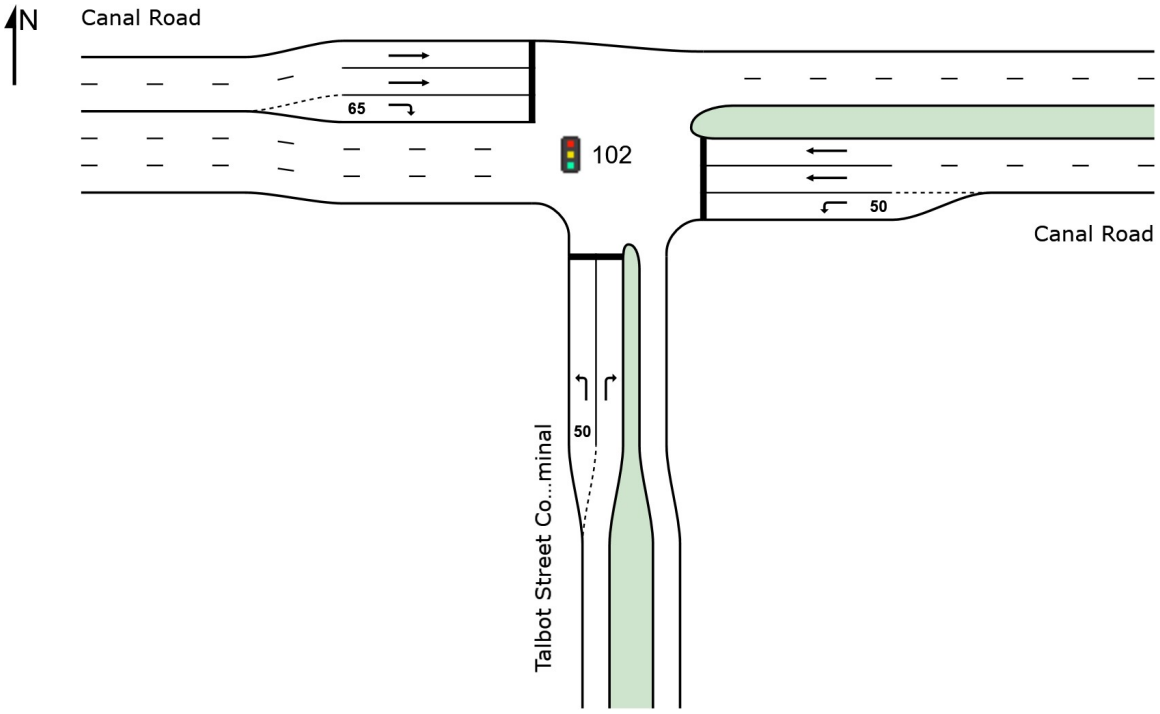
Site: 102 [Canal Road/Container Terminal Future PM Peak]

Network: 2 [Future PM_Peak]

Existing Three Way intersection
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase C
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Site Layout



Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Talbot Street Container Terminal														
1	L2	16	73.3	16	73.3	0.091	63.7	LOS E	0.6	6.7	0.90	0.70	0.90	19.8
3	R2	40	94.7	40	94.7	0.631	83.9	LOS F	1.8	23.1	1.00	0.81	1.14	16.3
Approach		56	88.7	56	88.7	0.631	78.2	LOS F	1.8	23.1	0.97	0.78	1.07	17.2
East: Canal Road														
4	L2	37	97.1	33	97.0	0.035	7.3	LOS A	0.1	1.1	0.07	0.58	0.07	47.2
5	T1	1911	4.8	1833	4.6	0.627	2.2	LOS A	8.3	60.5	0.15	0.14	0.15	53.8
Approach		1947	6.6	1867 N1	6.2	0.627	2.3	LOS A	8.3	60.5	0.15	0.15	0.15	53.4
West: Canal Road														
11	T1	1185	4.2	1055	4.2	0.327	5.4	LOS A	11.9	86.5	0.53	0.48	0.53	44.3
12	R2	2	50.0	2	50.1	0.015	16.8	LOS B	0.0	0.5	0.66	0.65	0.66	41.4
Approach		1187	4.3	1057 N1	4.3	0.327	5.4	LOS A	11.9	86.5	0.54	0.48	0.54	44.3
All Vehicles		3191	7.2	2980 N1	7.7	0.631	4.8	LOS A	11.9	86.5	0.30	0.28	0.30	47.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

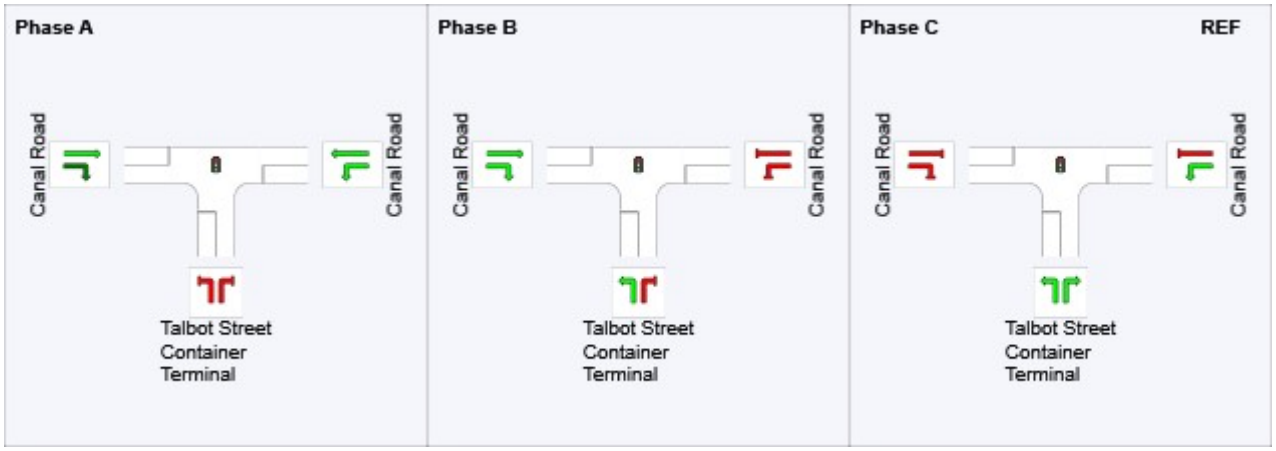
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

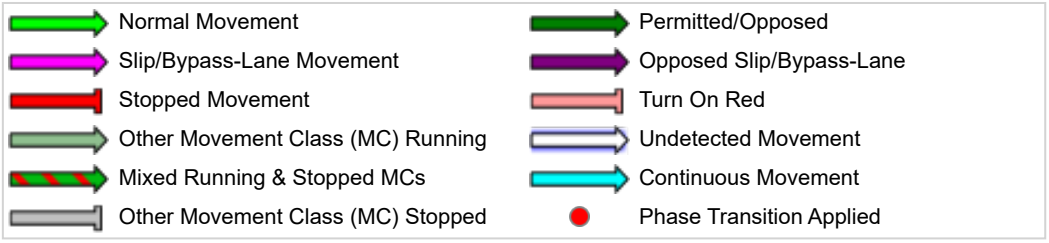
Phase	A	B	C
Phase Change Time (sec)	14	128	0
Green Time (sec)	108	6	8
Phase Time (sec)	114	12	14
Phase Split	81%	9%	10%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



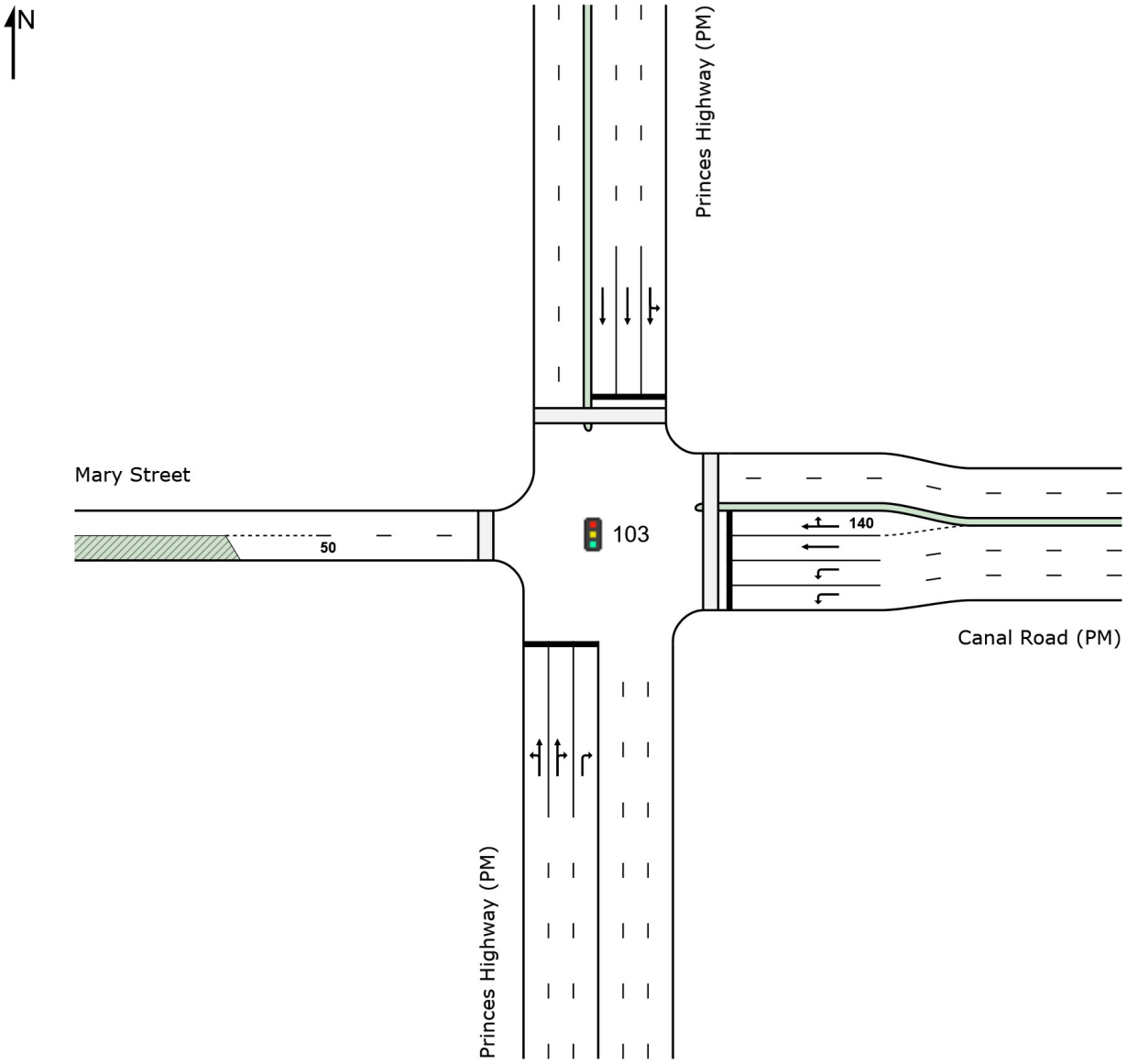
Site: 103 [Princes Highway/Canal Road Future PM Peak]

Network: 2 [Future PM_Peak]

Existing Four Way Intersection with Tidal Flow
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Downstream lane blockage effects included in determining phase times
Green Split Priority has been specified
Phase Sequence: Two-Phase
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Site Layout


N
Princes Highway (PM)
Mary Street
50
103
140
Canal Road (PM)
Princes Highway (PM)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Princes Highway (PM)														
1	L2	109	0.0	109	0.0	0.781	19.1	LOS B	28.4	200.8	0.71	0.68	0.71	47.7
2	T1	964	1.4	964	1.4	0.781	13.6	LOS A	28.4	200.8	0.71	0.68	0.71	48.7
3	R2	981	4.1	981	4.1	1.153	190.9	LOS F	32.3	233.7	1.00	1.34	2.14	7.2
Approach		2055	2.6	2055	2.6	1.153	98.6	LOS F	32.3	233.7	0.85	1.00	1.39	17.2
East: Canal Road (PM)														
4	L2	1191	4.7	1143	4.5	0.609	26.6	LOS B	14.1	102.3	0.63	0.78	0.63	36.9
5	T1	379	0.0	365	0.0	0.905	64.0	LOS E	15.6	110.9	0.94	0.89	1.08	24.8
6	R2	107	6.9	103	6.6	0.905	76.1	LOS F	15.6	110.9	1.00	1.00	1.21	23.0
Approach		1677	3.8	1611[N1]	3.6	0.905	38.2	LOS C	15.6	110.9	0.72	0.82	0.77	32.1
North: Princes Highway (PM)														
7	L2	203	4.1	203	4.1	0.898	59.7	LOS E	29.7	211.7	1.00	1.00	1.13	21.6
8	T1	1828	1.3	1828	1.3	0.898	53.8	LOS D	30.2	213.9	1.00	1.00	1.13	31.9
Approach		2032	1.6	2032	1.6	0.898	54.4	LOS D	30.2	213.9	1.00	1.00	1.13	31.1
All Vehicles		5763	2.6	5697[N1]	2.6	1.153	65.7	LOS E	32.3	233.7	0.87	0.95	1.12	24.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

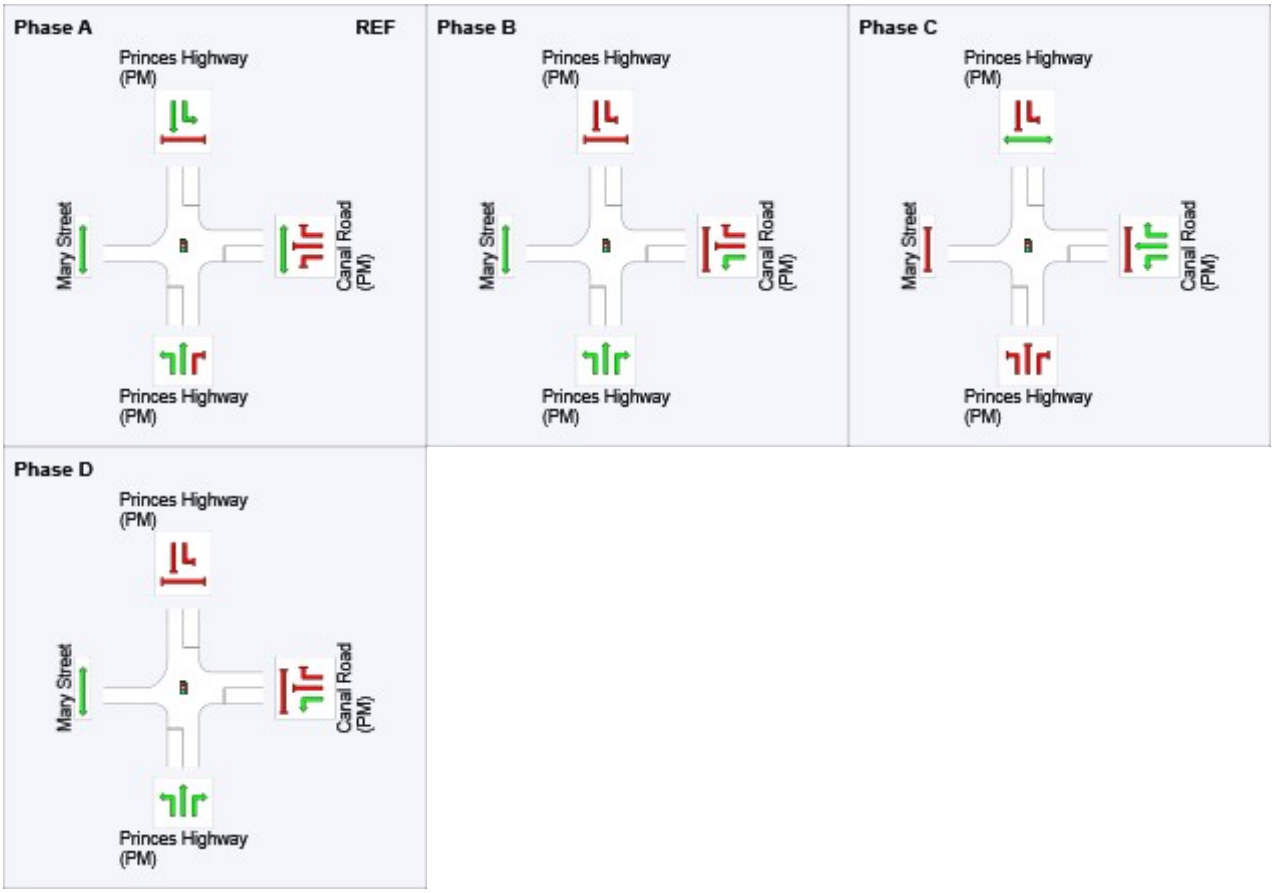
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	61	73	107
Green Time (sec)	55	6	28	27
Phase Time (sec)	61	12	34	33
Phase Split	44%	9%	24%	24%

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement	Permitted/Opposed
Slip/Bypass-Lane Movement	Opposed Slip/Bypass-Lane
Stopped Movement	Turn On Red
Other Movement Class (MC) Running	Undetected Movement
Mixed Running & Stopped MCs	Continuous Movement
Other Movement Class (MC) Stopped	Phase Transition Applied

Appendix C

Air quality impact assessment

Air quality impact assessment

Modification 12 | Boral St Peters

Prepared for Boral Resources (NSW) Pty Ltd
September 2019

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Air quality impact assessment

Modification 12 | Boral St Peters

Report Number

J190375 RP4

Client

Boral Resources (NSW) Pty Ltd

Date

12 September 2019

Version

v3 Final

Prepared by

Scott Fishwick
Associate - National Practice Leader, Air Quality

Approved by

Francine Manansala
Associate - Air Quality

Table of Contents

Tables

Figures

1 Introduction

Boral Resources (NSW) Pty Ltd (Boral) owns and operates a concrete batching plant (the concrete plant) and construction materials handling facility (the handling facility) at 25 Burrows Road South, St Peters (the site).

The approved production limit for concrete at the site is 750,000 cubic metres (m^3) per annum and the throughput of the handling facility is 1 million tonnes per annum (Mtpa). Potential environmental impacts from particulate matter emissions generated by site operations were assessed for the previous modification (Modification 11). Development consent Condition A6 was inserted to provide limits on peak hourly traffic movements for the concrete plant, making clear distinctions for traffic movements between the concrete plant and the handling facility.

Boral is proposing to modify the site's development consent (Modification 12) to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/throughput, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11. To ensure that the worst-case scenario is modelled regarding air quality impacts, an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa was assumed, whilst correspondingly decreasing the concrete plant production. The site combined traffic volume would still correspond to that contained in the Modification 11 environmental assessment.

The proposed Modification 12 includes no changes to the site layout, development footprint, consent area or operating hours.

1.1 Purpose of this report

EMM Consulting Pty Limited (EMM) has been commissioned by Boral to prepare this air quality impact assessment (AQIA) for the proposed modification. This AQIA forms part of the Environmental Impact Statement (EIS) to accompany the application to modify the site's development consent (Modification 12).

A comprehensive AQIA was completed for Modification 11 by Ramboll in July 2018 (hereafter the MOD11 AQIA) in accordance with the NSW Environment Protection Authority 2016 guidance document, the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. On the basis that Modification 12 represents a proposed alteration to the distribution of activities at the site without changes to the site layout, development footprint, consent area or operating hours, the current AQIA has been completed using consistent approaches as follows:

- input meteorology dataset from the Bureau of Meteorology Sydney Airport automatic weather station for 2015;
- baseline air quality from the NSW Department of Planning Industry and Environment (previously Office of Environment and Heritage) Earlwood air quality monitoring station;
- particulate matter emissions inventory based on United States Environmental Protection Agency AP42 emission factors and equations; and
- dispersion modelling conducted using AERMOD.

Detailed analysis of these inputs is presented in the MOD11 AQIA and remain largely unchanged for this assessment and is not reproduced in this report.

This AQIA consists of the following sections:

- a description of the site and proposed modification;
- an overview of the air pollutant emissions inventory for Modification 12; and
- results of atmospheric dispersion modelling at the selected assessment locations for Modification 12 operations.

2 The site

2.1 Background

The site is located within the Inner West local government area (LGA). The south-eastern boundary of the site adjoins the Alexandra Canal. The Sydney International Airport is located approximately 300 m to the south of the site. The nearest private residences are located approximately 600 m to the north-west of the site on the opposite (north) side of the Princes Highway.

The site has two existing land uses; the concrete plant and the handling facility. Both uses predominantly receive bulk construction materials (aggregate, sand and cement) by rail from Boral's Peppertree and Dunmore quarries and Berrima Cement Works. There are two train unloading areas on one of four rail sidings; one unloading area for the concrete plant and one for the handling facility. Trains are parked and shunted in the rail sidings. Some fly ash and special admixtures used in the concrete plant are delivered to the site by road.

The site is approved to operate 24 hours per day, seven days a week.

2.1.1 Concrete plant

The concrete plant is located in the south-western section of the site.

Aggregates and sand are stored in large elevated bins, and cement and fly ash are stored in large elevated silos located above the concrete plant. Aggregates and sand are transferred from the concrete plant train unloading area to the storage bins by conveyor.

The concrete plant mixes the aggregates, sand, cement and admixtures, and gravity dispenses the batched product into concrete agitators inside the loading bays building. Once loaded, the concrete agitators drive out of the loading bay building and proceed to the slump stands where water is added. The concrete agitators mix all ingredients and concrete is then transported to customers by road.

2.1.2 Handling facility

The handling facility is located in the centre and north-eastern section of the site. The handling facility receives and temporarily stores aggregates and sand from Boral's Peppertree and Dunmore quarries and cement from Berrima Cement Plant before dispatching them by road truck to other concrete batching plants and asphalt plants within the Sydney metropolitan area.

The aggregates and sand are transferred from the handling facility's train unloading area to storage bins by conveyors, which are then loaded into road trucks for dispatch offsite or for transfer to storage bunkers or stockpiles.

2.2 The proposed modification

The modification (Modification 12) to the site's development consent is proposed to provide more flexibility to the site by combining the site's overall traffic volumes, to allow an increase in production volumes/throughput at one of the site's operations, while correspondingly reducing at the other. The worst case scenario for this is an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa whilst correspondingly decreasing the concrete plant production and allow for a total combined traffic volume for the concrete plant and the handling facility.

The proposed increase in the handling facility approved throughput to 1.75 Mtpa would correspond to an extra 138 average daily truck movements, of which potentially 14 (7 in and 7 out) could occur in the am and pm peak hours. Additional to the currently approved 184 average daily truck movements at the handling facility, this is 322 average daily truck movements proposed in total, with a potential maximum of 36 (18 in and 18 out) could occur in either the am or pm peak hours.

The currently approved concrete production limit of 750,000 m^3 per annum is not proposed to be increased. Conversely, the proposed modification is expected to result in a corresponding reduction of 138 daily truck movements in the concrete plant operations (1,046 average daily truck movements was estimated for Modification 11). This 13.2% reduction would reduce the approved production limit to 650,000 m^3 with 908 average daily truck movements. The maximum peak hourly truck movements for the concrete plant would remain the same (88 = 44 in and 44 out) as stipulated in the current approval.

It is expected that all site (handling facility and concrete plant) daily and peak hourly truck movements for the proposed Modification 12 will remain the same as what was assessed and subsequently approved for Modification 11, as no formal limit was specified in the development consent for the peak hourly truck movements from the handling facility.

3 Emissions estimation

In order to understand the implications for air pollutant emissions from the site arising from the proposed Modification 12 changes, the emissions inventory for Modification 11, as presented in the MOD11 AQIA, has been modified. The same emissions factors and equations adopted in the MOD11 AQIA have been retained for Modification 12.

As was the case for Modification 11, the developed emissions inventory is based on the assumption of maximum site material throughputs and is therefore considered a conservative upper estimate of likely operational emissions at the site.

The annual emissions inventory for Modification 12 is presented in Table 3.1. Additionally, the change in annual emissions by source type from Modification 11 to Modification 12 is illustrated in Figure 3.1, while the comparison of total annual emissions by grouped source categories in illustrated in Figure 3.2. The referenced table and figure highlight the following key points:

- sources associated with the concrete plant show a decrease in annual emissions under Modification 12;
- sources associated with the loading and dispatch of material from the handling facility (truck loading and the movement of trucks) show an increase in annual emissions relative to Modification 11;
- emissions from the tripper car transferring aggregate and sand to the handling facility have reduced significantly through the inclusion of a telescopic chute with water sprays and revised bunker design (see Section 3.1 for further details); and
- annual total site emissions for Modification 12 are lower than Modification 11.

3.1 Additional mitigation measures

The dispersion modelling completed for Modification 11 highlighted that a key contributing source of particulate matter emissions is the transfer of aggregate and sand material to the handling facility via the elevated conveyor and tripper car. In order to further control emissions from this area, Boral has incorporated some additional mitigation measures into the design of Modification 12, including:

- addition of a telescopic chute with water sprays at the tripper car to improve the capture of emissions from the unloading of material and lower the height of release to below the storage bunker walls; and
- revised design of the bunker walls, with the concrete side walls angled up towards the tripper car to provide improved shielding (see Figure 3.3 for cross-sectional illustration of the redesigned bunker walls).

To account for these additional mitigation measures, the following emission reduction factors have been applied to the emissions inventory calculations and reflected in the emission totals presented in Table 3.1:

- tripper car unloading - telescopic chute with water sprays – 75% reduction (Katestone 2011); and
- bunker storage area – increased wind shielding from redesigned bunker walls - 75% reduction for three side enclosure (Katestone 2011).

Table 3.1 Annual emissions inventory – proposed modification 12 operations

Operational area	Emissions source	Annual emissions (kg/year) by particle size		
		TSP	PM_{10}	$PM_{2.5}$
Concrete plant	Cement/ admix delivery - paved	417.2	80.1	19.4
	Aggregate pre-silos conveyor transfer	325.1	153.8	23.3
	Sand pre-silos conveyor transfer	61.2	29.0	4.4
	Aggregate transfer to storage	442.1	209.1	31.7
	Sand transfer to storage	83.3	39.4	6.0
	Cement unloading to silos	120.3	40.9	4.1
	Aggregate transfer storage to weigh hopper	443.3	209.7	31.7
	Sand transfer storage to weigh hopper	95.2	45.0	6.8
	Weigh hopper loading	526.7	263.4	39.9
	Mixer loading (truck mixer)	1,344.4	372.8	60.1
	Agitator truck dispatch - paved	2,579.8	495.2	105.6
Handling facility	Aggregate truck unloading to stockpiles	9.6	4.5	0.7
	Sand truck unloading to stockpiles	17.2	8.1	1.2
	Aggregate unloading from train	769.4	363.9	55.1
	Sand unloading from train	182.8	86.5	13.1
	Aggregate elevated conveyor transfer	769.4	363.9	55.1
	Sand elevated conveyor transfer	213.3	100.9	15.3
	Aggregate tripper car to stockpiles	384.7	182.0	27.6
	Sand tripper car to stockpiles	91.4	43.2	6.5
	Sand to internal truck	6.1	2.9	0.4
	Aggregate/sand internal transport to new dump station	42.9	8.2	2.0
	Sand to new dump station	24.5	11.6	1.8
	Aggregate truck loading - sales	351.4	166.2	25.2
	Sand truck loading - sales	138.0	65.3	9.9
	Aggregate/sand delivery and dispatch - paved	1,271.4	244.0	58.6
	Wind erosion - storage bins	836.7	418.3	62.8
Diesel combustion	Diesel combustion – mobile plant	528.9	528.9	484.9
	Diesel combustion – trucks	132.0	132.0	121.0
	Diesel combustion - locomotive engines	885.0	885.0	858.4
Total		**13,100.0**	**5,560.5**	**2,138.6**
MOD11 AQIA total		**17,092.2**	**7,420.5**	**2,417.7**

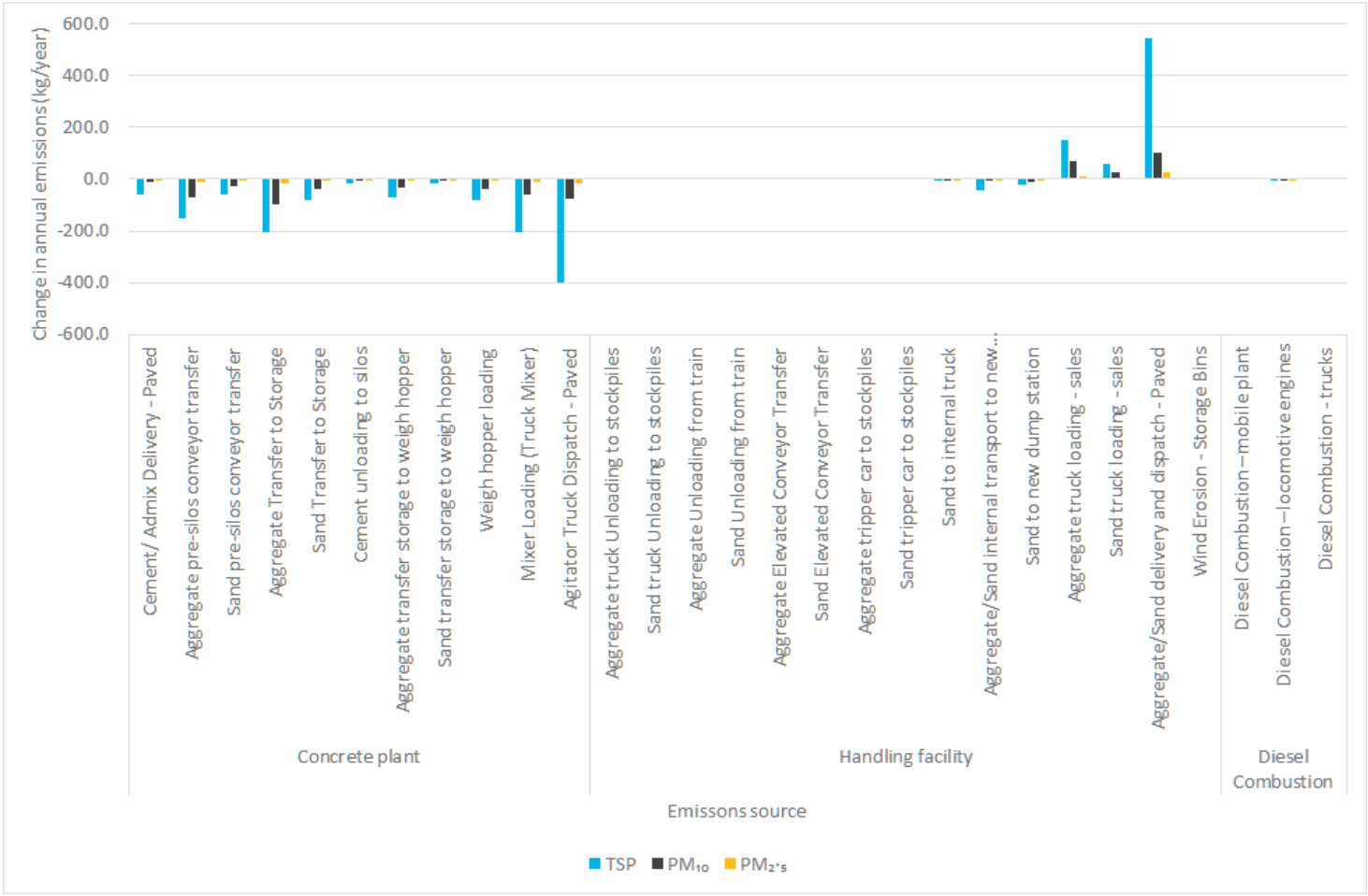


Figure 3.1 **Changes in annual particulate matter emissions – Modification 12 from Modification 11**

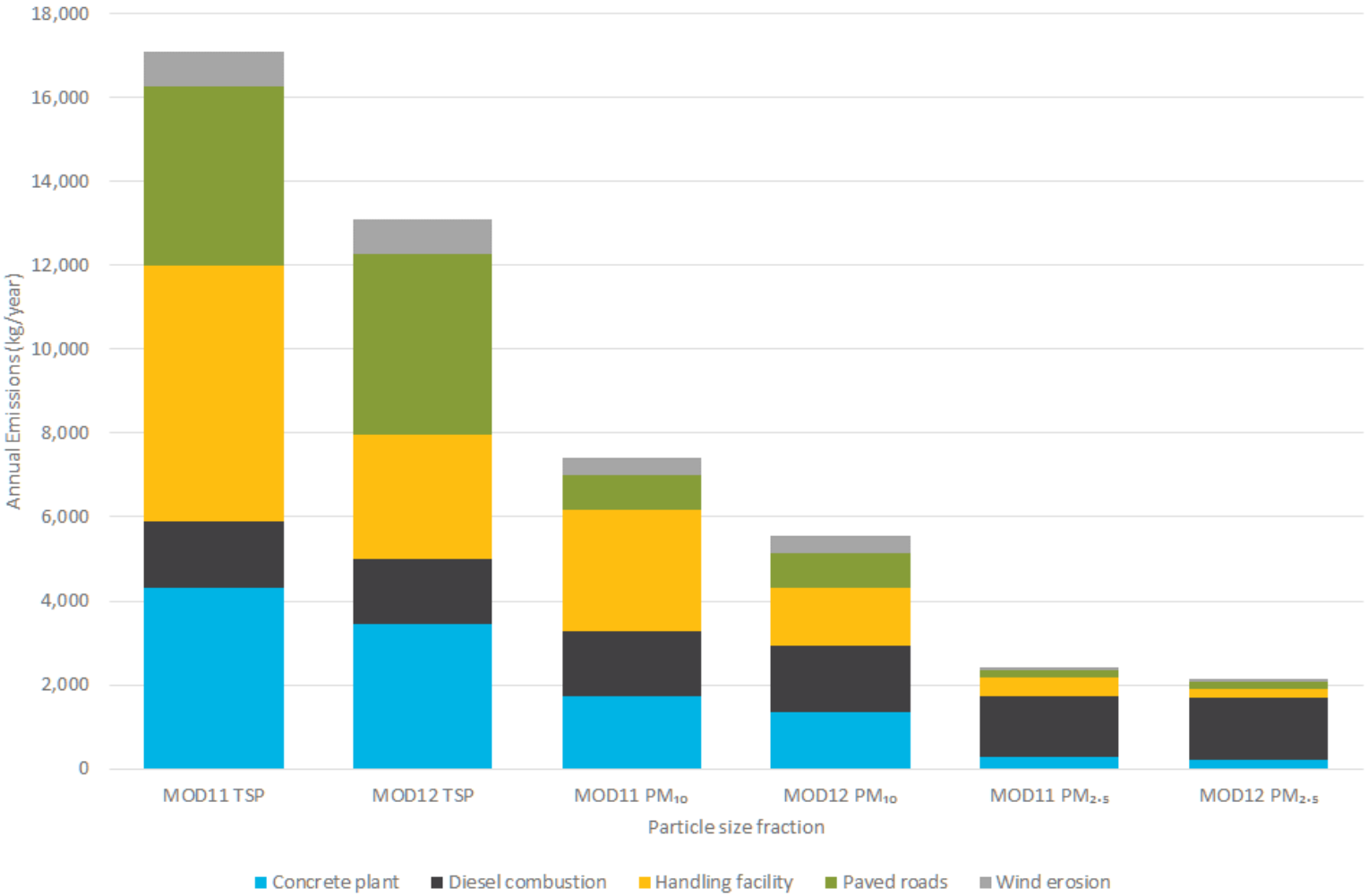


Figure 3.2 **Annual particulate matter emissions comparison – Modification 11 vs Modification 12**

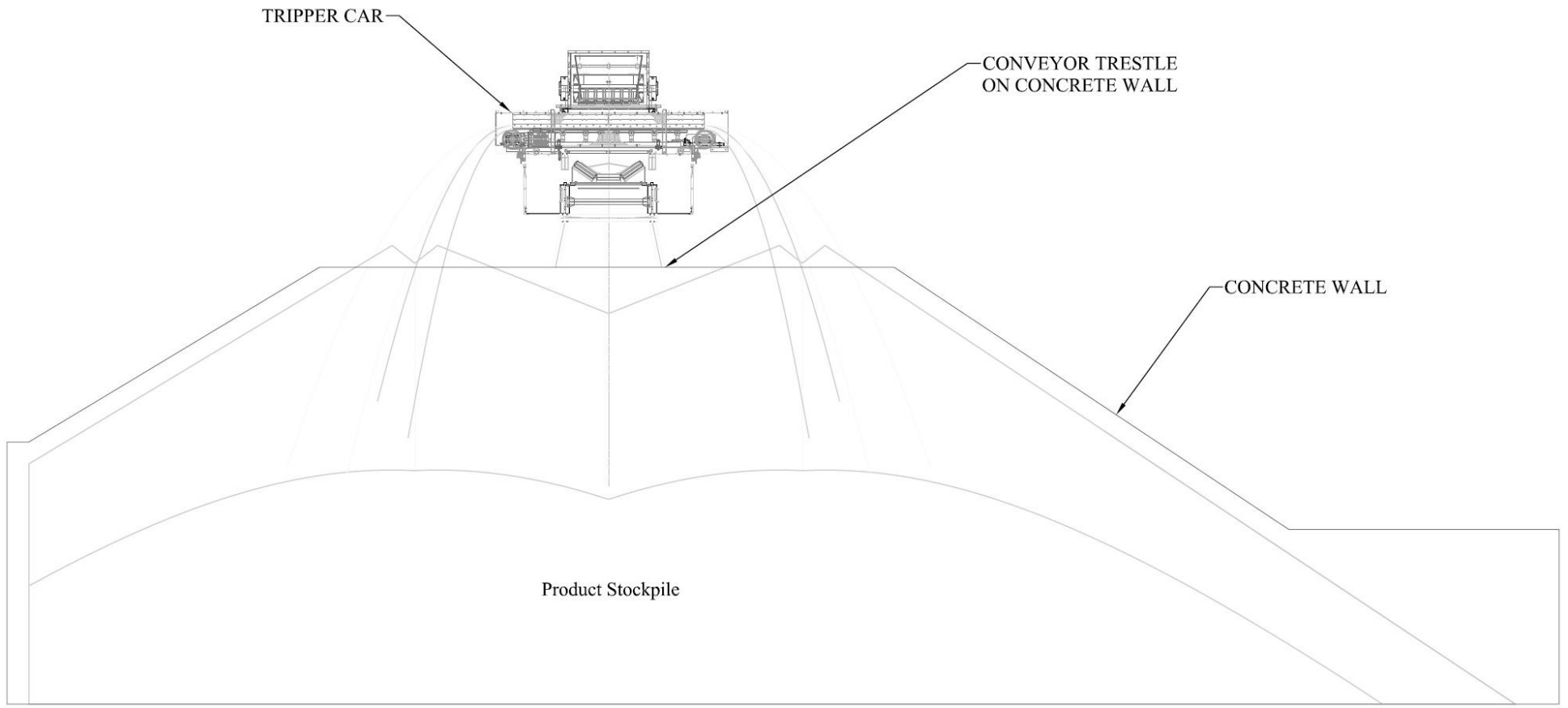


Figure 3.3 Cross section of proposed handling facility bunker – St Peters Terminal

Note: telescopic chute from tripper car not marked on drawing

4 Dispersion modelling

Dispersion modelling of Modification 12 emissions was completed using the MOD11 AQIA model configuration for the site, using the amended emissions inventory discussed in Section 3. As was the case for MOD11 AQIA, two variations of the single Modification 12 emissions scenario have been developed:

- peak day emissions, based on maximum daily concrete agitator and aggregate truck movements; and
- average day emissions, based on average daily concrete agitator and aggregate truck movements.

The peak day emissions profile has been used to predicted 24-hour average PM_{10} and $PM_{2.5}$ concentrations, while the average day emissions profile has been used to predict annual average TSP, PM_{10}, $PM_{2.5}$ and dust deposition levels.

Predicted incremental TSP, PM_{10}, $PM_{2.5}$ concentration and dust deposition rates from the site under peak and average day Modification 12 operations are presented in Table 4.1 for each of the adopted assessment locations. The change in predicted incremental concentration or deposition rate from the Modification 12 emissions inventory relative to the results presented in the MOD11 AQIA are illustrated in Figure 4.1.

Table 4.1 Incremental particulate matter concentration and deposition results – proposed Modification 12 operations

Receptor	Incremental concentration (µg/m³) or deposition (g/m²/month) due to Modification 12					
	Annual TSP	**24-hour PM_{10}**	**Annual PM_{10}**	**24-hour $PM_{2.5}$**	**Annual $PM_{2.5}$**	**Dust deposition**
1	0.1	0.1	<0.1	0.1	<0.1	<0.1
2	0.1	0.2	<0.1	0.1	<0.1	<0.1
3*	1.7	3.4	0.7	0.9	0.3	1.2
4*	1.5	1.9	0.6	0.6	0.2	1.0
5*	0.5	0.6	0.2	0.3	0.1	0.3
6*	0.9	1.1	0.4	0.6	0.2	0.5
7*	1.2	1.8	0.7	1.0	0.4	0.6
8*	0.3	0.5	0.1	0.2	0.1	0.1
9*	0.1	0.3	0.1	0.1	<0.1	0.1
10*	1.5	2.7	0.6	0.6	0.2	1.1
11*	1.1	2.8	0.5	0.7	0.2	0.9
Criteria	**90**	**50**	**25**	**25**	**8**	**2**

Note *: industrial receptor

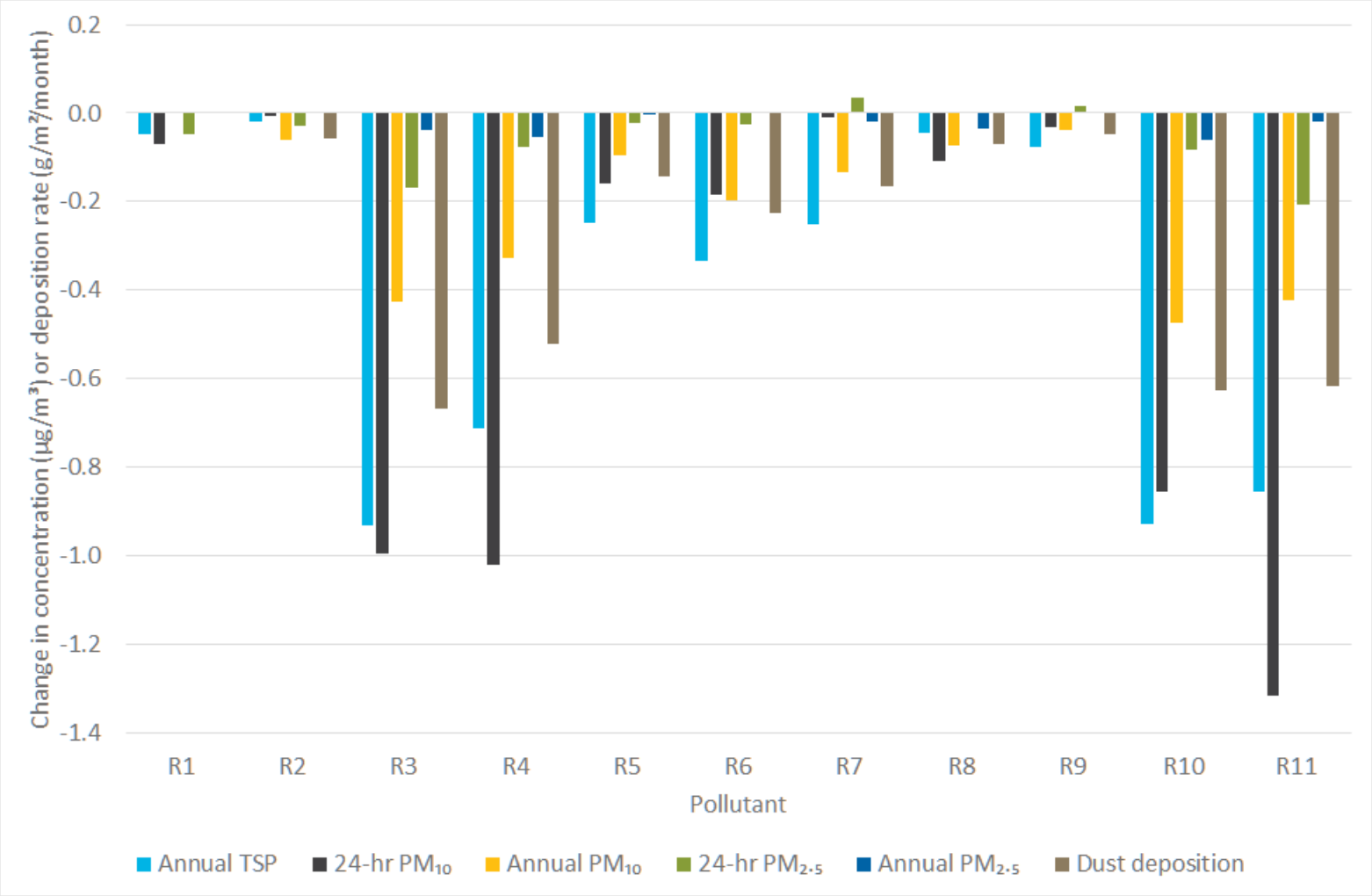


Figure 4.1 **Change in predicted concentration or deposition rate – Modification 12 vs Modification 11**

The results in Table 4.1 and Figure 4.1 highlight the following:

- the predicted change in concentrations and dust deposition rates at the two residential receptors (R1 and R2) are negligible to minor reduction relative to Modification 11;
- peak day PM_{10} and $PM_{2.5}$ and annual average dust deposition impacts at the immediately adjacent industrial receptors (R3, R4, R10 and R11) are predicted to decrease for Modification 12;
- when compared with the predicted cumulative 24-hour and annual average concentrations for TSP, PM_{10} and $PM_{2.5}$ presented in the MOD11 AQIA, any predicted increases for Modification 12 would not result in the exceedance of cumulative impact assessment criterion at any surrounding assessment location; and
- the predicted incremental dust deposition levels are predicted to be below the NSW EPA incremental impact assessment criterion of 2 g/m^2/month.

The results of the modelling completed indicate that the additional mitigation measures, namely the telescopic chute at the tripper car and the redesigned bunker wall, will improve the air quality performance of the site relative to Modification 11.

It is noted that, as part of the Modification 11 conditions of consent, Boral has committed to the installation of a real-time particulate matter monitoring network at the boundary of the site. The proposed monitoring network is intended to assist Boral with the reactive management of particulate matter emissions from the site by alerting site personnel to periods of elevated site emissions and allow for the implementation of increased emission controls. The real-time monitoring network will assist Boral with controlling particulate matter emissions from the site and management of predicted impacts at surrounding receptors.

5 Conclusions

EMM has completed an assessment of the potential changes in particulate matter emissions associated with the proposed Modification 12. The assessment utilised most of the input data used for the assessment of Modification 11, completed by Ramboll (2018).

The assessment of Modification 12 made the following key findings:

- the proposed modification to site operations would result in a decrease in total site annual particulate matter emissions relative to Modification 11;
- the decrease in emissions is associated with a reduction in the concrete plant operations and improved particulate matter mitigation measures at the handling facility;
- the proposed telescopic chute at the tripper car and redesigned storage bunker walls will effectively reduce key emissions sources relative to Modification 11;
- the model predictions for Modification 12 showed a decrease in impacts at immediately adjacent industrial receptors;
- the predicted compliance with NSW EPA impact assessment criteria for cumulative annual average TSP, 24-hour average and annual average PM_{10} and $PM_{2.5}$ presented in the MOD11 AQIA would not change for Modification 12 operations;
- further afield, the change in predicted impacts at other representative assessment locations, including residential receptors, is considered negligible; and
- the proposed real-time particulate matter monitoring network will assist with the management of particulate matter impacts at neighbouring receptors.

References

NSW EPA 2016, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. New South Wales Environment Protection Authority, Sydney.

Ramboll 2018, *Air Quality Impact Assessment Boral St Peters Terminal - Modification 11*

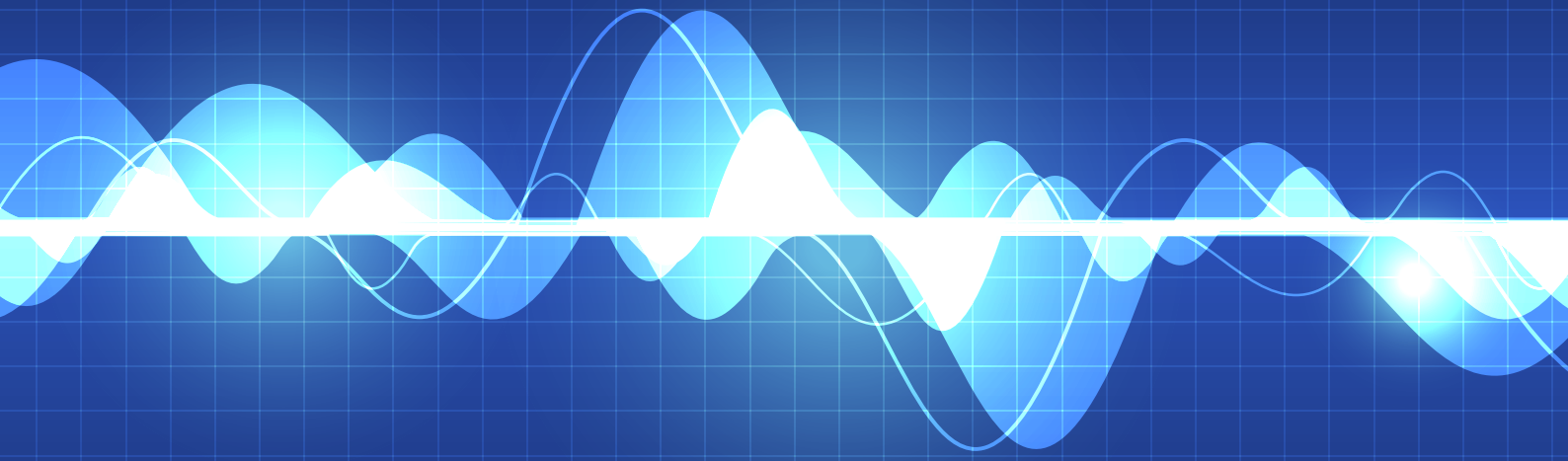
Appendix D

Noise and vibration impact assessment

Noise and vibration impact assessment

Modification 12 | Boral St Peters

Prepared for Boral Resources (NSW) Pty Ltd
July 2019



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Noise and vibration impact assessment

Modification 12 | Boral St Peters

Prepared for Boral Resources (NSW) Pty Ltd
July 2019

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Noise and vibration impact assessment

Modification 12 | Boral St Peters

Report Number

J190375 RP3

Client

Boral Resources (NSW) Pty Ltd

Date

23 July 2019

Version

v2 Final

Prepared by

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Senior Acoustic Consultant
23 July 2019

Approved by

Katie Teyhan
Associate Acoustics
23 July 2019

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

Table of Contents

Appendices

Tables

Figures

1 Introduction

Boral Resources (NSW) Pty Ltd (Boral) owns and operates a concrete batching plant (the concrete plant) and construction materials handling facility (the handling facility) at 25 Burrows Road South, St Peters (the site).

The approved production limit for concrete at the site is 750,000 cubic metres (m3) per annum and throughput of the handling facility is 1 million tonnes per annum (Mtpa). Potential environmental impacts, including from noise and vibration, from associated site operations were assessed for the previous modification (Modification 11). Development consent Condition A6 was inserted to provide limits on peak hourly traffic movements for the concrete plant, making clear distinctions for traffic movements between the concrete plant and the handling facility.

Boral is proposing to modify the site's development consent (Modification 12) to provide more flexibility for the concrete plant and handling facility, so that if one business requires an increase in production/through put, the other business can subsequently reduce their operations, so that the combined traffic movements do not exceed those that are approved under Modification 11. To ensure that the worst-case scenario is modelled regarding impacts to noise, an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa was assumed, whilst correspondingly decreasing the concrete plant production. The site combined traffic volume would still correspond to that contained in the Modification 11 environmental assessment.

The proposed Modification 12 includes no changes to the site layout, development footprint, consent area or operating hours.

EMM Consulting Pty Limited (EMM) has been commissioned by Boral to prepare this noise and vibration assessment (NVIA) for the proposed modification. This NVIA forms part of the Environmental Impact Statement (EIS) to accompany the application to modify the site's development consent (Modification 12).

This NVIA has been prepared with reference to the following guidelines and policies:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPfI) 2017; and
- NSW Department of Climate Change and Water (DECCW), Road Noise Policy (RNP) 2011.

A number of technical terms are required for the discussion of noise and vibration. These are explained in Appendix A.

2 The site

2.1 Background

The site is located within the Inner West local government area (LGA). The south-eastern boundary of the site adjoins the Alexandra Canal. The Sydney International Airport is located approximately 300 m to the south of the site. The nearest private residences are located approximately 600 m to the north-west of the site on the opposite (north) side of the Princes Highway.

The site has two existing land uses; the concrete plant and the handling facility. Both uses predominantly receive bulk construction materials (aggregate, sand and cement) by rail from Boral's Peppertree and Dunmore quarries and Berrima Cement Works. There are two train unloading areas on one of four rail sidings; one unloading area for the concrete plant and one for the handling facility. Trains are parked and shunted in the rail sidings. Some fly ash and special admixtures used in the concrete plant are delivered to the site by road.

The site is approved to operate 24 hours per day, seven days a week.

2.1.1 Concrete plant

The concrete plant is located in the south-western section of the site.

Aggregates and sand are stored in large elevated bins, and cement and fly ash are stored in large elevated silos located above the concrete plant. Aggregates and sand are transferred from the concrete plant train unloading area to the storage bins by conveyor.

The concrete plant mixes the aggregates, sand, cement and admixtures, and gravity dispenses the batched product into concrete agitators inside the loading bays building. Once loaded, the concrete agitators drive out of the loading bay building and proceed to the slump stands where water is added. The concrete agitators mix all ingredients and concrete is then transported to customers by road.

2.1.2 Handling facility

The handling facility is located in the centre and north-eastern section of the site. The handling facility receives and temporarily stores aggregates and sand from Boral's Peppertree and Dunmore quarries and cement from Berrima Cement Plant before dispatching them by road truck to other concrete batching plants and asphalt plants within the Sydney metropolitan area.

The aggregates and sand are transferred from the handling facility's train unloading area to storage bins by conveyors, which are then loaded into road trucks for dispatch offsite or for transfer to storage bunkers or stockpiles.

2.2 The proposed modification

The modification (Modification 12) to the site's development consent is proposed to provide more flexibility to the site by combining the site's overall traffic volumes, to allow an increase in production volumes/throughput at one of the site's operations, while correspondingly reducing at the other. The worst-case scenario for this is an increase for the handling facility throughput from 1 Mtpa to 1.75 Mtpa whilst correspondingly decreasing the concrete plant production and allow for a total combined traffic volume for the concrete plant and the handling facility.

The proposed increase in the handling facility approved throughput to 1.75 Mtpa would correspond to an extra 138 average daily truck movements, of which potentially 14 (7 in and 7 out) could occur in the am and pm peak hours. Additional to the currently approved 184 average daily truck movements at the handling facility, this is 322 average daily truck movements proposed in total, with a potential maximum of 36 (18 in and 18 out) could occur in either the am or pm peak hours.

The currently approved concrete production limit of 750,000 m^3 per annum is not proposed to be increased. Conversely, the proposed modification is expected to result in a corresponding reduction of 138 daily truck movements in the concrete plant operations (1,046 average daily truck movements was estimated for Modification 11). This 13.2% reduction would reduce the approved production limit to 650,000 m^3 with 908 average daily truck movements. The maximum peak hourly truck movements for the concrete plant would remain the same (88 = 44 in and 44 out) as stipulated in the current approval.

It is expected that all site (handling facility and concrete plant) daily and peak hourly truck movements for the proposed Modification 12 will remain the same as what was assessed and subsequently approved for Modification 11, as no formal limit was specified in the development consent for the peak hourly truck movements from the handling facility.

No changes to approved construction activities are proposed and hence no material changes in construction noise and construction vibration are anticipated as a result of the proposed modification. Therefore, the assessment of construction noise and construction vibration provided in the Modification 11 NVIA report remains applicable, and hence these matters are not discussed further in this report.

3 Existing environment

3.1 Noise sensitive receivers

The site is located within an industrial precinct and is immediately surrounded by other sites such as Boral's recycling facility, Visy's paper and cardboard warehouse, Maritime Container Services' terminal and various warehousing and storage facilities. The closest residences are approximately 600 m to the north-west of the site on the opposite (north) side of the Princes Highway. Otherwise surrounding land uses are industrial, with the site directly bounded by industrial premises. The site's location in its local context is shown in Figure 3.1.

It is considered that if the noise trigger levels (refer to Section 4) can be satisfied at the assessment locations, which are closest to the site, then noise trigger levels will be satisfied at noise-sensitive locations that are further from the site.

Nearest representative noise sensitive locations to the site have been identified and are provided in Table 3.1, hereafter referred to in this report as assessment locations. The assessment locations are shown in Figure 3.1.

Table 3.1 Assessment locations

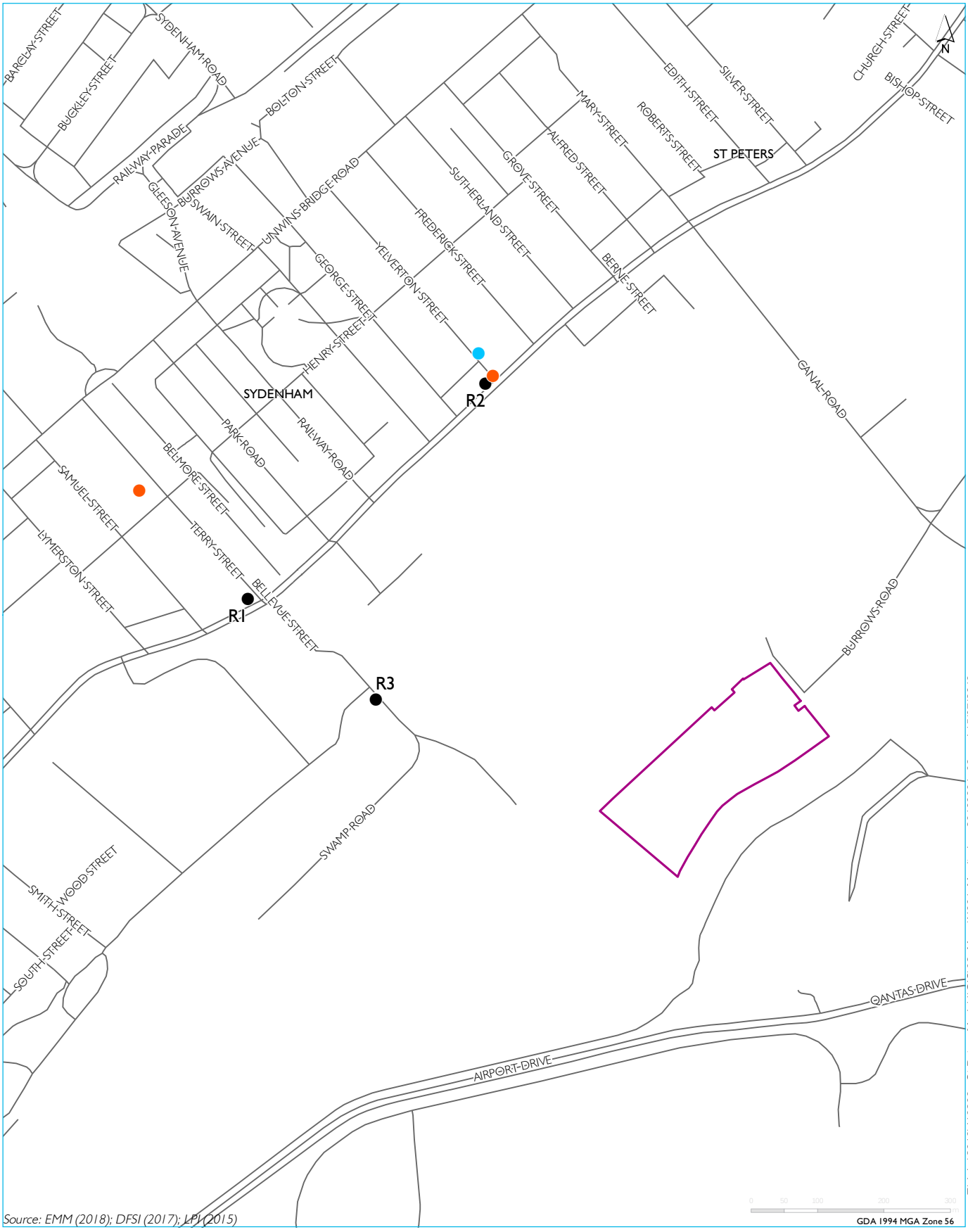
ID	Receiver type[1]	Address
R1	Residential	10 Terry Street, Tempe
R2	Residential	383 Princes Highway, Sydenham (Cnr of Yelverton Street and Princes Highway)
R3	Commercial/Industrial	Bellevue Street, Tempe

Notes: 1. As defined in the NPfI (EPA 2017).

3.2 Background and ambient noise levels

Unattended and attended noise monitoring was previously conducted for the site as part of the noise assessment completed by EMM in 2016. The noise monitoring data was also used for the purpose of the NVIA (2018) for Modification 11. The EMM report *Noise and vibration impact assessment - Modification 11 | Boral St Peters* (2018) references the existing ambient noise environment surrounding the site. The noise monitoring data is considered valid and representative of existing noise levels and hence has been used for the purpose of this assessment.

The noise monitoring locations are shown in Figure 3.1.



Source: EMM (2018); DFSI (2017); LPI (2015)

KEY

- Assessment location
- Attended noise monitoring location
- Unattended noise monitoring location
- Site location

Noise monitoring and assessment locations

Noise and vibration impact assessment

Modification 12

Boral St Peters

Figure 3.1

[redacted]

4 Noise criteria

4.1 Operational noise

Noise from industrial sites or processes in NSW are regulated by the local council, the Department of Planning, Industry and Environment (DPIE) and/or the EPA. These limits are generally derived from operational noise trigger levels applied at assessment locations. They are based on the Noise Policy for Industry (NPfI) guidelines (EPA 2017) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

4.1.1 Development consent

Noise assessment criteria for the site are stipulated in the site's development consent. The noise assessment criteria are specified for day and night periods at locations which are considered to be representative of residences with the most potential to be impacted by the site. The condition regarding noise is reproduced from the development consent as follows:

B24 The Applicant must ensure that operational noise from the development does not exceed the noise limits presented in Table 3.

Table 3: Development Noise Limits (dBA)

Day and Night LAeq (15 minute)	**Location**
42	Bellevue Street
44	Yelverton Street

Notes:
Noise generated by the development is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Noise Policy for Industry (2017).

It is of note that the land surrounding Bellevue Street is zoned either industrial (IN1 – General Industrial) or commercial (B6 – Enterprise Corridor), and hence the residential noise limits for Bellevue Street in Table 3 of the development consent do not apply in accordance with the NPfI.

4.1.2 Noise Policy for Industry

The NPfI guidelines for assessing industrial facilities have been used for this assessment. With respect to the noise trigger levels, the NPfI states:

> The project noise trigger level provides a benchmark or objective for assessing a proposal or site. It is not intended for use as a mandatory requirement. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community.

Regarding decisions on developments, the NPfI also states:

Planning decisions for proposed developments take into account social, economic and environmental factors. Noise impact is one factor taken into account and decisions can be made that result in residual noise impacts.

The objectives of noise trigger levels for industry are to protect the community from excessive intrusive noise and preserve amenity for specific land uses.

i Project noise trigger levels

To ensure these objectives are met, the EPA provides two separate noise trigger levels: intrusiveness noise level and amenity noise level.

The project noise trigger level (PNTL) is the lower of the calculated intrusiveness or amenity noise levels. The PNTLs adopted for all assessment locations were referenced from the Modification 11 NVIA.

The PNTLs are provided in Table 4.1 for all assessment locations.

Table 4.1 PNTLs

Location	Intrusiveness $L_{Aeq,15min}$ noise level, dB			Amenity $L_{Aeq,15min}$ noise level[1], dB			PNTL $L_{Aeq,15min}$[2], dB		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1 – Residence	59	57	50	**58**	**48**	**43**	58	48	43
R2 – Residence	59	57	50	**58**	**48**	**43**	58	48	43
R3 – Commercial[3]	N/A	N/A	N/A	63 (when in use)			63 (when in use)		

Source: Modification 11 NVIA (EMM 2018).

Notes: 1. Project amenity noise level is the recommended amenity noise level minus 5 dB and $L_{Aeq,15min}$ is equal to $L_{Aeq,period}$ + 3 dB as per the NPfI (EPA 2017).
2. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; evening: 6 pm to 10 pm; night is the remaining periods.
3. The more stringent amenity noise level for commercial land zoning has been adopted.
4. Value in bold font and underlined is the lower of the intrusiveness and amenity noise levels for residences.

ii Sleep disturbance

The site operates during the night-time period (24 hours) and therefore the assessment of potential sleep disturbance from maximum noise events at residences is required in accordance with the NPfI. Sleep disturbance is defined as both awakenings and disturbance to sleep stages.

The NPfI provides the following sleep disturbance trigger levels for residences:

- $L_{Aeq,15min}$ 40 dB or the prevailing RBL plus 5 dB, whichever is the greater; and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB, whichever is the greater.

A detailed maximum noise level event assessment is required if at least one of these trigger levels is exceeded. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period. Some further guidance in regard to potential impact on sleep is provided in the Road Noise Policy (RNP) (DECCW 2011).

The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep, and provides the following factors that are key in assessing the extent of impacts on sleep:

- how often high noise events would occur;
- the distribution of likely events across the night-time period and the exiting ambient maximum events in the absence of the project;
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods); and
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

The sleep disturbance noise trigger levels adopted for the residential assessment locations were referenced from the Modification 11 NVIA and are shown in Table 4.2.

Table 4.2 Sleep disturbance noise trigger levels - residential assessment locations

Assessment location	Recommended sleep disturbance trigger level, dB		Adopted sleep disturbance trigger level, dB	
	$L_{Aeq,15min}$	L_{Amax}	$L_{Aeq,15min}$	L_{Amax}
	Standard/RBL +5	Standard/RBL +15		
R1	40/**50**	52/**60**	50	60
R2	40/**50**	52/**60**	50	60

Source: Modification 11 NVIA (EMM 2018)

Notes: 1. Value in bold font and underlined is the greater of the sleep disturbance noise levels.

4.2 Road traffic noise

The principle guidance for assessing the impact of road traffic noise on receivers is in the RNP.

The proposed modification will include an increase in road truck movements (the handling facility) and a decrease in concrete agitator movements on the transport route. The site is accessed via Burrows Road South, Canal Road and the Princes Highway. Table 4.3 presents the road traffic noise assessment criteria for residences for the relevant road category, which have been reproduced from Table 3 of the RNP.

Table 4.3 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15hr}$ 60 (external)	$L_{Aeq,9hr}$ 55 (external)

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, after consideration of all feasible and reasonable noise mitigation and management measures.

5 Noise assessment

5.1 Operational noise

A semi-quantitative assessment of the potential change in site noise levels between currently approved (Modification 11) and proposed (Modification 12) operations was completed. Assumptions related to the overall site adopted in this assessment are generally consistent with the EMM reports prepared as part of the Modification 11 EIS and Response to Submissions. Operational assumptions for the site are generally consistent with the Modification 11 NVIA, and otherwise updated to include the proposed modification.

The difference in operating noise levels between the current approved operations and the proposed modification has been assessed. Operational noise sources and associated sound power levels adopted for the Modification 11 NVIA and assessed as part of Modification 12 (additional quantity) are summarised in Table 5.1.

It is noted that although a reduction in the numbers of concrete agitators is anticipated as a result of Modification 12, the quantity of concrete agitators within a NPfI 15-minute assessment period in this assessment has been assumed to be the same as that in the Modification 11 NVIA (2018), and therefore represents a worst-case assessment scenario.

Table 5.1 Operational plant and equipment sound power levels

Plant and equipment	Current quantity (Modification 11)	Additional quantity (Modification 12)	Sound power level[1] L_{Aeq}, dB
Concrete agitator	7	-	103
Concrete agitator slumping	7	-	111
Batching plant – Mixing bowl[2]	2	-	100
Cement tanker	1	-	110
Front-end loader (FEL)	1	-	105
Water truck	1	-	96
Train (loco idling)	1	-	103
Bobcat	1	-	100
Forklift	1	-	105
Aggregate truck	1	1	104
Aggregate truck idling	1	1	97
Articulated dump truck	1	-	108
concrete plant conveyor[3] – train to storage bins	1	-	78 (per metre)
concrete plant conveyor[3] – storage bins to batch plant	4	-	78 (per metre)
HF conveyor[3] – train to storage bins	1	-	78 (per metre)
HF conveyor[3] – storage bins to truck stand	1	-	78 (per metre)
HF conveyor[3] – storage bins to stockpiles	1	-	78 (per metre)
Aggregate incline conveyor[3]	1	-	78 (per metre)

Notes: 1. Sound power level listed is per unit. Doubling the quantity of plant/equipment increases the sound power level by 3 dB.
2. As the batching plant is enclosed loading facilities with automatic doors, it has been afforded a 10 dB emission reduction (ie 110-10=100 dB).
3. As the conveyors are enclosed, they have been afforded a 10 dB emission reduction (ie 88-10=78 dB).

Table 5.1 shows that in terms of numbers of onsite operational noise sources, the only additional sources are the increased road truck movements within the handling facility. The assessment identified that the $L_{Aeq,15min}$ noise levels from the proposed increase in road truck numbers would not measurably increase current site noise levels at all assessment locations. Therefore, no impact from site noise is anticipated from the proposed Modification 12 operations.

Sleep disturbance from proposed operations during the night period has been considered. The highest predicted maximum noise levels ($L_{Aeq,15min}$ and L_{Amax}) from site would not measurably increase and would remain well below the NPfI trigger noise levels. Therefore, proposed night-time operations for Modification 12 are unlikely to cause sleep disturbance at residential assessment locations.

5.2 Road traffic noise

The nearest residences potentially affected by an increase in road traffic volumes as a result of the proposed modification are located on the Princes Highway.

Assessed traffic movements have been based on average daily volumes for the site. Modification 12 will result in an additional 138 average daily truck movements (from the handling facility) on the public road network.

The traffic assessment (EMM 2018) for Modification 11 estimated that site related traffic would increase daily traffic movements on the Princes Highway by 0.4% (south of Canal Road) and 0.7% (north of Canal Road). Given the latter and the relatively small increase in proposed road traffic movements from the handling facility for Modification 12, there would be a negligible increase in road traffic noise levels at the nearest residential locations. Therefore, the impact of road traffic noise associated with the proposed Modification 12 is predicted to be negligible and within the 2 dB allowable increase for land use developments in accordance with the RNP.

6 Conclusion

EMM has assessed potential noise and vibration impacts from the proposed Modification 12.

No changes to construction noise and construction vibration are anticipated as a result of the proposed modification.

The assessment has shown that onsite operational noise levels from the proposed modification are not predicted to change from current approved operations. Proposed night-time operations for Modification 12 are unlikely to cause sleep disturbance at residential assessment locations.

Road traffic noise generated by the proposed modification is not expected to result in any noticeable increase in road traffic noise levels at the nearest residential locations on the transport route and therefore will satisfy the relevant RNP assessment requirements.

References

NSW Environment Protection Authority (EPA) 2017, *NSW Noise Policy for Industry*.

NSW Department of Environment, Climate Change and Water (DECCW) 2011, *NSW Road Noise Policy*.

EMM 2018, *Noise and vibration impact assessment - Modification 11 | Boral St Peters.*

Appendix A

Glossary of acoustic terms

A.1 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise. These are explained in Table A1.

Table A.1 Glossary of acoustic terms

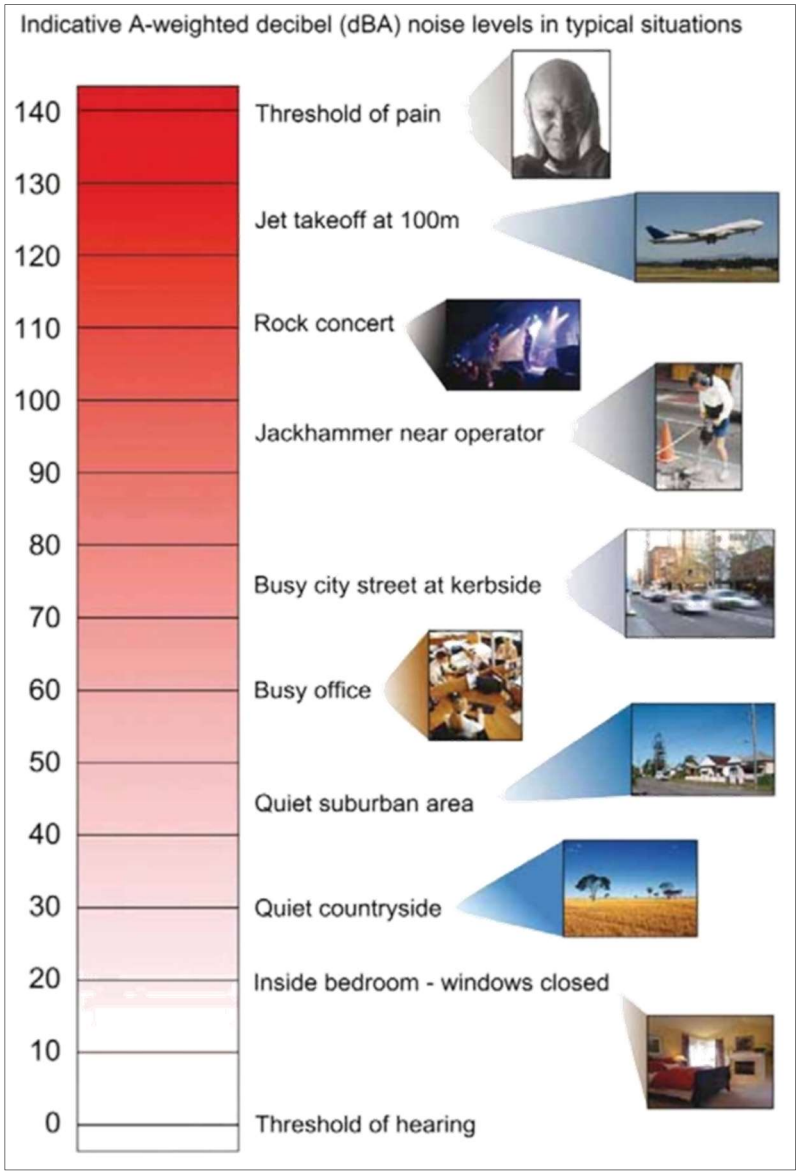
Term	Description
dB	Noise is measured in units called decibels (dB).
A-weighting	There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{Aeq}	The A-weighted energy average noise from a source and is the equivalent continuous sound pressure level over a given period. The $L_{Aeq,15min}$ descriptor refers to an L_{Aeq} noise level measured over a 15-minute period.
L_{Amax}	The maximum root mean squared A-weighted sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period (as defined in the INP).
Sound power level	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table A2 gives an indication as to what an average person perceives about changes in noise levels:

Table A.2 Perceived change in noise

Change in sound pressure level (dB)	Perceived change in noise
1 to 2	typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

Examples of common noise levels are provided in Figure A.1.



Source: Road Noise Policy (DECCW 2011).

Figure A.1 Common noise levels